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Energy resources from the food bowl: an uneasy co-existence. Identifying and managing cumulative impacts of mining and agriculture

Project Report
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Disclaimer

This Report details a pilot study undertaken as a precursor to a research program for areas that host both extractive industries and agriculture. It seeks to report perceptions of the cumulative impacts of these industries and the nature of interactions between the industries, the environment and regional communities. It also identifies lessons and challenges associated with managing regional development in such areas and ways to enhance industry performance and achieve mutual benefits. While the Report has been prepared with care, the University of Queensland and participating researchers and research centres accept no liability for any decisions or actions taken by individuals or organisations on the basis of this document.

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Executive Summary

This study has identified key considerations and constraints in managing the cumulative impacts of multiple industries – cropping, grazing, mining and CSG extraction – on the Darling Downs (defined as Toowoomba Regional Council and Western Downs Regional Council areas).

We assessed impacts on the residents, society, environment, infrastructure and economy of the regional communities. This model of the ‘5 capitals’ extends an economic development perspective to address ‘assets’ in a range of categories.

Employing this framework, our surveys and interviews revealed the most frequently mentioned concerns as being in relation to ‘natural capital’ (environment), followed by ‘financial capital’ (economic benefits). Interestingly, the perceptions expressed, when aggregated across respondents in different sectors (including mining, gas, and agriculture), suggested no significant impact on any of the ‘capitals’ over the past five years. For example, positive impacts noted by one sector with respect to some indicators averaged out against negative impacts noted by another sector with respect to indicators of that form of capital. These differences in perception indicate that co-existence of energy extraction and agriculture requires solutions that take into account social dimensions and subjective values rather than simply a technical solution.

The research questions that guided the study were:

1. What barriers, challenges, and opportunities inform current thinking and behaviour in relation to combined, or alternative, land uses and managing their impacts?
2. What are the priorities and roles of various sectors and organisations in managing the cumulative impacts of resource extraction and agriculture in rural regions such as the Darling Downs?
3. How can agriculture and energy production co-exist in ways that create a better future for local communities?

The methodology involved interrelated components:

- (a) Search of public materials to establish relevant stakeholders and issues
- (b) Gathering of perceptions of diverse stakeholders using a standardised perceptions scale and semi-structured interviews.

A total of 26 respondents affected by resources development and/or involved in managing it completed a purpose-designed Perceptions Scale (see Appendix A). The respondents represent a range of sectoral affiliations including agriculture, energy resources, government, non-government and business. As well, 32 individual and group interviews were conducted representing a total of 35 stakeholder groups from the same cross-section of sectors.

STAKEHOLDER PERCEPTIONS OF CHANGES IN THE DARLING DOWNS

Aggregating all stakeholder views, the net changes perceived in various regional assets as a result of the resources boom that has occurred over the last five years were minimal. However, considering the views of each of the sectors (including Agriculture, Coal Seam Gas, Mining, Community and Environment) separately, different sectors perceived different assets as having changed for the better or the worse. There are some patterns of views from the various sectors evident when each form of capital is considered in turn.

Natural capital denotes the key natural resources, such as water, land, clean air, wildlife and forests that people can access from the environment for lifestyle or livelihood purposes and that provide indispensable ecosystem services. A cross-section of interviewees from multiple sectors regarded environmental assets as of paramount concern, though they sometimes had different priorities. Land and water were particularly valued – as much for their productive and economic values as for any ecological, aesthetic, recreational or other values they could serve.

Financial capital represents available revenue streams and economic resources. It was the second most frequently mentioned form of capital in the interviews, followed closely by Socio-cultural Capital. Growth of the resources sector is seen to have added to financial capital in an uneven way. Associated costs were noted, for example, rising prices and competition for labour with 'have nots' seen to be falling further behind. The disparate financial fortunes are also linked to factors unrelated to resources development, such as drought and fluctuating prices for agricultural produce that are leading to other changes in the regional economy.

Socio-cultural capital consists of the array of organisations, social contacts, networks and relationships, based on shared values, mutual trust and reciprocity. They are resources that enable people to interact and cooperate effectively to achieve valued outcomes. This category also includes symbolic assets, such as the shared traditions and institutions that constitute the identity and status of local people or communities. In many respects, the strongest feelings expressed in interviews related to impacts in these social areas. They included the values and emotions associated with people's attachment to land and sense of identity. Very few participants thought the social fabric had improved in recent years. Reportedly, the differential impacts on community members were heightening some social divisions. As well, some social problems were more prevalent. It was reported that, as a consequence, community non-government organisations (NGOs) were struggling to cope, government social services were inadequate, and community investment by companies was not optimally effective.

Built capital denotes the physical infrastructure, such as buildings, transport, equipment and communications utilised, for economic and other valued activities. Perceptions of trends in infrastructure provision and condition illustrate the challenges associated with the rapid change typical of a 'boom'. For instance, there were concerns about too little housing for an increased population and increased pressure on transport infrastructure, including noticeably more traffic.

Human capital of a community refers to the aggregated skills, knowledge, abilities and good health possessed by its residents that enable them to earn a living, contribute to society and to build other forms of capital. The advent of new industries was reported to offer opportunities to attract new people with new skills to the region and potentially boost the overall stocks of skills and education. However, it has also depleted stocks of wage labour and has 'poached' skilled workers from other industries. If not managed effectively, the net effect on education and training may be negative. There were also negative perceptions of impacts of recent changes on the health of the population, with the emotional well-being and mental health of many residents reportedly declining in the face of the uncertainties and fears about proposed gas and mining developments.

CHALLENGES AND OPPORTUNITIES OF CO-EXISTENCE FOR RESOURCE EXTRACTION AND AGRICULTURE

There are significant barriers to achieving co-existence of agriculture and resource extraction that are not easily overcome. These barriers include contrasting values amongst stakeholders, associated lack of common language, and a prevailing lack of trust. They underpin some challenges confronting those responsible for managing the changes associated with the development of new industries, such as mining and CSG extraction, in predominantly agricultural rural areas. As well, the barriers exacerbate the broader challenges posed because of:

- emerging social divisions;
- incomplete, inappropriate, inaccurate, ambiguous and contested data as a basis for informed decision-making;
- the cumulative nature of the impacts; and
- the complexities of supporting a path of development that enhances all five categories of assets.

Many interviewees described more recent industries as eroding some dimensions of the asset base and displacing the pre-existing industries, rather than complementing or adding to them. However, some participants saw new industries as offering positive opportunities to transform the region's natural resources in ways that would expand the local asset base, for example, using gas company

resources to create skilled workers, long-term jobs and a drought-buffer for farms. These examples represent specific small-scale initiatives as well as new land uses in broader, post-mining/extraction futures for the region.

MANAGING THE IMPACTS OF RESOURCE EXTRACTION AND AGRICULTURE

Stakeholders identified governance as being the key to appropriate management of resources development in this predominantly agricultural region. Roles and responsibilities for either Government or resources companies were highlighted.

From companies, stakeholders expected:

- the sharing of benefits and mitigation of impacts in fair ways that have fair results;
- openness in communication, in sharing knowledge and in collaborating with government and community initiatives;
- courteous and respectful behaviour; and
- exceeding minimal compliance with regulation in all of these respects.

There were also high expectations that governments at all levels, and especially State Government, would ensure more coherent and strategic governance and safeguard the public interest in respect to these developments by:

- integrating planning;
- distributing benefits collected as taxes, royalties and charges;
- coordinating disparate initiatives and responses to prevent needless duplication of effort, and to find synergies;
- regulating or controlling activities and side-effects of industry; and
- being pro-active, fostering cooperation and supporting integration of all dimensions.

CO-EXISTENCE STRATEGIES

Co-existence can include a wide range of options for different enterprises to operate in the same region while maintaining the condition of important regional assets, including, land and water. Despite a lack of consensus about whether and how co-existence is achievable, general principles and common themes emerged.

Effective relationships between governments, industries and civil society were seen to require the key principles of fairness, accountability, respect, transparency and empathy. Respondents stated that co-existence may be possible with:

- collaboration and collective action;
- integrated landscape management approaches;
- on-going, open communication, engagement and negotiation; and
- commitment to enhancing community assets.

NOT SIMPLY A TECHNICAL SOLUTION

This study revealed some common perceptions and also marked differences, the latter often resulting from different values and priorities rather than different amounts of knowledge. The key conclusion of the study is that challenges to co-existence cannot be resolved merely by gathering more data, defining issues more clearly, developing more plans, increasing spending, segmenting the issues and working piecemeal, or focussing exclusively on logic, while ignoring emotion and subjective considerations. Conventional solutions meant to appease the majority are seen to exacerbate conflicts and lead to negative consequences.

The research highlights that co-existence of agriculture and energy extraction requires a mix of socially-orientated and technical solutions. It needs an approach that is inclusive, multidisciplinary and adaptive. It also needs to address a spectrum of issues from a range of different perspectives.

1. Introduction

This study focuses on two local government areas in southern Queensland: Toowoomba Regional Council and Western Downs Regional Council. Toowoomba city, with a population of approximately 100,000 is the administrative centre of the Toowoomba Regional Council and is situated 125 kilometres west of Brisbane. The local government area has eight other main towns, with populations ranging from several hundred to 8,000, and surrounding rural primary production areas.

Adjoining the Toowoomba region to the west is the Western Downs Regional Council which covers seventeen towns with populations ranging from around 300 to almost 11,000. Dalby is the largest town and local administrative centre. The combined population of these two local government areas is approximately 189,895 persons (June 2012 estimate) and is projected to grow by some 45,000 by 2021 (Government Statistician 2008, 2013). This once parochial and homogenous region has experienced considerable flux in locational identity associated with political, economic, environmental and other changes including the local council amalgamations of 2008.

For brevity, throughout this report we refer to these two local government areas collectively as the Darling Downs, though according to the Queensland Government's regional planning boundaries this is a more extensive region that includes four additional local government areas:

- Southern Downs Regional Council
- Goondiwindi Regional Council
- Maranoa Regional Council
- Balonne Shire Council.

The region is well endowed with natural resources and has major inland catchments, including the Condamine, which forms part of the headwaters of the Murray-Darling river system. In addition, there are significant groundwater resources in the region, which comprise aquifers of the Great Artesian Basin that support a range of purposes including irrigation, urban, commercial, industrial, aquaculture, stock and domestic water supplies. To take advantage of these water resources and the very fertile soils that constitute some of Queensland's most diverse agricultural assets, the region has been extensively cleared for agriculture and produces cotton, irrigated and dryland cereals, pulses and other crops, as well as livestock, especially beef (Table 1). Despite these rich resources, primary producers in the region engaged in these activities have faced production losses in the recent years from natural disasters and extreme weather events (droughts and floods).

Table 1: Agricultural production of Darling Downs-Maranoa region - Number of farms classified by main value commodity produced

	Darling Downs - Maranoa region			Queensland	
	no.	%	Value \$'000	no.	%
Beef cattle	3,063	43	505	12,708	45
Grain growing	829	12	478	1,162	4
Mixed grains and livestock	713	10		1,042	4
Other livestock	501	7	137	2,383	8
Cotton	343	5	656	415	1
Dairy	194	3		665	2
Fruit and nuts	176	2	95	1,712	6
Mixed livestock	162	2		441	2
Sheep	151	2		263	1
Vegetable	149	2	110	1,086	4
Other crop growing	135	2		4,096	14
Other	639	9		2,428	9
Total Agriculture	7,054	100	25000	28,401	100

Source: Adapted from Trestrail et al 2013, pp 3, 4

The two local government areas also overlap with a substantial part of the Surat Basin Energy Resources Province (Figure 1: Map of Surat Basin Region) which has the majority of the State's known coal seam gas (CSG) reserves and significant accessible thermal coal reserves (Figure 2: Surat Basin Operations and Developments, December 2012). These energy resources have remained largely untapped until recent times. The region is also experiencing growth in mining with production of both coal and coal seam gas projected to increase almost ten-fold between 2006 and 2031.



Figure 1: Map of Surat Basin Region showing two local government areas of study plus Maranoa (Gov. Statistician 2012)

There are five operating coal mines in the region: Cameby Downs (Yancoal Australia), Commodore (Millmerran Power), Kogan Creek (CS Energy), New Acland (New Hope Coal) and Wilkie Creek (Peabody Energy) (Queensland Government 2012). They service both the domestic and export markets. Others are proposed or under construction, with the largest being the Wandoan Coal Project targeting export markets through Gladstone. A proposed Ambre Energy mine and coal-to-liquids production plant at Felton was blocked by the Liberal National Party State Government elected in 2012 in response to considerable rural opposition.

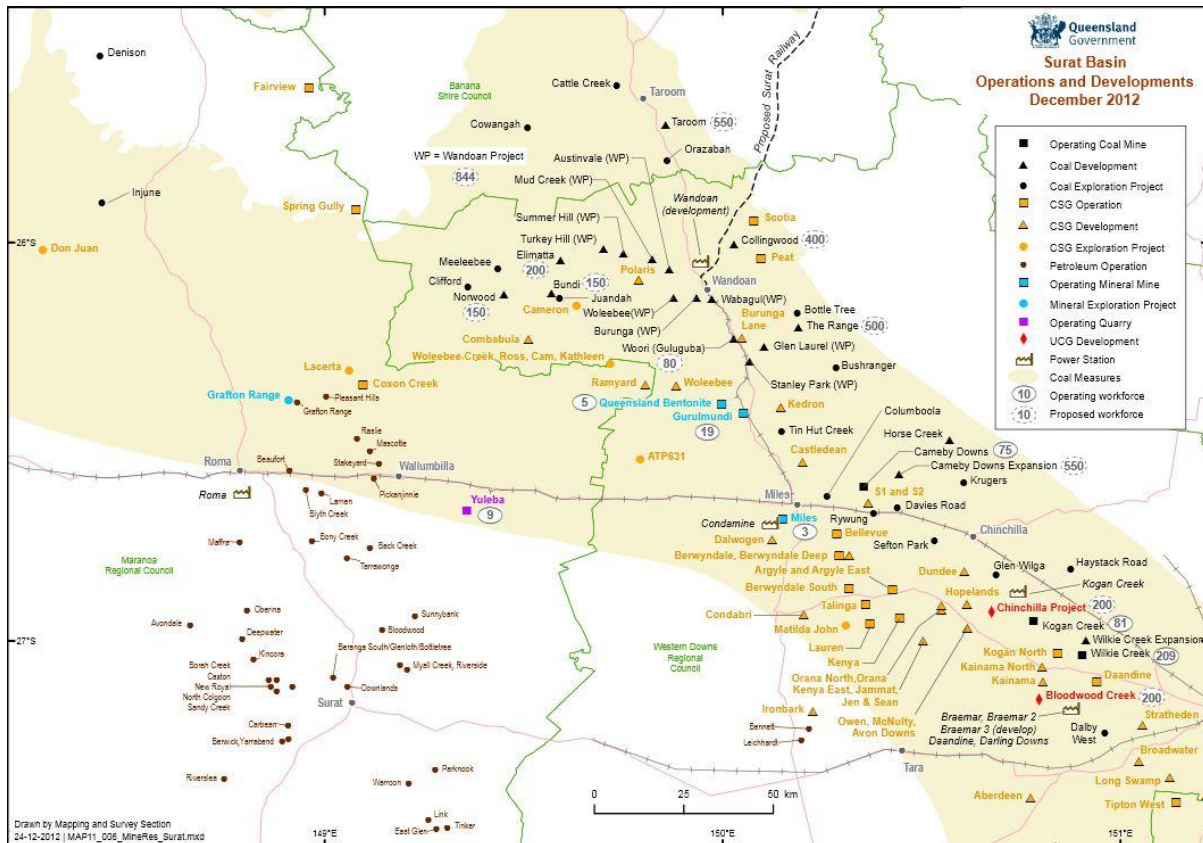


Figure 2: Surat Basin Operations and Developments, December 2012 (DNRM 2012)

Despite a long history of conventional natural gas production at Roma in the neighbouring LGA of Maranoa, the coal seam gas (CSG) industry is quite recent with escalation of exploration activity and rapid increases in output since the first commercial production in 2006 (Baker and Slater, 2008). Proved and probable reserves of CSG have expanded dramatically since 2006 (Figure 3).

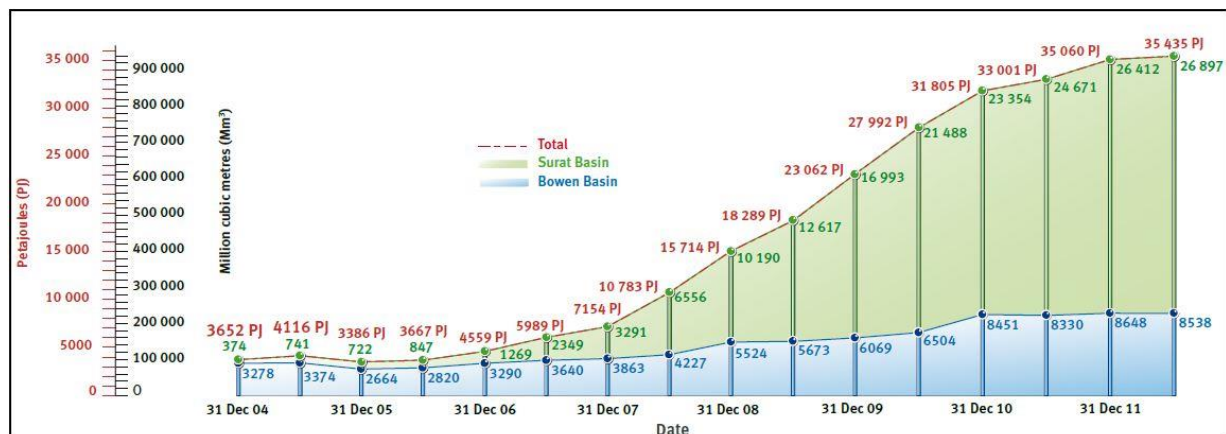


Figure 3: Queensland coal seam gas — 2P reserves (proved and probable). (DNRM 2013, p.5)

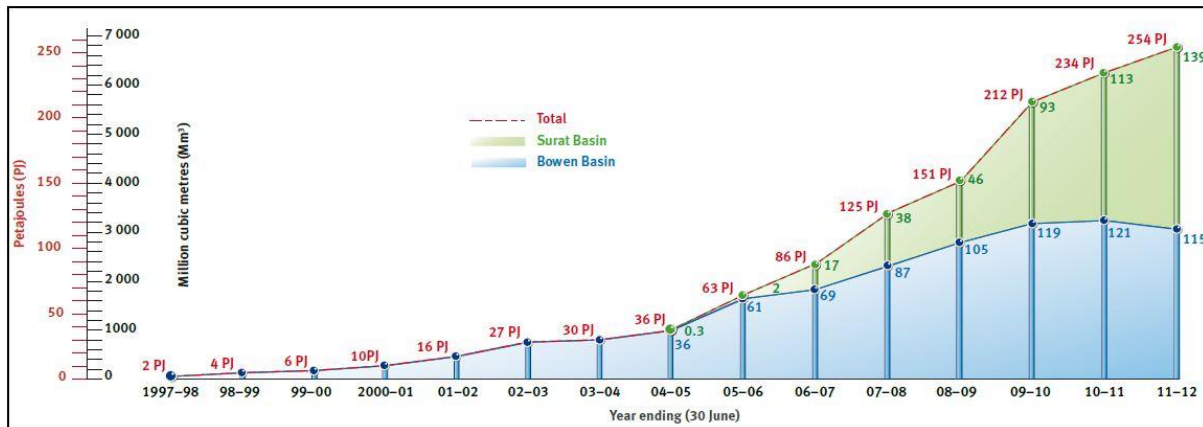


Figure 4: Queensland coal seam gas — production period 1997–2012. (DNRM 2013, p.5)

Together with the Bowen Basin, these vast onshore reserves account for more than 95 per cent of Australia's CSG production. Gas production in the region is now eight times 2007 volumes (Figure 4) with four companies, operating in consortia, dominating: Origin Energy (With Conoco Phillips in the APLNG Consortium), QGC (part of the BG Group), Arrow (aligned with Shell) and Santos (partners with Petronas in the GLNG project).

There are some direct links between the resources and agricultural industries. For instance, one coal company, New Hope, established Acland Pastoral Company in 2006 to manage current and post-mining land use. As well, QGC provides gas to Incitec Pivot for fertiliser production. However, by and large, major resources developments in this region have created a situation in which small, predominantly grazing, cropping and lifestyle communities, mainly on highly productive agricultural land, confront significant social, economic and environmental change. This is because of the large scale of the mining and CSG developments currently unfolding and the rapid pace at which the energy resources operations are being developed.

Consequently, the co-location of agriculture with mining or coal seam gas creates unprecedented cumulative impacts and involves complex interactions between communities, local economies, environmental considerations, attitudes and culture, and governance and regulatory arrangements.

The objective of this research was to scope the issues surrounding the potential co-existence of these industries and associated barriers, challenges and opportunities from the multiple perspectives of stakeholders affected by and/or influential in decision-making and management of mining, CSG extraction and agricultural activities in Darling Downs communities. In doing so, the research would shed light on diverse understandings of situations where these industries combine, compete or interact. It would also profile the complexities of assessing and managing the cumulative impacts of these industries, to the satisfaction of resources companies, government, primary producers, business, and community members and point to possible improvements in management techniques.

The report is divided into sections.

Section 2 discusses the conceptual frameworks for understanding the combined and interacting impacts of disparate industries.

Section 3 is an overview of the methodology adopted.

Section 4 outlines the results of the research in terms of the main perceptions of interviewees with respect to impacts on Natural Capital, Financial Capital, Social/Cultural Capital, Physical/Built Capital and Human Capital.

Section 5 discusses the synthesised results in terms of the barriers to co-existence and the challenges and opportunities presented by the expansion of mining and coal seam gas industries in an agricultural region.

Section 6 discusses governance and management issues particularly the roles and responsibilities of the government and the resources companies in managing cumulative impacts in a multi-industry context.

Section 7 presents the principles underpinning co-existence and potential strategies for enhancing co-existence that emerged from this research.

Section 8 summarises overall conclusions and areas for future research.

2. Conceptual framework – community assets as ‘capital’

A range of community and territorial assets are significant for the region and, as the number and nature of economic activities that are undertaken expands, it is increasingly necessary to balance the needs of different sectors and stakeholders and protect these assets. This research assumed that ‘co-existence’ of disparate industries could be achieved when various farming, grazing, mining and coal seam gas extraction activities operate in a region, serving a range of interwoven functions including economic, environmental and social, without harming the overall regional asset base (Wilson 2008). Any industry entails a process of transforming some of the available local assets, potentially depleting some and enhancing others. The overall effects of this transformation on human well-being needs to be positive and ensure future generations have access to a pool of assets equivalent to that available to current generations (Warhurst 2001).

However, given current levels of understanding, this poses some challenges. One relates to the fact that impact management, thresholds and adaptive capacity of some kinds of assets are better understood than others. For instance, the requisites for sustaining environmental assets or for achieving economic growth are understood better than the factors that sustain a community of people (Magis and Shinn 2009). Hence a way of conceptualising various kinds of assets is a necessary starting point. The five capitals framework is useful in this regard. A second challenge is that in regions with mixed land uses there is competition for the same assets and different activities impact on the same assets, so it is necessary to understand the combined and interacting impacts of various activities rather than consider them in isolation. For this, the concept of cumulative impacts is helpful. These two concepts are elaborated below.

There are various ways of conceiving the many assets or resources a community or a region has at its disposal that can be positively or negatively impacted upon by human activities. In one framework, the economic concept of capital has been extended for these purposes. As Porritt (2005: 112) explains,

Capital is a stock of anything that has the capacity to generate a flow of benefits which are valued by humans. It is this flow – normally of goods and services of benefit to people – that makes the capital stock an asset, and the value of an asset is derived directly from the lifetime value of the flows to which it gives rise.

The elaboration of this concept beyond limited economic applications underpins what is known as the ‘Five Capitals Framework’ involving five ‘stocks’ of assets: natural, human, social, built (or manufactured) and financial (Moran et al 2013). In line with this, Brereton and Pattenden (2007) suggest that ideally development will result in net benefits in terms of the human, social, built, natural and economic assets of local communities. Hence an industry, whether producing coal, CSG, beef, wheat or cotton can add economic value by generating profits and returns to producers and shareholders and contributing supply chain benefits to regional businesses. It can also provide education, skills and training and improve health and safety which constitute a boost to human capital

that likewise serves many functions, including economic (increasing productivity) and social (improving quality of life). By stimulating or providing adequate social services, an increase in recreation options and vibrant volunteering as well as protecting heritage, and respecting and fostering a strong local identity and Indigenous values and culture, the industry may enhance social assets. An additional result, with suitably targeted investment, can be improved physical infrastructure (transport, communications and information technology, public buildings, water and power) as well as more plentiful housing. Finally, if there are associated measures to achieve or maintain rich biodiversity and restore landscapes and ecosystems, natural assets can be nurtured (Porritt 2005).

This study undertook to apply the five capitals framework and specifically to conceive of co-existence as occurring when, despite productive activities drawing on the flow of benefits and transforming some forms of capital to others, a balance is maintained such that overall stocks of these five kinds of capital are not depleted beyond a point where there will be continued 'flows' in future. A starting point for the research was to identify some widely accepted indicators of a positive state with respect to the different forms of capital. There are no standard indicators since there is considerable subjectivity and wide contextual variation involved in such assessments as well as interdependence of various measures.

Because of the interactions and transformations of different kinds of assets and the importance of not depleting stocks below sustainable thresholds, the net impact cannot be considered in a piecemeal fashion. Instead it is necessary to consider the combined and interacting effects of multiple land uses or the cumulative impacts (Franks et al 2011) of multiple activities on all forms of capital over time and space. In practice, many cumulative impact assessments have focussed on receptors at one scale (for example, a catchment, a nature reserve, a town, or a farm). As well, cumulative impacts have often been conceived as primarily environmental effects and often as the net impact of multiple *related* activities, such as multiple mines or multiple irrigation licenses. Such issues are usually considered separately to land use conflicts, particularly between productive uses (often agriculture), conservation functions and residential areas (for example, Carr & Zwick, 2007; Duinker & Greig, 2007; Esteves et al 2012). Hence there is value in exploring not only environmental impacts but also economic and socio-economic impacts of the combination and interaction of multiple, contrasting productive uses of land (agriculture, CSG, mining and others) on land, water, residents, services and infrastructure and considering these effects at multiple scales simultaneously (farm-scale to regional).

To achieve co-existence it is not only necessary to identify valued local assets of all kinds (or the stocks of capital available), but also to determine the multiple past, present and reasonably foreseeable future human activities that have affected or will affect these assets; predict the impacts on the various forms of capital of the combined activities; and suggest how to manage these cumulative effects so as to maintain the asset base and ensure net benefits now and into the future (Ross 1998). It should be noted that maintaining the asset base does not necessarily mean (and is not necessarily achieved by) maintaining the status quo. Indeed there may be a number of alternative configurations of human activity that will all deliver net benefits and remain within acceptable limits.

3. Methodology

The overarching aim of the research was to identify key considerations and constraints in managing the cumulative impacts of multiple industries – cropping, grazing, mining and CSG extraction – on the human capital, society, environment, infrastructure and economy of regional communities on the Darling Downs. Only effective management of these impacts to maintain or enhance the asset base constitutes satisfactory co-existence. Due to the limitations of considering activities, sites of production and sectors of the economy in isolation, the project did not seek to add to the growing body of scientific data in many discrete disciplines about individual industries' management of selected impacts. Rather, it focused on how the industries are understood to relate to one another and to various categories of assets and how the separate bodies of knowledge and separate datasets interface with the decisions and perceptions of producers, regulators and communities.

The research was guided by the following research questions:

1. What are the barriers, challenges, and opportunities that inform current thinking and behaviour in relation to combined or alternative land uses and managing their impacts?
2. What are the priorities and roles of various sectors and organisations in managing the cumulative impacts of resource extraction and agriculture in rural regions such as the Darling Downs?
3. How can agriculture and energy production co-exist in ways that create a better future for local communities?

The jurisdictional boundaries of Western Downs Regional Council (WDRC) and Toowoomba Regional Council (TRC) within the Darling Downs were the geographical focus of the research. Though the Darling Downs is a larger area with four additional local government areas, we use the term to refer to these two local government areas. These two regional councils were selected based on:

- the number of existing and potential large-scale mining and coal-seam gas projects present;
- the long-established agricultural and pastoral activities within these jurisdictions; and
- the priorities of our research and institutional partners – including Western Downs Regional Council, AgForce and New Hope Coal – under the UQ Collaboration and Industry Engagement Fund (CIEF) grant.

The research involved two interrelated components:

- (a) A search of public materials to establish relevant stakeholders and issues,
- (b) The gathering of perceptions of stakeholders with respect to the issues using a standardised perceptions scale and semi-structured interviews.

Procedures for each of these are detailed below.

Scoping Exercise: Media Search and Environmental Impact Statement Survey

We undertook a media search, a survey of documentation from Environmental Impact Statement (EIS) processes for major resources projects focusing on public consultation and submissions, and a review of existing sets of indicators within single industry sectors such as the cotton best management practices (Roth 2010) and Mineral Council of Australia's *Enduring Value* (MCA 2006). This scoping exercise had a two-pronged objective: 1) to identify key issues associated with the intersection of agriculture and resources development in the region in order to develop a set of interview questions and a set of indicators to include in a perceptions scale, and 2) as a first step in identifying key stakeholders.

The media search used *Factiva*, a database of local and international newspapers, newswires, magazines and journals sourced through Dow Jones and Reuters. Three media searches were conducted using the search terms “Darling Downs” and “mining”; “Darling Downs” and “coal seam gas” or “CSG”; and “Darling Downs” and “agriculture” or “agricultural”. The search was restricted to a five year period (1 January 2007 to 31 December 2011) and excluded social media.

A search of “Darling Downs” and “mining” returned 1957 publications; “Darling Downs” and “coal seam gas” or “CSG” returned 1211 documents; and “Darling Downs” and “agriculture” or “agricultural” returned 1672 results. Figure 4 shows the distribution of the publications on these search topics over the years 2007 to 2011.

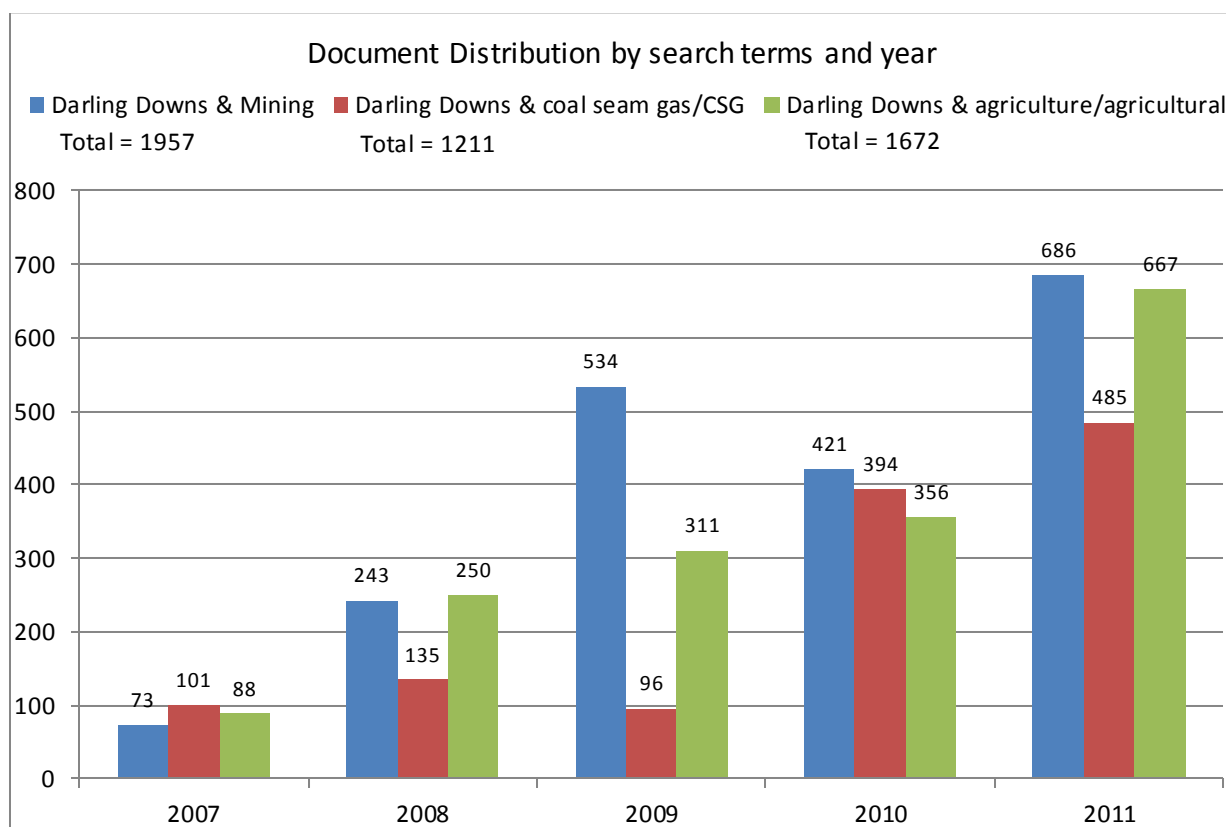


Figure 5: Document Distribution by search terms and year

The majority of documents containing the search terms were published in the last three years. The number of publications containing “Darling Downs” and “agriculture” (or “agricultural”) steadily rose from 2007 to 2011, more than doubling from 2009 to 2011. Similarly, from 2008 to 2009, the number of publications containing the search terms “Darling Downs” and “mining” more than doubled, although there was a slight decrease in publications in 2010 before a further increase in 2011. The biggest increase was in the number of items containing the search terms “Darling Downs” and “coal seam gas” (or “CSG”). These more than quadrupled from 2009 to 2010 and increased further in 2011.

Figure 6 shows how many documents published from 2007 to 2011 had an overlap of search terms. With “Darling Downs” as the fixed search term, 633 documents contained both “mining” and “coal seam gas” (or “CSG”); 644 documents contained both “mining” and “agriculture” (or “agricultural”); and 394 articles contained both “coal seam gas” (or “CSG”) and “agriculture” (or “agricultural”). 301 articles contained all four search terms.

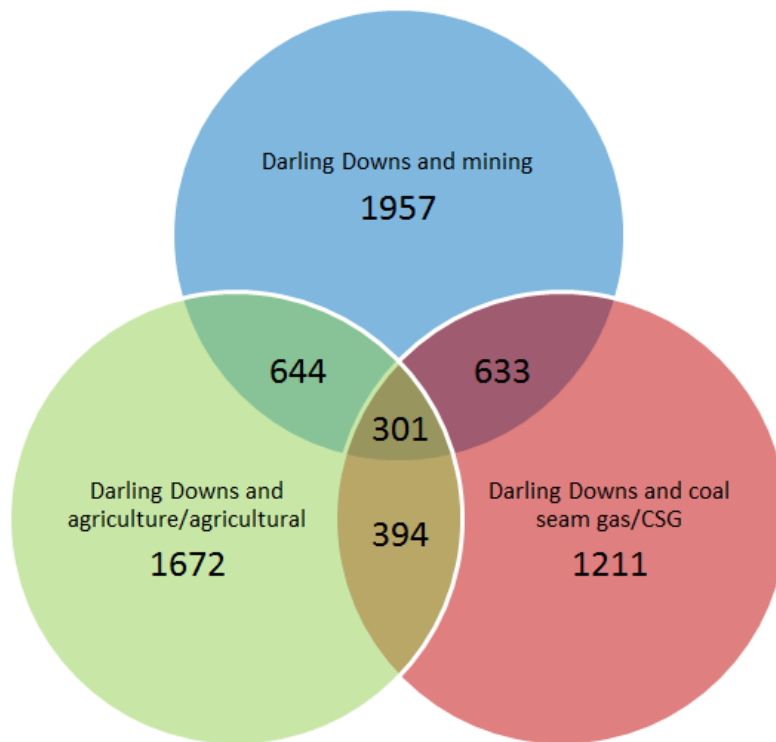


Figure 6: Factiva database search - number of documents and overlap of terms

Almost a third of the published items retrieved under a search of the terms “Darling Downs” and “mining” also contained the search terms “coal seam gas” or “CSG”. The three most commonly mentioned companies in this search were New Hope, BG Group and Origin. While New Hope is a coal mining company, both BG Group and Origin are CSG companies.

Of the 301 documents that contained all of the search terms, “land” and “water” were the most frequently mentioned words (excluding the search terms). Land was mentioned in over two thirds (214) of the articles and water was mentioned in one half (150). The word impact/s was also mentioned in around half of the items. A large proportion of the articles was focused on community concerns and fears (particularly farmer concern) regarding mining and CSG development, in particular, concern around CSG exploration and access to land, and the impacts of both mining and CSG, including impacts on surface and groundwater resources, good quality agricultural soil, food production, housing, infrastructure and health. Issues around the potential long-term impacts of resources development were emphasised.

Even though the search terms are focussed on the industries, it was evident that concerns were mainly about socio-environmental impacts. As well, many of the reports discussed campaigns against resources development (such as that of the Lock the Gate Alliance) and the effectiveness of management strategies particularly government policy, legislation and regulation. “Government” was mentioned in over two thirds of the articles and almost half of them mentioned the words “policy” or “legislation”. Common themes included the newly introduced Strategic Cropping Land legislation, ‘make good’ provisions for CSG companies to offset their impacts on groundwater, and impact assessment processes for resources companies, such as EISs and Social Impact Management Plans (SIMPs).

Similar topics, concerns and stakeholders featured in the public documentation associated with selected development consultations. The Consultation Report from the Strategic Cropping Land Draft Policy and Planning Framework (Queensland Government 2010b), for instance, identified issues around:

- the criteria for identifying strategic cropping land, for example, soil quality, slope of land, link between crop and soil types, inclusion of the natural environment, avoiding land fragmentation, considering the economic viability of cropping;
- potentially negative impacts of development such as mining on water resources, rivers, streams, wetlands, and aquifers;
- access and compensation arrangements; and
- amendments to legislation and policy.

Documentation from EIS processes surveyed included the Coordinator-General's reports for the EISs of the Wandoan Coal Project (Xstrata Coal),¹ the Queensland Curtis Liquefied Natural Gas Project (QGC),² the Gladstone Liquefied Natural Gas (GLNG) Project (Santos and PETRONAS),³ the Australia Pacific Liquefied Natural Gas (APLNG) Project (Origin Energy and Conoco-Phillips),⁴ and sections of the EISs summarising the results of community consultation processes for the New Acland Stage 3 Expansion (New Hope)⁵ and the Surat Gas Project (Arrow).⁶

As such documents, by definition, relate to large-scale developments, the issues canvassed tend to focus on concerns about potential negative impacts of resources development on local production of other commodities, on the environment and on communities and infrastructure. Key issues of concern to stakeholders and community members in relation to these projects included:

- **Infrastructure:**

- The existing poor condition of local roads and highways and the further impacts of resources development on transport infrastructure and road safety.
- Impacts on housing availability and affordability, including property values, ability to sell, rental prices and increased demand on affordable housing.
- Impacts of increased demand on community infrastructure, for example, water, waste disposal, tourist accommodation, airports, community and recreational facilities.
- Impacts of mining and CSG infrastructure (for example, gas wells, processing facilities) on communities and on rural properties.

- **Community services:**

- Impacts of increased demand for education, childcare, health, medical, emergency and other social services.
- Greater difficulty recruiting service provider workers due to increased living costs.

- **Social/cultural disruption:**

- Change in the demographic profile of the region due to incoming workers and residents.
- Impacts of increased populations on rural community lifestyles and values, including privacy, community safety and security, gender balance and community cohesion or fragmentation.
- Impacts on cultural heritage, including both European and Indigenous culture and history in the region.

¹ <http://www.dsdp.qld.gov.au/resources/project/wandoan-coal-project/coordinator-general-report.pdf>

² <http://www.dsdp.qld.gov.au/resources/project/queensland-curtis-liquefied-natural-gas-project/queensland-curtis-ling-project-cg-report.pdf>

³ <http://www.dsdp.qld.gov.au/resources/project/gladstone-liquefied-natural-gas/cg-report-gladstone-ling.pdf>

⁴ <http://www.dsdp.qld.gov.au/resources/project/australia-pacific-ling/coordinator-generals-report.pdf>

⁵ <http://www.dsdp.qld.gov.au/assessments-and-approvals/new-acland-coal-mine-stage-3-expansion.html>

⁶ <http://www.arrowenergy.com.au/community/project-assessment-eis/surat-gas-project-eis#item-6>

- **Health:**
 - Impacts associated with construction and road hazards, impacts on air quality, dust emissions, noise and vibration.
 - Increased community concern and anxiety regarding resources development.
- **Environmental impacts:**
 - Impacts on water resources including groundwater quality and specific surface water resources such as creeks and rivers serving both recreational and ecological functions.
 - Potential impacts on biodiversity (for example, fauna and flora).
 - The importance of rehabilitation in the case of mining.
 - Impacts on visual amenity.
- **Agricultural land and practices:**
 - Impacts on the quality of agricultural land and fragmentation of land.
 - Disruption to agricultural and grazing practices.
- **Labour force and business impacts:**
 - Impacts on local businesses and suppliers, including increased local expenditure and increased competition.
 - Skills shortages in the region and the potential loss of employees to mining/CSG employment due to higher wages.
 - Employment opportunities for local people.
 - Issues around FIFO workforces from both social and economic standpoints (for example, increased males in towns and decreased local spend).

Selection of Stakeholders

Participants were selected as data-rich sources on the basis of the role they have played in the industries and issues under investigation, the information they have and the stories they can tell, using purposeful rather than probability or random sampling. The initial selection of stakeholders was based on interest and influence of stakeholders (Reed 2009) through the scoping exercise outlined above, because this identified individuals and groups participating in critical events, decisions and routines involved in decision-making in the Darling Downs. Other information sources, besides the media reports and submissions made in response to the EISs of major resources projects in the region, included websites of councils, community organisations and companies, and publications such as community directories. We also utilised a snowballing technique whereby those engaged in the arena were asked to nominate others to whom it would be important to speak (Patton 2002). Effort was made to have representation of stakeholders across different sectors and within the two local government jurisdictions we selected in the Darling Downs. Dual research processes were undertaken to explore perspectives of this cross-section of stakeholders: a Perceptions Scale and semi-structured interviews.

Perceptions Scale

From the scoping exercise it was evident that the range of issues canvassed in association with these developments can be categorised according to how changes to the five capitals or the various kinds of assets at the disposal of individual communities are experienced. In order to gauge the perceptions of these changes in the recent 'resources boom' conditions, we developed a Perceptions Scale. The instrument adopted a five-point Likert Scale format that asked respondents to indicate the extent to which they agreed with a series of 42 statements about the state of their region with respect to indicators of five capitals at two different time intervals. It took respondents about 10 to 15 minutes to complete. There were seven to ten indicators for each of the five capitals chosen to cover the cross section of issues identified in the media search and scrutiny of public EIS documents and existing sets of indicators. The scale used is included as Appendix A.

Rather than gauging perceptions at a single point in time, the Perceptions Scale sought to establish people's views about whether recent trends in the communities – given the volatility of both agricultural and resources development – represented positive changes or not. Hence we gathered perceptions about the state of affairs at two different times. These times were chosen on the basis of the following considerations:

- the rapid increase in public prominence of the extractive industries since 2006;
- known fluctuations in agricultural prosperity with seasonal variability;
- the dynamic situation and multiple drivers of change; and
- the unreliability of people's memories if we were to use too broad a time frame.

Given these influences on the data and continuing flux in the region, a five year gap seemed both feasible and meaningful, with "5 years ago" representing "before" major resources industry development (commercial production began in 2006) and "now" capturing the midst of the resources boom. These intervals also aligned with Census collection years allowing for subsequent comparison of perceived trends with trends evident in those data.

The Perceptions Scale was sent in advance to all stakeholders who agreed to participate in the study and was completed before, during or after the interview. Those only newly associated with the region did not complete the scale, nor did some stakeholder representatives based in Brisbane, as they had limited familiarity with trends in the region despite a role in the policy debate. The number and sectoral affiliation of respondents to the Perceptions Scale is detailed in Table 2.

Table 2: Sectoral affiliation of Perceptions Scale respondents

Agriculture	4
CSG	6
Advocacy	4
Environment	2
Mining	3
Business	4
Community	2
Government	1
Total	26

Interviews with Key Stakeholders

Interviews were conducted – generally by two-person teams – over a period of a month in mid-2012. The line of questioning for the interviews probed perceptions of trends as per the Perceptions Scale, but also:

- views on successes and failures with respect to the management strategies being adopted at individual, community, regional and State levels in respect of matters identified in the issues analysis;
- views on the prospects for co-existence and the barriers, challenges and opportunities facing regions with multiple industries; and
- recommendations as to desirable futures.

Questions that were used as discussion starters and further explored by probing on the basis of responses included:

- In order of priority, what do you think are the key issues that people in this community are worried about in terms of CSG, mining and agriculture?
- What are the existing mechanisms/processes by which these concerns are addressed and by whom? (Who is taking action to resolve problems and in what ways?)
- What improvements would be required to minimise the negative impacts and maximise the positive impacts of resources development?

Most interviews were of about one-hour duration and were audio-recorded for accuracy of note-taking and subsequent cross-checking given the separate teams conducting the interviews.

Thirty-two individual and group interviews were conducted representing a total of 35 stakeholder groups. Interviews were undertaken with Queensland-based senior employees or other prominent representatives and spokespeople of mining, coal seam gas (CSG) and agricultural industries and their corresponding peak bodies, government (local and State departments), key community organisations, advocacy groups, and business and environmental network groups. Table 3 shows the geographical and sectoral spread of interviewees. To contextualise direct quotes used throughout this report whilst maintaining stakeholders' anonymity, each stakeholder is represented by a code which indicates their sectoral affiliation, as per the 'Interview codes' column in Table 3.

Table 3: Geographical and sectoral spread of interview participants

Sector	Toowoomba Regional Council	Western Downs Regional Council	Whole Region	Total	Interview codes
Government (local and State)	1	1	2	4	Government 1-4
Resources (mining and gas)	2	3	2	7	Resources Sector 1-7
Agriculture	1	1	5	7	Agricultural Sector 1-7
Community	0	4	0	4	Community Organisation 1-4
Advocacy	2	2	2	6	Advocacy Organisation 1-6
Business	1	3	1	5	Business Network 1-5
Environment	1	0	1	2	Environmental network 1-2
				35	

4. Stakeholder perceptions of changes in the Darling Downs

Generally, the Perceptions Scale revealed that change in the Darling Downs over the past five years has not been clearly positive or negative, and perceptions of change vary greatly according to the sectoral affiliation of the stakeholder and also within sectors. Many changes related to resources development in the region revealed both positive and negative dimensions and most were interconnected.

Considering each of the groups of indicators from the perspective of the whole group of stakeholders, responses to the Perceptions Scale show little perceived change as a result of the ‘resources boom’ in that the median and average results with respect to most capitals was on, or close to, the zero/neutral value (neither positive nor negative change) (Figure 7).⁷ There was a small difference between averages and medians with regard to direction of change, however, overall little to no difference was perceived between five years ago and now in terms of both median and average results. This can be partly attributed to the fact that different sectors perceived the directions and dimensions of change differently – some positively and others negatively – with the net effect cancelling each other out and showing a neutral perception of change in the different capitals. Differences were more evident with respect to specific indicators (refer to Appendix A for a list of the indicators included in the Perceptions Scale). The extent of some of these differences is illustrated below and fleshed out by reference to the interview data.

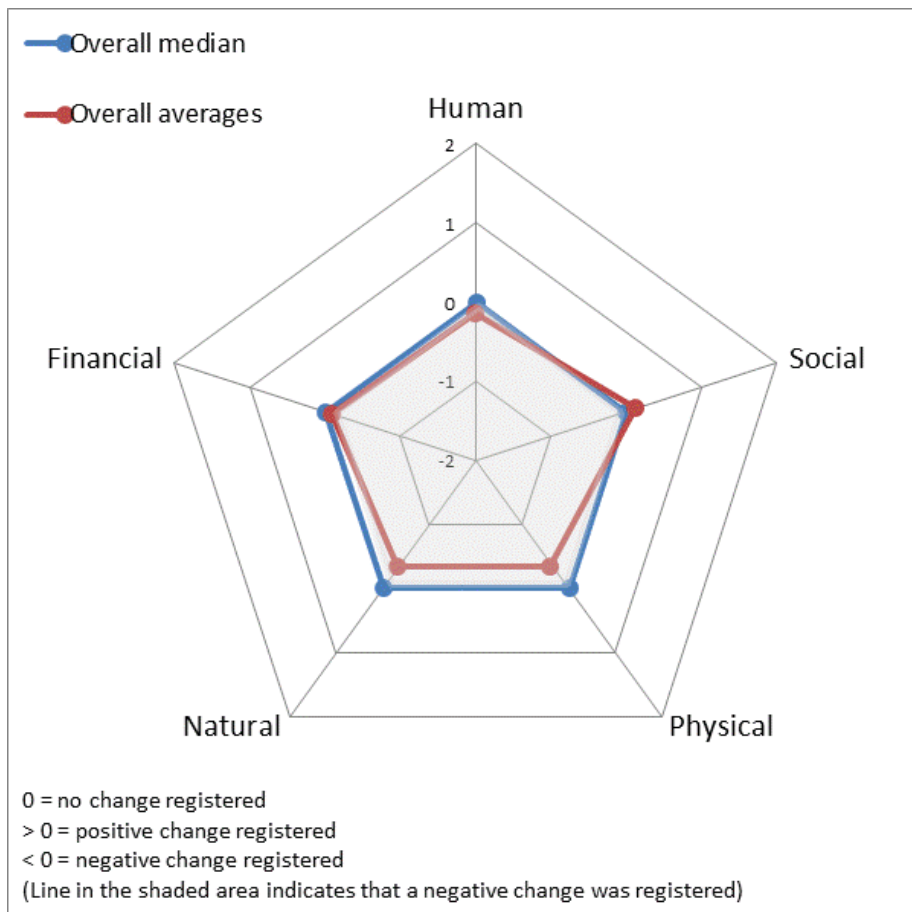


Figure 7: Average and median change registered in all responses to groups of indicators by capital

⁷ Averages were calculated by totalling all scores and dividing by the number of responses. Median represents the value of the response sitting in the ‘middle’ of all responses; that is, there are as many respondents giving a higher rating than the median as there are giving a lower rating than the median.

One way of examining stakeholder perceptions in a region with identifiable sectoral divisions, is to consider the views of each sector as a whole, although it would be misleading to suggest that sectors are homogenous and that all stakeholders within a sector hold the same perception. Nevertheless, considering the differences between sectors with respect to their perception of the trends in regard to each of the five capitals, it is informative to note whether changes were broadly deemed to have been positive (that is current perception is more favourable than five years ago) or negative (with the difference between the current and past state being less favourable). Separate sectors regarded some assets as having changed for the better or worse as demonstrated in Figures 8 to 10.⁸

The Agriculture sector (n=4) perceives negative changes in the Darling Downs over the last five years, except with respect to natural capital, for which it registered no change (Figure 8). However, it is interesting to note that the Darling Downs was in the midst of a drought five years ago and although climatic conditions have since improved, the agricultural sector did not rate the state of natural capital more positively now. This suggests that positive changes associated with better weather have been nullified by other negative changes to natural capital. The most negative change perceived by the agricultural sector was in respect to human capital.

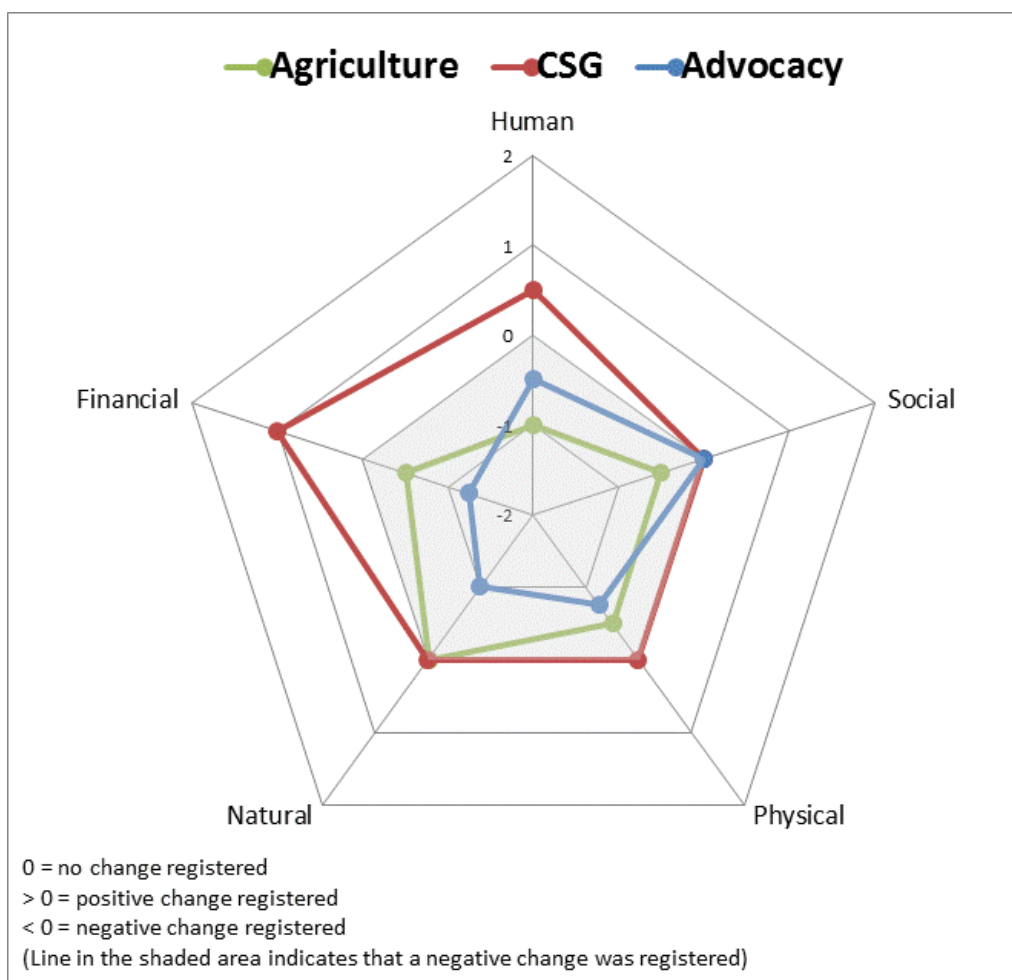


Figure 8: Change registered by capital for Agriculture, CSG and Advocacy sectors

⁸ Figures 8 to 10 represent the perceived change from five years ago to now for each of five capitals (human, social, physical, financial and natural) in the Darling Downs according to different sectors. They do not reveal whether median responses were positive or negative overall, but rather whether any positive or negative *change* was registered. We calculated the median responses to indicators of sectors by capital, and then the median *change* in aggregate indicators of each capital according to each sector.

Similarly, Advocacy Groups (n=4) had a largely negative perception of changes in the Darling Downs, with the exception in their case being social capital, for which they registered no change. In contrast, the CSG sector (n=6) regarded the changes as having been neutral or positive (Figure 8).

Community organisations (n=2) reported the most mixed views, seeing positive changes with respect to human capital, negative in the natural, financial and physical capitals, and neutral or steady states in social capital (Figure 9). Some sectors reported undesirable change in the sector of most relevance to them; for example, Business (n=4) held a negative perception of financial changes in the region and slightly negative perception in regard to changes to physical capital, but reported no trend or change for the other capitals (Figure 9).

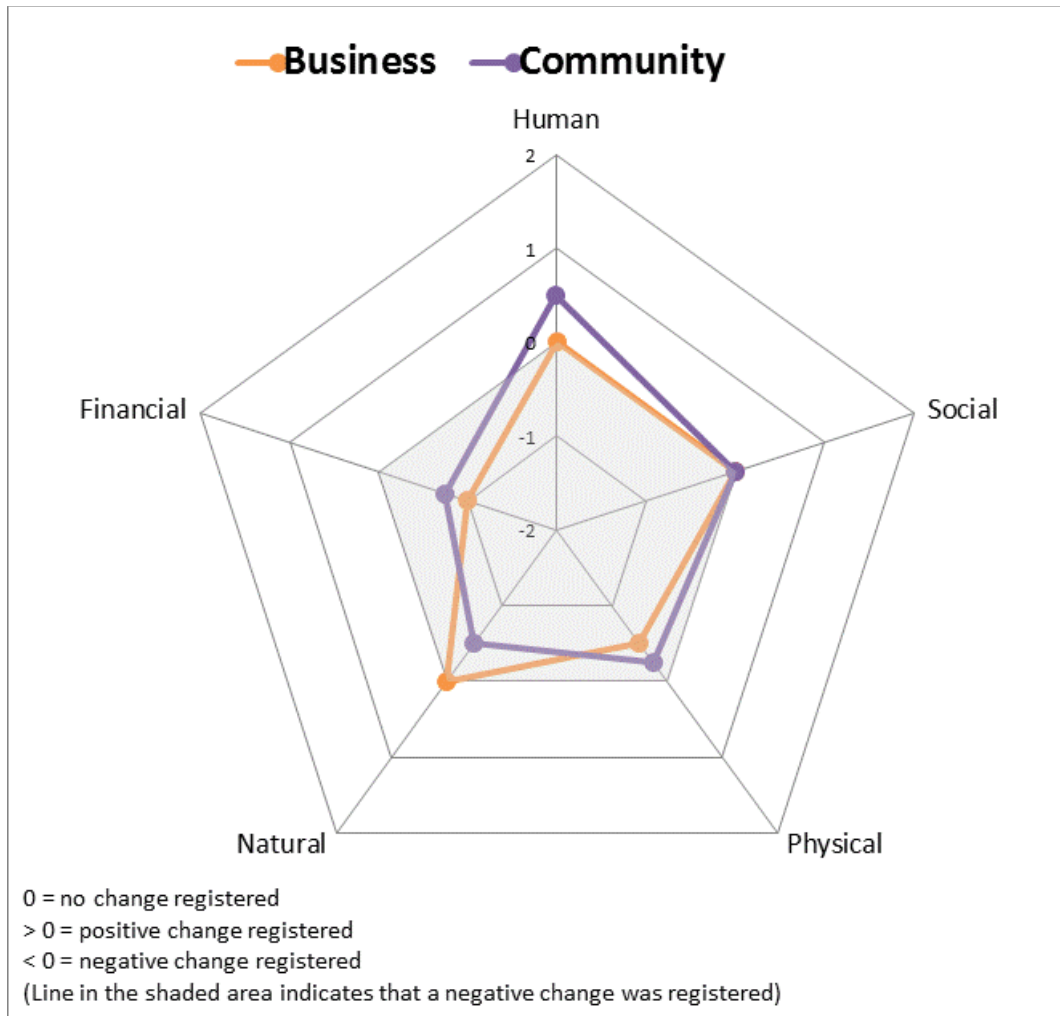


Figure 9: Change registered by capital for the Business and Community Sectors

Environment organisations (n=2), and Mining organisations (n=3) though small samples, reported no perceived changes for any of the capitals. Similarly, the one government respondent who felt able to comment saw the situation as neutral for all the capitals (Figure 10).

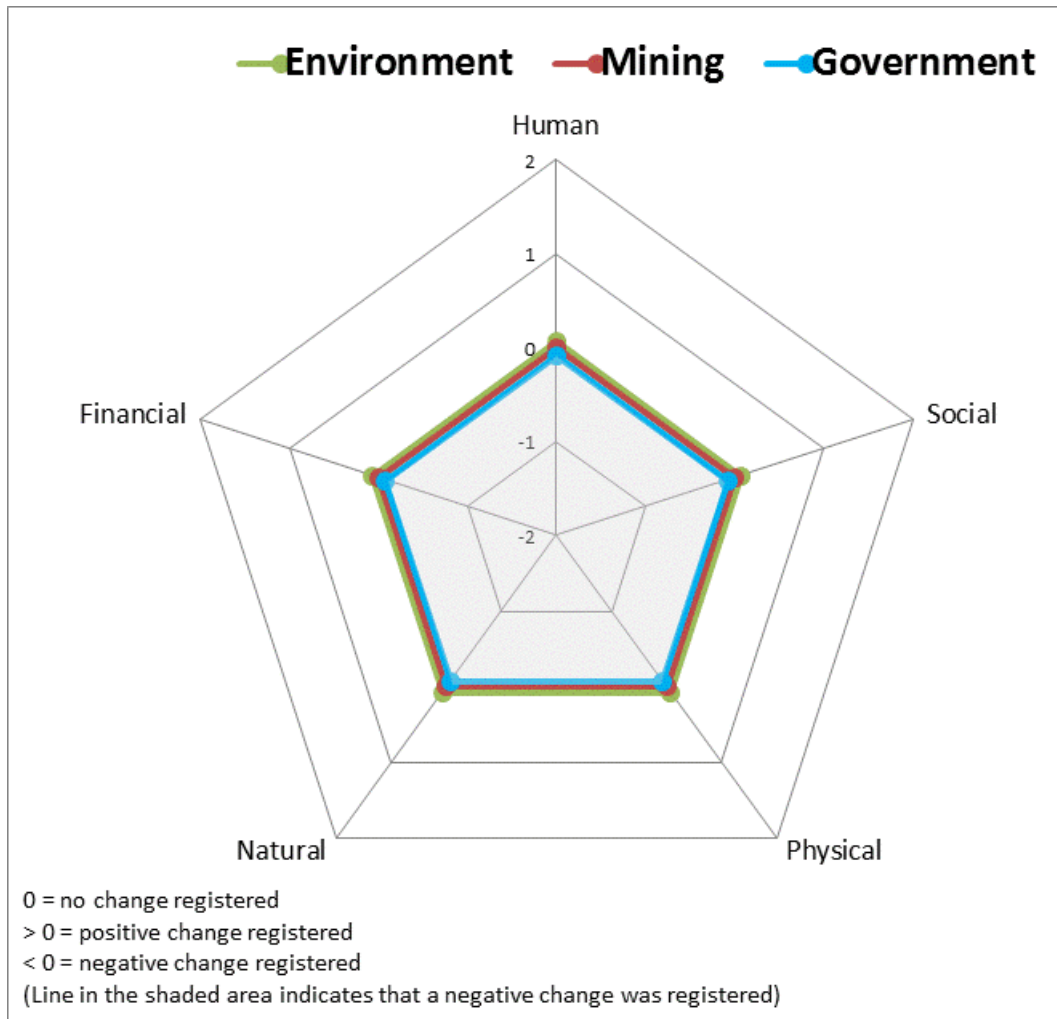


Figure 10: Change registered by capital for the Environment, Mining and Government Sectors

The analysis above indicates the perceived trends over the past five years, but not the overall state of community and regional assets according to the different groups, or which indicators of each form of capital were regarded as contributing most to their assessment. Also, by examining the median *difference* in responses registered by sectors between five years ago and now, the spider graphs in some instances had a flattening effect on the reported overall change perceived by the sector.

The following sections draw on the perceptions scales and the qualitative data from the interviews to further tease out these results in terms of each of the five capitals in turn. The figures generated from the perceptions scales in the following sections are calculated differently. They use the average of each sector's median response by capital with five years ago and now represented in separate bars and the perceived change evident in the difference in bar heights. Hence some nuances in perceptions of change are more evident in the bar graphs.

Natural Capital

Natural capital denotes the key natural resources, such as water, land, clean air, wildlife and forests that people can access from the environment for lifestyle or livelihood purposes and that provide indispensable ecosystem services. As might be anticipated in a region richly endowed with natural resources, issues related to natural capital were the most frequently mentioned in the qualitative interviews. The agricultural sector went into particular detail about natural capital and it was common for people to sum up the natural assets of the region in terms of good rainfall, fertile soils and ground and surface water resources that all allowed for “double cropping”. Being a predominantly agricultural region reliant on irrigation and stock water and fertile soil for productivity, strong links were made between natural capital and financial capital. While both water and good quality soil were already under stress prior to mining and CSG development, issues surrounding these resources were frequently articulated as having arisen as a result of resources development.

Little overall change

As reported above, the perceptions scale revealed that most stakeholders do not perceive indicators of natural capital as having changed significantly over the last five years. The nine indicators in the Perceptions Scale related to such matters as water quality and quantity, soils, biodiversity, weeds and pest management, air quality, and amenity, scenic qualities and natural resource management (refer to Appendix A). The majority of stakeholders rated indicators of natural capital positively both five years ago and now, with the exception of the agricultural industry and community organisations, which tended to rate indicators negatively at both times, and respondents from the advocacy sector, for whom, the average aggregate rating on natural capital indicators was positive five years ago and negative now (Figure 11). The resources sector (mining and CSG) was the only stakeholder group to rate indicators in the area of natural capital as having slightly improved in the last five years.⁹ Considering all stakeholders together (regardless of sector), whilst the majority rated indicators of natural capital positively at both points in time, the number of stakeholders rating indicators of natural capital positively tended to be higher five years ago compared to now (Figure 11).

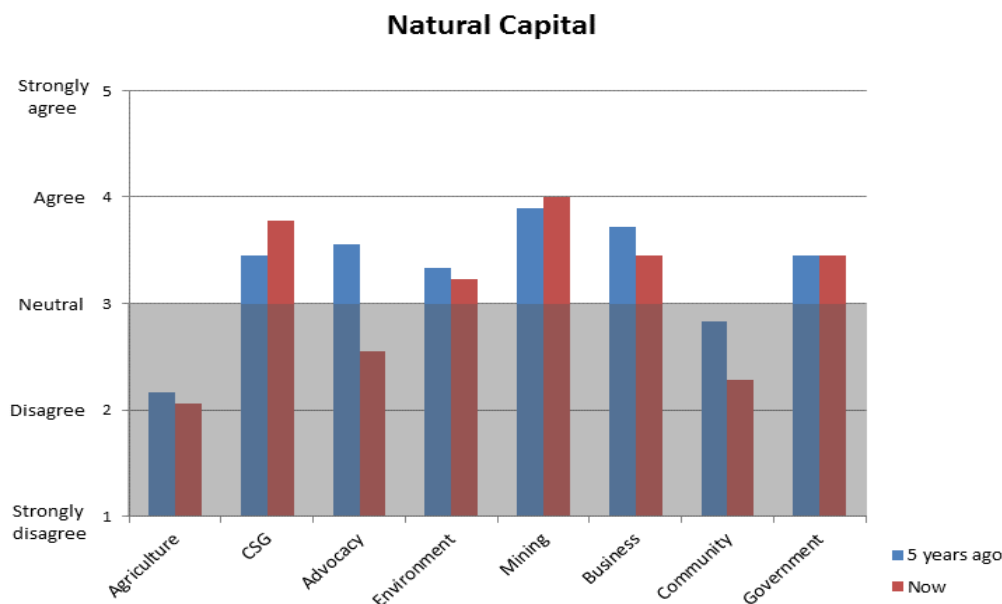


Figure 11: Average Likert scale scores of interviewees from different sectors assessing the change in natural capital over the last 5 years in communities as a result of interaction between industries

⁹ Note that this difference was slight and as such was not picked up in the calculation of the median of perceptions of overall change of natural capital by the CSG sector.

Looking at the individual indicators of natural capital, three were rated positively by the majority of stakeholders five years ago but negatively by the majority of stakeholders now:

- The extraction and use of natural resources from the earth occurs in way that neutralises harmful effects to people and/ or the environment.
- The region's ecological system, biodiversity and the state of natural resources are protected or enhanced.
- Our surface and ground water are free of pollutants that could harm people, stock or the environment.

The one indicator that was rated negatively at both points in time related to the quality of surface water and ground water (in terms of being free of pollutants that could harm people, stock or the environment). Air quality and visual amenity were rated positively at both points in time by the vast majority of stakeholders.

Different views from different sectors

In interviews, both the resources and agricultural sectors tended to emphasise their respective positive impacts on natural capital, in terms of sustainable land and catchment management and taking good practice on board. For example, representatives of the agricultural sector mentioned having reduced use of chemicals and ground and surface water use. They noted the role of voluntary producer initiatives, tight regulation, and technological improvements (including genetically modified, pest resistant crops varieties and water-conserving irrigation advances) in bringing this change. In the case of the resources sector, representatives described positive impacts, including providing water for irrigation and reforestation and promoting sustainable approaches to land management on resource company-owned land. One example of the latter identified sustainable grazing outcomes as a consequence of a broader scale approach:

“So what we’ve done by amalgamating a lot of these farms is to allow for a more sustainable approach – a sustainable grazing outcome ... looking at a landscape approach. What we want to do is use native species etc. and what we believe we can do is link some of the existing corridors and get some ecological outcomes from our grazing as well. We’ve got specific ecological areas as well. So the sustainable grazing approach is what we believe will work best for that area, and [...] having a pastoral company assists us in that approach. It’s a bit unusual for a mining company to take that approach, but it’s been beneficial.” ~Resources Sector 3

The threefold strategy of technological advances (for example, reverse osmosis), voluntary initiatives (for example, progressive rehabilitation) and regulation (for example, environmental license conditions) were cited as prompting these successful initiatives.

Little to no mention of the negative environmental impacts of agriculture was made by most stakeholders. However, the impacts of agriculture on natural resources were discussed differently by the resources sector. For instance cattle grazing and cotton growing were both criticised for having deleterious effects on the natural environment, including surface water sources. Indeed, there was one suggestion that mining provided some respite for agricultural land:

“Because the vagaries of farming – when we mine there. There has been a fair bit of drought from 2002 until recent events. I think some of these farmers have struggled because of it. [When we mine there] we’re giving land a chance to have a break and recover a bit. ~Resources Sector 3

Negative environmental impacts appear to have become so strongly associated with resources industries by stakeholders in the Darling Downs that the agricultural industry is now represented as either a good environmental steward or at least an impact-neutral operator in the region. Indeed, farmland was represented by many as the ‘natural’ state of the region. Similarly, while some concerns were raised about the impacts of mining on natural capital, the majority were focused on the CSG

industry. This may relate in part to CSG being a more high profile industry with a large geographical footprint, whereas the impacts of mining tend to be geographically concentrated.

Uncertain, unpredictable effects and incomplete, contested knowledge

There were widespread concerns expressed about the inadequate state of knowledge of cumulative and long-term impacts related to natural capital. Many responses focussed on environmental assets and some even suggested that a comprehensive understanding required the 'full story' of a range of (mainly environmental) issues:

We need a watchdog out there, and there's a bit of emphasis in there but the news isn't getting through. [...] I think we've been a bit bull at gate-ish - well, I don't know that we've been bull at gate-ish, because there's evidence right throughout the world that this is going on, but no one has told the story terribly well as to what's gone on internationally and what is going on out here. It's new out here. That's the story that needs to be told. We need somebody to take a position of leadership on it and tell those stories. ~Business Network 4

Many participants were disconcerted about the uncertainty and the failure of both authorities and scientists to provide definitive answers:

"But I think the mining - it's all about this unknown... I think in 50 years' time we'll know but right now people are scared of not knowing or having a definitive answer; or having definitive science; or not believing the science because of the misinformation. You've got mining companies with so much money they [...] throw PR out there and straight up you don't trust their information. And you might have someone else at the other extreme coming up with this." ~Community Organisation 4

Some impacts on natural capital – particularly in relation to CSG – are regarded as known and predictable. These include the impacts on land availability due to CSG wells or vehicles and the introduction of weed and pest species associated with increased vehicle movements (bio-security issues). Others, especially the impacts on groundwater, are seen as unknown and unpredictable. Interviewees expressed concerns about anticipated negative impacts regardless of the state of knowledge and degree of certainty about consequences:

"On the floodplains and on our better quality soils, the concern is that there will be infrastructure and so forth put on land that the rehabilitation won't put it back the way it was, so the long-term productive capacity will be reduced. In some parts of the region, the concern is that the industry will deplete aquifers that are currently production aquifers for irrigated agriculture. That's particularly the Eastern Darling Downs." ~Environmental Network 2

The sentiment above was further confounded by the fact that apparent certainty from one sector was greeted with distrust or was challenged by another sector, highlighting the gaps in knowledge and the contested nature of the data on which management strategies are based:

"You've got the two polar opposites. You've got the mining company saying there's nothing wrong; this technology's fine; there won't be any issues. Then you've got the other end, the people that...I wouldn't say are looking for the issues but they're hypersensitive to any changes...People are looking for things to blame on the mining companies as opposed to taking a bit of a more an objective 'it might not be them' [attitude] – straight away it's them." ~Community Organisation 4

"We were told five years ago that the CSG industry would never have an impact on underground water in any way. And yet we've seen in the last three weeks the independent QLD Water Commission's underground water impact report come out, saying that yes, there will be impacts on the aquifers that we are dealing with in this industry. Now some of those impacts change and vary quite widely, it's still only model-based, so we're still not using the real data that we've got to check against those models that all of these activities were approved upon... So if we were told five years ago there was going to be no impact, 18 months to two

years ago were told there could be an impact we don't really know what yet, and yet we then get this independent report three weeks ago saying yes, there is going to be an impact. Well if we ground-truth against those models and we find out that 40,000 wells on a cumulative basis is sustainable, fantastic, if we find out that 60,000 wells on those cumulative models is sustainable, no worries, but what if we find out it's 20, or ten or heaven forbid five, and we've already past that point? That's the gap of the knowledge we've got at this point in time."
~Agricultural Sector 1

The reinjection or substitution of produced and treated water into aquifers by resources companies was cited as an example of proposed processes with unclear impacts as well as contested criteria for allocation. Similarly, the 'make good' provisions are not fully trusted since people felt that cumulative impacts might manifest after resources companies have left the region:

"...the underground water impact statement says that the impact is only going to peak in 2070, 30 years after these blokes are gone. And these blokes are only going to have water in the first 15 or so years of their operation. There's going to be a huge gap in there where they won't physically be able to get the water to make good...And they won't be able to detect the loss probably until after they leave because [...], the impacts will be undetectable during the period that they've got the potential to actually do something about it. The only way that they could do something about that [is if] they make good ahead of time." ~Agricultural Sector 4

In such matters, interviewees bemoaned the absence of trusted, independent expertise:

"There's certainly lots of areas of science. A little example is we've been advocating when it comes to fracking, having some more certainty around that, so that you're not going to fracture the buffer zone between aquifers. But also things like tracer beads. At the moment, a number of the companies still use radioactive tracer beads to tell how far their fracking operation has gone. That's introducing radioactive material into our environment. Is that okay? There's almost no public information, no research around that. [...] We don't have the expertise to know whether that's right or wrong. That needs some independent verification..." ~Environmental Network 2

There was a sense that the State Government's environmental authorities were inadequate, untrustworthy or impotent. There is a common perception that the government, as regulator, has not fulfilled its responsibilities and so the agricultural industry has had to gain rapid knowledge in terms of the impacts of CSG on water. There is general lack of trust in government information and intervention:

"If you go back 5 years or seven years really, the companies weren't meeting with anyone really – because they simply didn't have to. I worked up around Roma and there was no such thing... we had to initiate meetings with them because the next thing we had growers and farmers ringing us and saying 'These people just came on my place, I don't know who they are'. And the agriculture industry – to its credit – basically got on board very quickly and everyone had to become an expert in hydrology and everything because there was no government representation there and none of our government departments were coming to the foray and they were being told to shut up pretty much. So the agricultural industry kicked up such a stink that finally the government have had to listen, and there's been some changes, though not huge. But there's finally a code of conduct and that sort of thing. Seven years ago that wasn't there." ~Agricultural Sector 4

This inaction and deficient state of knowledge was not seen as avoidable or easy to fix quickly because of the long timeframes for effects to manifest themselves. These timeframes were antithetical to the imperatives of the government and resources sector to progress with development despite knowledge gaps:

"The agricultural community [needs] the confidence that the energy resources company knows

exactly what they're doing and they're not going to stuff it in 20 years or 50 years -time – that the place is going to basically be like it always has [and] that we're not going to run out of water and they're not going to make everybody sick from various different things... I think it's just this lack of understanding, lack of education and the fear of the unknown." ~Business Network 1

"The difficulty we've got is that the referee of the game is also one of the largest beneficiaries of the game. And that's the government. We've got a government that's got an empty wallet. So we've often seen some activities that appear to have been driven through for alternative agendas that maybe have not always taken into account the full impact of what may not happen for another 40 years, but a government that is reacting to what they need today." ~Agricultural Sector 1

Where evidence does exist, it sometimes deals with the water issue in isolation or with just one impact on the water system or one component of the system (for example, groundwater or surface water). However, as many people told us, the issues are interlinked. Often it was the interactions, relationships and feedback between various impacts that were unknown:

"But then there's that undercurrent of the unknown. That links back to the agriculture, the land management, the water." ~Community Organisation 4

It was not just that knowledge was only partial, but also that the quality and source of available data was questioned and people were selective about the evidence they accepted and trusted – though sometimes they recognised this more in others than themselves:

"I think that's why you'll never get your perfect interaction [...] – or even maybe optimum – because the companies take all the science that supports their view, the science that says we don't know. So they'll say it won't happen because really they don't know but they're just saying it won't happen because science doesn't show that it will happen." ~Community Organisation 4

"It's all about trust. People don't ask these questions about agriculture. UK did a study about threats to aquifers in the UK and they found that agriculture is the biggest threat to aquifers. I'm not surprised to hear that, but somehow we trust that. For example, you can't find out what chemicals are in a swimming pool, but you can find out what chemicals are in a frack. [...]. It's about building up the confidence". ~Resources Sector 1

There was evidence of a convergence of views about some sources of information, with people being disappointed in most government reports and some scientific ones and being equally cynical about any research sponsored by mining or CSG companies. However, even the most strident critics quoted the Queensland Water Commission report as apparently the best available evidence given the prevailing uncertainty. Overall, suggestions for managing uncertainty showed a leaning towards adopting the precautionary principle while remaining flexible and adapting. This required closer attention to constant monitoring and validating of data and to establishing critical thresholds and limits:

"Surely, statistically we're going to be able to start tracking some of those impacts we're seeing from those [CSG] wells right now against some of the linear models that we've done to approve the project in the first place." ~Agricultural Sector 1

"The other is one of establishing some thresholds for development. Some of those might be biophysical ones[...], like water quality or biodiversity impact [which would enable us] to say, "right, beyond that impact, no go; that's as far as we're prepared to go with water" or what-have-you. If another development comes along, then existing development needs to improve their technology or what-have-you before the next one's allowed to go ahead. That deals with the cumulative impact as well as the biophysical... If we could establish some of those, then it would give the sector more confidence that they could go ahead as long as they're under that. It would give us more confidence that impact is not going to get out of control." ~Environmental Network 2

One point of agreement – Water is a critical natural asset

Water was the number one issue for the majority of stakeholders – particularly those in the agricultural and CSG industries. Many participants spoke about water issues in terms of the “uncertainty” regarding the long-term impacts of CSG development on specific underground water resources such as the Condamine Alluvium and the Great Artesian Basin, upon which the agricultural industry is heavily reliant for irrigation and stock watering. Only a small minority mentioned the negative impacts of coal mining on water though this has been an issue elsewhere. Water is a highly valued natural asset, and concern around its sustainability has been amplified by recent periods of drought:

“Water is a key asset of this region and – particularly during the horrible years of the mid 2000s when we saw drought and had no surface water – it was that groundwater asset that kept us here and the businesses that service our businesses. Without that we wouldn’t be here. So the groundwater is extremely precious stuff and a sustainable groundwater system is priceless when it comes to agriculture and industries that service agriculture and a region that relies on agriculture.” ~Agricultural Sector 4

There was a consistent view of inequity where the resources industry was seen to have been given ‘right of way’ by government and did not have the same constraints on access to resources (notably water) that agriculture did.

As some interviewees suggested, water quality concerns are pertinent for most Australian catchments and are not unique to the Darling Downs and agricultural areas experiencing concurrent resources development pressures. There were perceptions that an integrated approach to regulation of impacts on the natural asset base by various industries might better manage impacts on water resources:

“Another is around the environmental impact, particularly, I think, having come out of the drought [...] or the two drought stints we’ve had since the ’90s, and the region having such a microscope on water management, to then have an industry that has an as-of-right access to take whatever they like and seemingly not be regulated, to take whatever water they want, has put a focus on that topic, perhaps more than it otherwise might have if we hadn’t have had those droughts.” ~Environmental Network 2

References to the drought and the fact that issues around water were more frequently framed around quantity rather than quality of water, suggest that quantity of water supply is of most immediate concern to stakeholders. Nevertheless some concern around the ‘uncertainty’ or ‘unknowns’ of CSG development’s impacts on aquifers – such as concerns about the extent of aquifer interconnectivity – are implicitly related to quality, even if not expressed as such. No interviewees mentioned de-watering of mines which has caused salinity concerns in other catchments and few stakeholders specifically mentioned the potential contamination of water from the chemicals used in the practice of ‘fracking’ (hydraulic fracturing) in CSG extraction as a concern, despite it being an issue that featured prominently in media coverage. One participant remarked that water quality issues were only recently receiving more attention, suggesting that the focus on quantity is a legacy of drought years. This highlights the subjective and contextualised nature of people’s perceptions:

“Again it’s very contextual. When we were in a drought it was about lack of water, about the fact that there was a little bit of water underground and they were taking it all out and it was going to affect all the aquifers. But now it’s definitely, because there’s plenty of water around, it’s the pollution...It all seems a bit mundane. I think we all know that our water has been used a million times over and we’re going to use it again” ~Community Organisation 4

As well as the impacts on groundwater, impacts on surface water were mentioned by interviewees, for example, potential environmental hazards associated with salt water storage with references to evaporation ponds, and a recent case of gas bubbling through a river. However, impacts on surface water were not emphasised to the extent of possible impacts on groundwater. Generally, when surface water was mentioned it was – again – water quantity rather than quality that dominated the

discussion, for example, in relation to the allocation of surface water in terms of irrigation licenses issued and arrangements to manage this sustainably:

"Surface water sustainability issue has been on the agenda for a few years but we're not affected by the enormous issues other systems are faced with by current Murray Darling planning process because we're virtually at a sustainable take level already." ~Agricultural Sector 4

Perhaps unsurprisingly, the environment sector took a quite holistic view of multiple industries impacting on both ground and surface water and the flow-on effects to vegetation and the whole ecological system:

"I've been involved in research looking at the condition of woodlands along the Condamine River through the main irrigation area of the Upper Condamine and [there are] significant concerns about water management in that area ... [M]ining and then the imposition of CSG over the top of that is just quite a frightening prospect because we're already in trouble in terms of water management in our area [in terms of] groundwater in particular. Surface water, I think, is over-allocated but it's managed and I think there's quite a lot of attention being paid to surface water. I think groundwater is the hidden problem. And there's widespread acknowledgement that we've got declining groundwater but we don't understand the impacts of that, and there's certainly major impacts in terms of native vegetation. Extracting more groundwater basically puts additional pressure on surface water resources – if that's possible – or it means that people are just far less able to continue to operate in the manner that they have operated. And while there are efficiencies in the system that can be gained, there's a limit in terms of what can actually change there." ~Environmental Network 1

Where potential benefits were seen this was often in terms of the critical resource, water. However the discussion of both benefits and negative impacts also served to highlight the challenge of uneven or inequitable distribution of impacts and even of mitigation measures:

"I am frustrated that they can take the water from there and take it to Condamine and then sell it in Chinchilla, rather than recycle it in our area, because we would love to take that water and put it into our ring-tank there. We do have a small groundwater allocation, so we could do substitution. We could leave our groundwater in the ground and take treated water. So, in theory, we're recharging the Condamine in the whole process. That bit frustrates me." ~Advocacy Organisation 1

Competition for land – the interlinked issues

While water was a prominent concern, for some stakeholders land was the natural asset of prime concern, with salinity, compaction, and land lost to production comprising some of the concrete effects raised in the interviews, and the more abstract issues of ownership, access and alienation also featuring. Some interviewees commented on the irony that the energy resources were sitting under the best soil ("black soil") and most sectors espoused protections for the richest and most productive soils. Farmers, especially, expressed concern about loss of land to coal mining or CSG wells. In the case of open-cut coal mining, the displacement and permanent alienation of agricultural land is a key concern. This was seen to be exacerbated by the fact that the type of mining that is taking place or planned on the Darling Downs is on a massive scale involving very large open-cut mines. When resources companies buy land or take out a mining lease, the fear is that it may permanently be lost to agricultural uses and also depreciate the value of neighbouring properties perceived as under threat of subsequent acquisition.

While acknowledged by the resources sector as an issue, the level of importance they placed upon issues of compensation for land or land access was not commensurate with the level of concern expressed by other stakeholders. In particular, CSG wells have been presented by the CSG industry as having less impact than mining in respect to land because they occupy small areas and, as many

interviewees noted, unlike coal companies, CSG operators do not buy the property or permanently alienate the land. Nevertheless, agricultural organisations pointed out that the presence of gas wells changes the nature of the landholding and the productive practices that can take place there. For instance, land is potentially “dissected into unmanageable areas” (Agricultural Sector 3) thus limiting cropping options and use of machinery. In addition, the maintenance of gas wells requires regular vehicular access occupying further land, compacting soils and encroaching on areas to which landholders expect exclusive access.

Concerns about land occupied by coal mines – and even by CSG wells, roads or pipelines – being taken out of production and the consequent impacts on farming practices were linked to the quality of land at stake as well as quantity. Concerns are clearly not only based on perceived depreciation of natural capital, but also closely related to the economic functions of this natural resource. For example, one threat to soil quality and hence productivity that was raised was the effects of salt deposits from CSG by-products and saline discharges from mines (for example, during floods) on agricultural soil and waterways in a nation plagued by salinity problems. Because of such factors, alternative ways of converting natural assets like land and soil to financial assets typified a major difference in perceptions. As people from different sectors said,

“[T]he landowners’ issues are more around land use conflict – one patch of ground can’t be used for both agricultural production and open cut mining at the same time.” ~Resources Sector 7

“And I would think that protecting our valuable groundwater supply and our best soils that the State has is far more in the public interest than exposing those valuable environmental assets to the harm that coal seam gas will do.” ~Agricultural Sector 4

Few interviewees hailed recent attempts to manage this land use conflict – by legislating to protect prime agricultural land and buffer zones around sizeable settlements – as wholly successful, and there were suggestions that a more comprehensive approach was desirable:

“So we need a long-term strategy. [Strategic Cropping Land] legislation is a bit of a fuphy – losing that is not the primary problem for the cropping sector because that’s a small amount. Other impacts are hitting agriculture.” ~Business network 2

However the links between natural and financial capitals were not the only ones emphasised. Stakeholders in the community and advocacy sectors commonly mentioned the links between impacts on the natural environment and undesirable impacts on human capital in terms of matters such as health, stress, and sense of identity.

Despite the strong economic leanings, there was evidence that the territorial assets of the natural environment were also valued for functions other than material ones. It was clear that, for farmers particularly, working the land and stewarding the natural capital contributed not only to their financial capital but to their sense of identity, social worth and emotional well-being. The impacts of mining and CSG production on land, water and other natural resources has caused stress and undermined these benefits in extreme cases through displacing them from land and homes. This was true even in instances of CSG development when farmers could remain on their properties and derive almost as much financial capital as before. Farmers expressed the dramatic disruption when a major industry locates nearby or on their property as producing feelings of violation because, even if they are compensated, their land may be temporarily or permanently alienated and they feel they lack the power to control access by resources companies:

“I’m sure that when you talk about what worries people that would be another thing that worries people – the perception that people can just walk onto their land and do whatever they like and whenever they like.” ~Government 4

These perceptions are subjective and linked to individual value systems as well as being strongly connected to human capital.

Conservation values absent

There were surprisingly few references to conservation values with respect to natural capital. Negative impacts of the extraction of groundwater by the agriculture, mining and CSG industries on native vegetation were reported, and there was some discussion about rehabilitation in relation to mining and the impacts of resources development on biodiversity. However, the majority of issues raised in relation to natural capital were also linked to the productive economic functions the land and water could serve for competing industries; purely environmental concerns were less common. So, for example, one participant regarded the impacts on agricultural land as more damaging than those on native forests:

“Just to the west of here towards Dalby, in Arrow’s tenements, we have some areas of State Forest, State Reserves – and they are the most terrible country that you ever... the goannas would have to take a cut lunch to cross them! But they’re State Reserves, State Forests. They are severely constrained – they’re either ‘No Go’ areas or highly constrained. Yet this beautiful floodplain, privately owned, extremely sensitive soils with the alluvium under it, is least constrained.... [T]o want to constrain it there in that horrible useless country that this nation has no shortage of! We’ve got an abundance of that sort of bull oak and pines and sand ridges. It’s just useless country – it grows good cypress pine, that’s about it. This patch of turf here is an extremely rare commodity – in world terms it’s a rare commodity. Why would it be the least constrained and that useless country owned by the State be most constrained?” ~Agricultural Sector 4

Most stakeholders framed concerns about impacts on natural capital in terms of the impacts of resources development on the agricultural industry, rather than impacts of both industries on the natural assets and the multiple functions they can serve in providing ecosystem services and recreational resources. In fact, agricultural producers portrayed themselves as exercising stewardship of the country over time:

“[P]art of our resilience response is to provide for protective and ongoing management of some of these conservation benefits that are there because we’ve managed them for generations but yet it’s devalued to the point that a resources company can come and dig it up” ~Agricultural Sector 1

A systems view

Although, the dominant perspective envisaged new industries impacting on agricultural systems, a minority of respondents from various sectors expressed concern that this perspective led to the neglect of much-needed systems thinking and approaches:

“I think it goes back to that co-existence, where we talk about agriculture and the resources industry, but we forget there’s a natural eco-system service there that tends to get left out of the picture and tacked on. We can’t have co-existence if we’re not mapping what the threshold limits of those systems that we rely on [are]: the water, the soils, the vegetation, the biodiversity. I think that’s just left out of the picture and tacked on at the very end.” ~Environmental Network 2

As well as the discrete considerations of impacts on water, on soil, on biodiversity, on single properties, and on a single industry (by a single operation), many of those interviewed noted that it was cumulative impacts over time and space on the region’s overall development that needed to be understood whereas current management approaches tended to focus on individual impact sources in the present. In this respect they implied endorsement of a systems approach across time and different spatial scales:

“At what point in time does the overall development of an area [get taken into account] when we’re approving [on a] project by project basis? How do we take into account the cumulative impact of the loss of that landscape, or the loss of that water, of the impacts on underground

water, of produced water, of everything else?” ~Agricultural Sector 1

“...I’d like to see a future fund of water, so we can bring in the solar farms, or whatever else; industries that need water, because at the moment we haven’t got any spare water in the system. They’d have to buy it off an irrigator, or something, to bring new businesses in. [...] There are some companies who can do some extremely sophisticated 3D modelling of the underground and if we’ve got an area of concern, I’d like to see investment in that stuff to see if we can more accurately predict what might happen.” ~Advocacy Organisation 1

Nevertheless, ways the region could benefit from broader environmental initiatives were rarely mentioned. The one that was – the Carbon Farming Initiative – did not seem to have wide take-up across the region.

Summary

Key natural resources that were valued were land and water, though this was as much for their productive and economic values as for any ecological, aesthetic, recreational or other values they could serve. Nevertheless, problems were regarded as multi-dimensional as evident in the fact that with respect to this category of assets – more than any other – there was mention of psychosocial impacts of recent development connected to energy extraction. This highlighted that identity and emotional well-being are important considerations. There was also the interesting phenomenon of agriculture being ‘naturalised’ and farmers portrayed as ecological stewards.

The responses about natural assets showed that a cross-section of the people interviewed regarded environmental issues as of paramount concern and as relevant to multiple sectors/stakeholders, though they sometimes had different priorities. This meant that management strategies could not be successfully implemented sector-by-sector but rather required a degree of coordination. The variety of strategies included technological advances, voluntary initiatives by producers and regulation by government.

Strong distrust was evident when it came to perceptions about this form of capital. The distrust was of authorities and of the resources industries as well as of available data. The latter was seen as incomplete and uncertain and hence underpinned considerable uncertainty, perceptions of high risk and an inability to predict and plan satisfactorily.

Financial Capital

Financial capital represents available revenue streams and economic resources (Cleary, Baumann, Bruno, Flores, and Warren 2003; Porritt 2005). It was the second most frequently mentioned form of capital in the interviews, followed closely by Social/Cultural capital. The Perceptions Scale sought feedback about ten different indicators of the state of the regional economy including: employment, house and land prices, the cost of living, business milieu, and debt levels. Interview participants drew attention to changes in the conditions of both household and regional economies.

Pluses and minuses

The story told here should be a familiar one to many in the region, and elements are characteristic of what one might expect in a resources boom, albeit in the context of a historically prominent agriculture – now agribusiness – sector. Financial capital in the region is perceived as having grown in some respects but having become more unstable in other respects. Increases in income and in sources of income were seen as positives for many residents, while rising costs, the risks associated with investments to take advantage of growth in demand, and limited benefits to those outside the resources sector were noted as salient negatives. Long-term changes in demographics and fluctuations in commodity prices surfaced as stressors. The interviews detailed specific negative effects on those with limited income (for example, the trebling of rent for a grocery store employee) and the challenges of adapting to a potentially more volatile economy (for example, shifting choices of crops).

Stakeholders from most sectors characterised these indicators as having worsened. The advocacy, business and community sectors considered that indicators of financial capital were positive five years ago but negative today (see Figure 12).

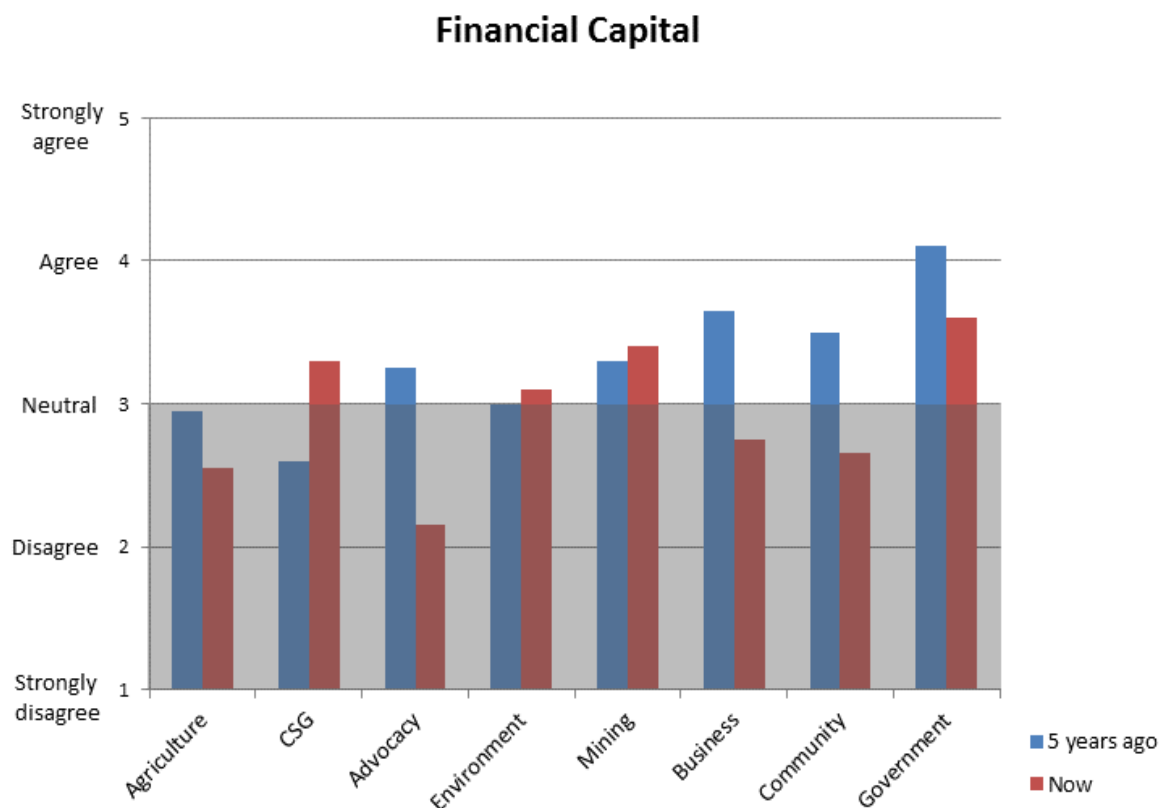


Figure 12: Average Likert scale scores of interviewees from different sectors assessing the change in financial capital over the last 5 years in communities as a result of interaction between industries

Economic turnaround

Representatives from the resources sector described indicators of financial capital as having improved in the last five years. The CSG industry respondents, for instance, rated financial capital negatively five years ago and positively now. Representatives of the environment sector also noted an (small) improvement in financial capital in the last five years. According to a number of interviewees, the Darling Downs region was in economic decline prior to the arrival of the resources industry, due in part to low agricultural commodity prices, drought, debt and tight credit, especially after the GFC:

“Rural communities prior to energy and resources were dying...These towns [had] the crippling interest rates in the 1980s then they had the huge drought on record in the 90s and noughties... It got to the stage where a lot of farmers were asset rich and cash poor. They're getting 3 to 4% return on their investment, the debt was starting to kill them – the whole range of things – their kids were leaving the farms because they didn't enjoy the lifestyle that they saw their parents [having] and the stretch [with which] they were having to do it. The regional communities couldn't keep the kids there, and there was no business being invested in the towns, housing was slow, the list goes on and on.” ~Business Network 4

“[Agriculture in the Roma area has been in] decline or on the border of subsistence. It has been a very difficult period – it has gone through a very dry period, so what agricultural activity occurred there has been directly impacted by a very long drought which in turn impacted the economics and so forth. So I don't think in any way, shape or form you could call it a high growth area without the coal seam gas/mining impacts in those areas, which give a diversification to the community.” ~Resources Sector 1

Other areas of the State have faced similar economic decline and the respondents indicated that they could see few options for mitigating these conditions other than government subsidies:

“Cost of production is outstripping what you're getting for commodity prices. So there's only one thing that's going to fix that. Whether farmers get subsidised like they do overseas, I don't know. But probably Australia can't afford to do that at the moment.” ~Business Network 3

However on the Darling Downs, a conjunction of factors and of natural and other resources was regarded as particularly auspicious and perhaps providing an alternative for this region:

“The opportunity of growth and renewal in a regional sense is something quite different to what we've seen in other areas of the State.” ~Resources Sector 6

Hence some respondents were willing to contemplate a future with new industries such as CSG extraction in the region and on their properties if it were an economic proposition and guaranteed a financial return:

“One of the problems, initially, was the companies only had to compensate for impact. Well, if you're only going back to where you were I'd sooner not have the damn thing in the first place, because there is nothing in it for me. There's either hassle in the process and nothing in it, or if there is a small profit, or a reasonable profit – and really, if you work back on a per acre basis, it's not hard to make it a very attractive crop, per acre. We know what we make out of growing crops, per acre and if you have something – gas well makes you 10 times that, on a regular basis, and it isn't causing you too much inconvenience, it probably isn't a bad thing.” ~Advocacy Organisation 1

Inflationary Pressures

The resources industry has recently injected capital into the region, creating jobs and increasing the overall population, as well as creating secondary income for some farmers. In other places, off-farm income has been associated with rural continuity and the persistence of otherwise marginal farms (Potter 2004). However, while the resources industry representatives emphasised the increased economic diversity of the region as a result of resources development, other stakeholders highlighted

the negative impacts of inflation attributed to resources development on the regional economy, which has affected various monetary assets and financial transactions:

“Obviously if you’ve got a major engineering or earth moving business, you attract business, you’re doing incredibly well, or a motel. But, if you work in town at a local shop, or the council, you’re doing incredibly poorly, because your rents have gone through the roof and suddenly you’re flat out paying to be able to live in town. For us, we’re seeing increased costs. All our professional services are \$100 an hour plus, whereas they used to be [in the] 40s and 50s. Freight is dearer. We can’t get labour. We’re relying on backpackers a lot more because we just can’t get permanent staff. So, it’s quite an added cost to one sector of the community, while the other sector booms. I’m not sure how you fix that. Over time we’ll fix it, but it’s pretty bloody hard for that five-year period or 10-year period that it’s all boom, boom, boom.” ~Advocacy Organisation 1

Some stakeholders described the economic situation as one in which there is an uneven distribution of negative and positive impacts (or ‘haves’ and ‘have-nots’), or they referred to a ‘two-speed economy’. One of the most commonly mentioned issues was the rising cost of housing (both rental and ownership) for all local people, but disproportionately for those in lower socio-economic groups:

“Even within a town, if you’re not in some way involved in the industry, then you’re not a winner – like if you’re a check-out chick working at Woollies and you’re renting in Chinchilla and your rent’s gone from \$105 to \$800 a week when you’re only earning \$400 a week at the supermarket. There is no benefit in this industry to those people at all, and they form a considerable part of the community in these country towns.” ~Advocacy Organisation 6

These inflationary pressures and the resultant two-speed economy, rather than alleviating the economically depressed rural conditions that preceded the resources boom, were seen to exacerbate divisions – both the material gaps and gaps in understanding:

“I don’t think the companies can understand that a person who has to live on \$500 a fortnight or something simply is put in an untenable position with the rents going up, mainly because that resources company is in town. Although they make all the right noises – “yes we do understand”, “it must be terrible” – but then sitting on their thousands a week, they couldn’t have a clue. And some of those old guys that are down on their luck now are old farmers. There wasn’t the money around then that there is now. And I think it’s just the understanding of that. Because I think they do know it, but they cannot understand it”. ~Community Organisation 2

Similarly, the resources industries have bought up land in some areas, reportedly leading to the inflation of property prices on one hand, and difficulty selling properties on the other:

“Mining and resources sector might move into an area and pay a lot of people out, who then go and offer above-market value for what they’re buying. While the Valuer General can remove what the resource pays in excess, they can’t take into account the inflated value of that person purchasing a secondary property.” ~Agricultural Sector 1

“You also hear a lot of people talking about not being able to sell property – that if you’re in a gas area you just can’t sell it; no-one wants to buy it. I don’t know how really true that is – obviously, some of the gas companies are buying property and building up their own acquisitions, so obviously some properties are changing hands – but you do hear that a bit – that you can’t sell property.” ~Environmental Network 2

Such price increases as well as increased demand from rising populations were linked to higher cost of labour and the higher cost of living in the region more generally. Businesses were said to struggle to pay higher wages and, in turn, to pass the higher cost of labour on through increased prices of products and services:

"The cost of living goes through the roof in some of the little towns. Little businesses struggle to find employees because of the wages mining is paying." ~Resources Sector 3

Government charges, including the costs of council rates, were also said to have increased. Escalated costs for labour and transport were noted as prohibitive for the agricultural sector and as creating shortages of these factors of production:

"With extra pressure from other industries taking labour and forcing the price of labour up and the difficulties with not being able to get trucks, not being able to get trains – all these kinds of things, some growers out there have just said, It's too hard. I can't do it." ~Agricultural Sector 5

"One of the largest costs for beef producing at the moment is the transport costs...Transport is a massive cost but if we can alleviate some of that and can actually get freight moving by rail as well... which is actually a task that the State Government need to look at as well... There needs to be foresight in that." ~Resources Sector 4

Labour market

Increased employment in the resources industries was reported to have some positive economic spin-offs for local communities and some local businesses, including some farms. Some resources companies claim to give preference to employing local residents for long-term recruitment, which is considered a mutually beneficial strategy:

"[I]f they're in the local town, they're a very cheap recruit and a cheap source of labour. So all of the coal seam gas companies said we have a preference for long-term operatorship to be located in the local areas. And in general that has been the case." ~Resources Sector 1

While employment was considered a positive economic benefit of resources development for local individuals and families, employment opportunities in the resources industry are reportedly not matching high expectations of unskilled or low-skilled people in the community:

"I see a lot of the lower [skilled] people looking – they think that there are all these jobs in the mines, but they never seem to be able to get them. That's always a bit of a problem – just how they go about getting jobs... [O]n the TV you hear about all these jobs, and we have had the odd person – we haven't had as many as Chinchilla or even Tara – the odd person who has turned up here, and [says] "where's the job?" They really think they're just there and you can just walk into it. So that's a bit tricky, because they usually come with not a lot [...] [T]he jobs that you hear about, they don't seem to be there...They are, but the non-skilled don't seem to be able to pick them up." ~Community Organisation 2

The high salaries paid by the mining and CSG sectors have also led to a reduced pool of skilled employees and an increase in the costs of labour for other industries, with many small businesses having to pay high wages to retain their staff:

"What they're paying for wages [in some towns] is two and half times what the wage should be – just to hold men. That's forcing consumer goods up, to try to cover the costs of those wages... So it's all spinning down the line... [For example] from a hardware perspective, anyone doing renovations to their home, even just the little bits are all getting more expensive because these guys are trying to cover the increase in wages that they've had to pay to retain men. And the [resources] companies are walking into businesses and offering staff – mainly mechanics...huge wages." ~Business Network 3

Business mix is changing

Interviewees reported a general shift in the regional economy with some traditional activities in decline while new opportunities existed. Hence the future scenario was regarded as being different:

"I'd say you'd have some changes to our economic base, I think in 20 years' time it will still be – in terms of the scale of land use – predominantly agriculture. What percentage that contributes

to the total economy in the future, I don't know, but I think it will still be largely agriculture in terms of a percentage of area that is used. But obviously in 20 years' time I think you'll find there will be a lot more coal seam gas wells [and mines]." ~Government 3

Associated shifts were also occurring in various towns and communities. While some small businesses (for example, car sales, coach charters, bakeries) have flourished as a result of resources development, others have reportedly closed or lost profit. This was said to be due to the influx of large chains like KFC, Woolworths and McDonalds to cater for the increased population as well as to broader social trends not linked to the resources industry, including the greater likelihood that local people will purchase products in the larger centres, the advent of online shopping, and the high costs of labour. It was reported that the profile of businesses in the region has changed, reflecting the changing business environment and demographic (that is, an influx of single males working in the resources sector and a concurrent exodus of families found in many rural towns). While there was said to be an excess of certain types of business (for example, bakeries in Chinchilla), a dearth of others was noted. It was suggested that some businesses have over-invested in infrastructure and staff to meet the demands of the resources sector:

"When you drive into towns like Chinchilla and Miles and Roma, the assumption is that those towns are humming; there's lot business going on. At one level [...] lots of businesses, [for example] the restaurants, the motels – our occupancy rate of motels in this region would rival the Gold Coast, easy – [are] running at 100 per cent plus. They'll squeeze other beds in if they can, in most motels. The assumption is that those sectors, the engineering works, all of those players, are making lots of money. But when you ask them are they making lots of money, they've put a lot of money into renovations, they've put a lot of money into finding and keeping staff, their wages bill has gone through the roof. So they've geared up, they've capitalised, [but] they haven't paid off their capital yet - a lot of those businesses have grown to stick with the industry ... I think there's an assumption that business is doing really well, but I think a lot of people in those businesses have grown and are still nervous that the growth will last long enough to be really profitable." ~Environmental Network 2

Constant adjustment in the business environment reinforces concerns about economic instability:

"When it started out at Roma a few years ago, yes, there seemed to be a lot more money in the town. Five years later – they're flying blokes in, they're flying them out, nothing is being locally sourced – it's all outside contractors. There's more small businesses for sale at the moment in Roma than almost any town in western Queensland. And they can't sell. So you can't tell me that that is a great thing for a rural community and that's happened in five years. It's not sustainable." ~Advocacy Organisation 6

Even within the agricultural sector there are changes. The low prices of agricultural commodities and increasing cost of inputs have led to what was described as a high cost-to-benefit ratio of some agricultural products, placing more importance on farmers being able to have a range of cropping options to adapt to changing price regimes for these commodities. These trends are linked into the broader context of global trade, though Australia's resources boom has recently exacerbated problems for other export industries like agriculture. As a consequence, for both recent resources industry-related reasons and also longer term structural adjustments, the agricultural landscape in the region was said to be changing:

"Productivity and sustainability are the two biggest issues, I think, especially in grain ... A lot of wheat producers aren't growing the volume of wheat they used to, and I don't mean the tonnage – I mean they're not planting the acres and the hectares that they used to. A lot are cutting out. I know quite a few that have just decided they're not going to grow wheat anymore, because there's just not enough financial return in it, especially when you take into consideration the risk factor. It's just not there... There's always been that return – always been that risk, but when you look at the wheat prices compared to what they were 20 years ago, why are we growing it? Why are growers growing it, because it's just not keeping up with the costs

... There's no saving commodity, there's nothing there that is – that anyone has come up with that is going to replace wheat. I think it's a moving change. This year, I think, we're going to see a lot more chickpea, because chickpea prices are up. It's a dearer crop to grow, but I think a lot will grow it. They'll take the risk on it because they need the return. Surprisingly, some are going back to just straight livestock” ~Agricultural Sector 5

In this state of flux, decisions about business mix were still within a producer's experience, knowledge and control. The impact that a new industry would bring on existing production practices was both less controllable and less understood:

“In terms of agricultural production, it is world renowned [in] this part of the world because of the adaptability. But what we don't understand and what we're not being told is the impact that this next industry is going to have on our industry. Now we don't just live here – I don't think any grower lives here – just because it's good to grow cotton.... We live here because it's a good place”. ~ Agricultural Sector 4

Such decisions demonstrated that many agricultural producers preferred to stick with more familiar diversification strategies that might involve moderate risk and a low return rather than take what they perceived as a higher risk that promised higher returns in the short term.

Sustaining the growth

The fluctuations in economic cycles have contributed to fears about the resources industry creating an unsustainable 'boom-bust' cycle with both the current boom and future post-mining scenarios posing challenges for the local economy. The capacity of local government to manage the rapid pace of resources development was called into question especially given the lack of royalty flows back into the region from State Government. The necessity in the longer-term for a self-sustaining, diverse economy after the resources 'boom' was emphasised, with people harking back to an earlier boom in the region to suggest authorities should plan ahead to ensure a lasting legacy:

“Roma is a good example – in the 70s they found natural gas and houses went up and businesses boomed and the next minute [it] all went away and everything nose-dived. And I think that will happen here [in Tara]. I suppose the industry is a lot bigger now and probably more ongoing, but at some stage they're going to have enough infrastructure there. What happens to all these houses? [...] The Government is pulling a lot of money out of this resources sector. At the moment they need it to survive. But if they can get themselves out of [that], I reckon they should look at schemes that will benefit agriculture in this area that will be an ongoing income, and create job opportunities for when this happens – when we get back to skeleton stage...There's a great market in Southeast Asia on our doorstep...Put some money aside for future development of the agricultural industry. The money that the government is pulling out of these areas – get into a think tank and say well, “What can we do to replace this industry?” ~Business Network 3

In the shorter-term, it was suggested that there are industrial opportunities in manufacturing connected to mining for the larger regional centres in a context where Australian manufacturing overall is stagnating:

“In terms of manufacturing, things are changing. Jobs are going to China. But we're finding new manufacturing opportunities from the mining industry.” ~Government 3

Similarly, alternative industries that take advantage of the energy production on the Darling Downs or of by-products of the industry (for example, food manufacturing and salt processing) were provided as examples of potential economic opportunities for the region in the future, as well as evidence of the imperative for co-existence:

“You can't have bacon without energy. It's interesting, farmers don't produce food, they produce agricultural products. When [my Dad] sold pigs at the local auction, no one showed up to eat a live pig. The abattoir, the refrigeration, the processing of the bacon, the energy for the

tractor is all a necessary part – so for me, food is agricultural products plus energy equals food. It's true you can't eat gas. You cannot eat live pigs, or you don't eat wheat either. You eat flour. You need the two together. So what we're saying is you have to have both". ~Resources Sector 1

However, whether that means they should be produced on the same land or in the same region rather than located on separate sites is not easily resolved by economic arguments and statistics. Nor can decisions about appropriate locations, levels of production and thresholds for impacts be based on consideration of each industry separately. Local councils reported that there are many decisions they face with respect to zoning and planning schemes in determining the functions of various rural land 'precincts' and that these needed consideration of multiple factors.

CSG's impact on agricultural productivity

In terms of co-existence of resources and agriculture, while the impacts of resources development – and particularly CSG development – on landscapes and farming practices were often framed in terms of social/cultural capital and lifestyle, the impacts in economic terms were also raised. Agricultural productivity was acknowledged as a defining characteristic of the region:

"[I]t is a significantly important agricultural area and we underestimate the importance of food security I think. Currently we're exporters of food and we support global food security. I think a lot of farmers take great pride in the fact that they are part of that. That they do have a very, a cutting edge industry almost, in a lot of cases. They really are at the forefront of innovation in agriculture and they really do a very good job in terms of agriculture. I think that will be compromised. I think there will be shortcuts that will have to be taken. They're not as financially secure as they were and we'll see a lot more land degradation. I can't see the rationale for compromising that for a resource that's available much more broadly across the State." ~Environmental Network 1.

Some of the strong concerns about compromised productive capacity now and in the future were linked to specific practices, including the potential transport of weeds from one property to another by gas company vehicles and the impacts of vehicles accessing areas where livestock may be grazing in terms of stress to animals, gate closing etiquette and soil compaction. Similarly, CSG infrastructure such as wells and access tracks are an intrusion on cultivated land, not only during the time they are in use but potentially beyond that:

"People need confidence that the CSG companies will not ruin natural resources and the place will return to a productive state. There is a lot of fear of the unknown and lack of understanding" ~Business Network 1

However, the presence of CSG wells on properties has provided a supplementary income for some landholders and examples were reported of properties that now produce both agricultural commodities (for example, wheat and beef) and CSG:

"We hear about people concerned that they'll have coal seam gas company staff coming and going at all hours and putting tracks in to access their gas holes. Some of that benefits the farm, to upgrade the farm tracks, but then some of it's putting in infrastructure all over the place that they don't really want. So [it's a] disruption to business. The flipside is they're being paid per gas hole, and some people [have] infrastructure upgraded that they do want. So it's not all negative." ~Environmental Network 2

Cases were also cited where farmers have been employed by resources companies, providing them with a stable source of off-farm income with work schedules that allow them to maintain their work on farms:

"Now some are leveraging resources sector incomes for these purposes [investing in on-farm capital improvements] and do not have to wait for a bumper crop. They are able to earn an off-farm income with flexible rosters of two-weeks on, two-weeks off. In some cases, this has

allowed farmers to improve their farms – investing in fencing infrastructure etc.” ~Advocacy Organisation 2.

This arrangement was said to have little appeal to full-time, profitable farmers and be more suited to those wishing to remain living on more economically marginal properties, sometimes called ‘hobby farms’ or ‘lifestyle blocks’. However, according to interviewees from the resources sector, a high percentage of broad-acre farms have off-farm income, partly because of the economic circumstances outlined earlier:

“I think employment is a big one. According to the ABS, 45% of broad acre farms have off-farm income – which is typically the wife is a school teacher or they have a job in the town or someone on the farm has external income – so nearly half of the broad acre farms are in such dire economic straits that they need to support it with other income. Now the gas industry is very good at drive-in-drive-out or fly-in-fly-out, so typically what I’ve seen in conventional areas, like Cooper Basin and more so is the case in these areas we’re talking about, is a farmer can keep the farm [and] actually work 12 hours on/12 hours off [for a] two week stint and get two weeks off, or ten days on/ten days off. So those sorts of rotations are perfectly suited to farmers. It enables them to get a farm income and generally takes advantage of their mechanical or operating skills...” ~Resources Sector 1

While these arrangements were possible with both mining and CSG employment, the resources sector also talked about the benefits of farmers being employed to maintain CSG infrastructure on their own properties:

“[I]n terms of sharing the benefits [it is worthwhile mentioning] programs where you up-skill the landholder to do some services related to CSG infrastructure – if you’ve got a few wells on your land [...] and whatnot. The beauty of it is it gives the landholder an additional income stream, which is seasonally independent, but it also reduces the privacy impact of the industry, which is often one of the main issues that cause people to be uncertain of the industry. [...] I think that can be a game-changer for the industry. I think the risk, of course, is that instead of being a farmer that does some CSG stuff you become a service company to the industry, [so] we need to make sure that it doesn’t become too lucrative so they entirely give up farming. But that’s a very good example of co-existence – of finding a way of two industries to work on the same piece of land and work well together.” ~Resources Sector 4

Compensation levels could play a big part in the economic viability of affected agricultural businesses. There were anecdotal accounts of farmers who accommodated CSG wells and even considered them a productive asset to a farming business:

“A big thing is disruption to their work patterns... [One Landcare group representative] has been telling [farmers] “Get yourself a property management plan This is where my cows are calving, these are my wet paddocks – I don’t want a pipeline and a well in the middle of my wet paddock.” And he seems to think that helps a lot. The resources company will say, “Okay, well we’ll just pop it over here on the fence”. And I think if you do it that way, they’re prepared to negotiate. But if you buck them, they’ll pull the big stick out. That’s the impression I get...” ~Business Network 3

“We’ve got power poles in our fields that we work around. We’ve got our own bores in our fields we work around. If viewed as an asset to your business, it would be treated a lot different than if it’s viewed as a liability to your business” ~Advocacy Organisation 1

This could even be viewed by some as a kind of ‘drought-proofing’ for producers vulnerable to the vagaries of nature:

“[I]f compensation to landowners was at a level where it actually reflected the disruption and the damage that gets done, then I think that it would go a long way, because I think that it would make those properties saleable again. Like if there was a large annual payment for having a

coal seam gas mine on your property then somebody who was looking to buy the property might then say, well okay, if worst comes to worst and we get a drought at least we'll still have this every year. So in that regard I do think that there could be less of an impact." ~Agricultural Sector 5

The resources industry representatives mentioned contributing to increased agricultural production (for example, beef) in some areas by providing treated CSG water extracted from underground aquifers for irrigation purposes, but this sort of tangible benefit is only relevant to those with purely commercial values:

"It depends on the size of your enterprise and how you want to run it. I guess if you're happy and your family is happy. For some people it is a lifestyle, for others it's a serious business." ~Resources Sector 3

Those from the agricultural sector who participated in the study gave the impression that rather than a 'business or lifestyle' dichotomy, elements of both were valued by them and that, indeed, a major attraction of farming was being able to combine their livelihood with a valued lifestyle. Even commercially very successful farmers expressed strong appreciation of other forms of capital that could not have a price put on them:

"It's not about money – I've made my money, I've made a living for forty years. I don't need their money. They could pay me all the money in the world and I would not tolerate that. So it's not about money you can't compensate for that and I will not live there and see that. I will not live there and see that. And that doesn't mean I'm going to move so you can read into that what you will." ~Agricultural Sector 4

This does have implications for how a neighbouring resources company might operate and why purely financial arrangements might not prove satisfactory to landowners, no matter how generous they appear. This was understood by some business operators:

"When you're on the land, it's a lifestyle, which as I found out, can't be replaced. So you have this privacy thing, and next minute you've got multitudes of vehicles... So they've got to monitor the wells, but spend a few bucks coming through the back paddock. And definitely notification to the owner that they're coming to inspect." ~Business Network 3

It also explains why opportunities for off-farm employment, greater control of interactions, attractive compensation and useful by-products such as water, though they may have potential to increase productivity and the financial assets of farming enterprises, were regarded as irrelevant by some farmers.

Paperwork

Not only were impacts viewed as overwhelmingly negative by some farmers, but those in the agricultural industry who were dealing with resources companies also reported considerable costs associated with examining EISs, attending meetings and, in some cases, meeting legal expenses:

"Those of us like [...] who are community spokespeople for various groups in this region could spend every hour of our working week discussing and negotiating with [resources companies]. And, if we do a really good job of it, do you know what our reward is? We get to keep a little bit of what we've already got. Because this isn't about our business, it doesn't enhance our business. The time that we spend interacting on this is about trying to keep what is important to the community and what is currency in our community and what we all love about our community and our businesses. It can never add anything to our business; it's about trying to limit the negativity of it." ~Agricultural Sector 7

This intense activity is particularly associated with CSG:

"We would all be averaging 20 to 40 hours a week on coal seam gas issues on an average week. It's a rare week when you're doing less than that. And then you get some weeks when

you're doing plus 40 hours a week. And that's not to mention your travel. [...] And you have to pay for that. [...] I've kept a bit of a tally and [...] it's gone over \$100,000, [the] cost to my farming business. And that's underrepresented because [that's] not counting [our] time and we would get paid \$200 an hour to deal with a coal seam gas company. So when you actually factor that in, we, as a community, [are] well over half a million dollars already... [O]utgoings that have gone out of my business in terms of pure legal expenses and all of that – it costs us \$70 a day to park in Brisbane every time we went to the solicitor. You know all of that it adds up – photocopying, printing banners. You tally it all up. And ours isn't the only business. [...] There's a huge effort gone into this.” ~Agricultural Sector 4

Similarly, advocacy organisations and local councils have had to employ individuals specifically to deal with issues related to resources development policy, which is an additional cost. Resources companies too complained of a burden of paperwork as a result of over-prescriptive regulation that was resulting in huge EISs and multiple reviews that did not serve the interests of any sector well.

Summary

Growth of the resources sector, then, is seen to have added to financial capital in an uneven way and with associated costs, for example, rising prices and competition for labour with 'have nots' seen to be falling further behind. The existing agricultural sector is portrayed as diversifying. For some producers this is through interaction with the CSG industry in various ways including 'drought proofing' income from access agreements and gaining off-farm employment in the industry. At the same time, factors unrelated to resources development, such as drought and fluctuating prices for agricultural produce, are leading to other changes in the regional economy, such as the planting of different crops.

It was noticeable that those interviewed did not report that they personally, or their sector, had profited significantly from the resources boom in spite of billions of dollars of investment in the region. In fact, representatives of all but one of the sectors outside of the resources industry characterised financial capital as being worse today than it was five years ago. This characterisation might not be at odds with a more widespread perception among the Australian population about their comparative circumstance over that time, but it could also reflect uneasiness with the nature of the flow of financial benefits. Alternatively, or in addition, it could suggest that financial benefits have not yet been realised; a delay in realising economic benefits is characteristic of 'boom towns' based on extraction of energy resources (Jacquet, 2009).

Perceptions we sampled spanned diametrically opposed views from those who saw energy extraction as a 'lifeline to dying towns' to those who viewed these industries as a 'death knell for prosperous regions'. The contrasting views are based more on differing values than on financial data about the regional economy. Hence a 'best of both worlds' compromise or even consensus on the tipping point appears elusive.

Social/Cultural Capital

Social capital consists of the relationships between people. It includes the extent of local social networks, the degree to which people know each other and collaborate, and the level of trust that people have in each other and in organisations and institutions (Flora and Flora, 1993). In addition to the array of organisations, social contacts, networks and relationships, based on shared values, mutual trust and reciprocity, which are resources enabling people to interact and cooperate, socio-cultural capital includes symbolic assets such as the shared traditions, norms and institutions that constitute the identity and status of local people or communities.

Study participants rated their perceptions of the past and current state of eight indicators of social capital including: community safety; cohesiveness; recreational, entertainment and cultural opportunities; resilience; social stability and public services.

Agreement on social issues

On average, most sectors felt that the level of social capital in communities has reduced with mining and CSG development. This was the view of interviewees from the agriculture, advocacy, community, and businesses sectors (see Figure 13). Only stakeholders from the CSG, mining, and environment sectors felt that there has been a slight increase in social capital. However, both the agriculture and mining sectors saw any change as being from a low base since both of these stakeholder groups judged social/cultural capital negatively at both points in time. Although some other sectors perceived a negative change, they still judged social/cultural capital positively overall.

Looking at responses from all the sectors combined, negative change was mainly attributed to two indicators:

- This is a cohesive society without divisions (only 15% of respondents rated this indicator negatively 5 years ago, while 50% rated it negatively now).
- The level of public services provided (for example, welfare, financial services, training opportunities, childcare, ancillary health services etc.) matches the total number of residents in our region (38% rated this indicator negatively 5 years ago, compared to 58% now).

Two other indicators – those related to the stability of families and safety in the communities in the Darling Downs – were regarded as showing a slight change for the worse, but safety was still rated highly at both points in time by the majority of stakeholders (77% five years ago and 65% now).

Stakeholders tended to agree that there are a large number of active clubs and associations in the region and that the communities in the Darling Downs are resilient and cope well with change and challenges. There was less agreement about access to quality health services and availability of a range of entertainment and cultural events and activities, although the majority of stakeholders still rated these two indicators positively at both points in time.

In the interviews, there was considerable agreement on the issues involved such that the range of issues and concerns raised with respect to social and cultural capital tended to be less diverse than those in relation to other capitals like natural capital and financial capital. However, one general observation was that assumptions that the energy sector will cause significant social change were widespread:

“[O]ne of the things that's changed is the amount of talk you hear at all sorts of meetings and coffee shops and all over the place about the region being taken over. The last few years, the amount of discussion amongst landholders and local government people and others around how big an impact – the assumption is – the coal seam gas and energy sector will have on the region.” ~Environmental Network 2

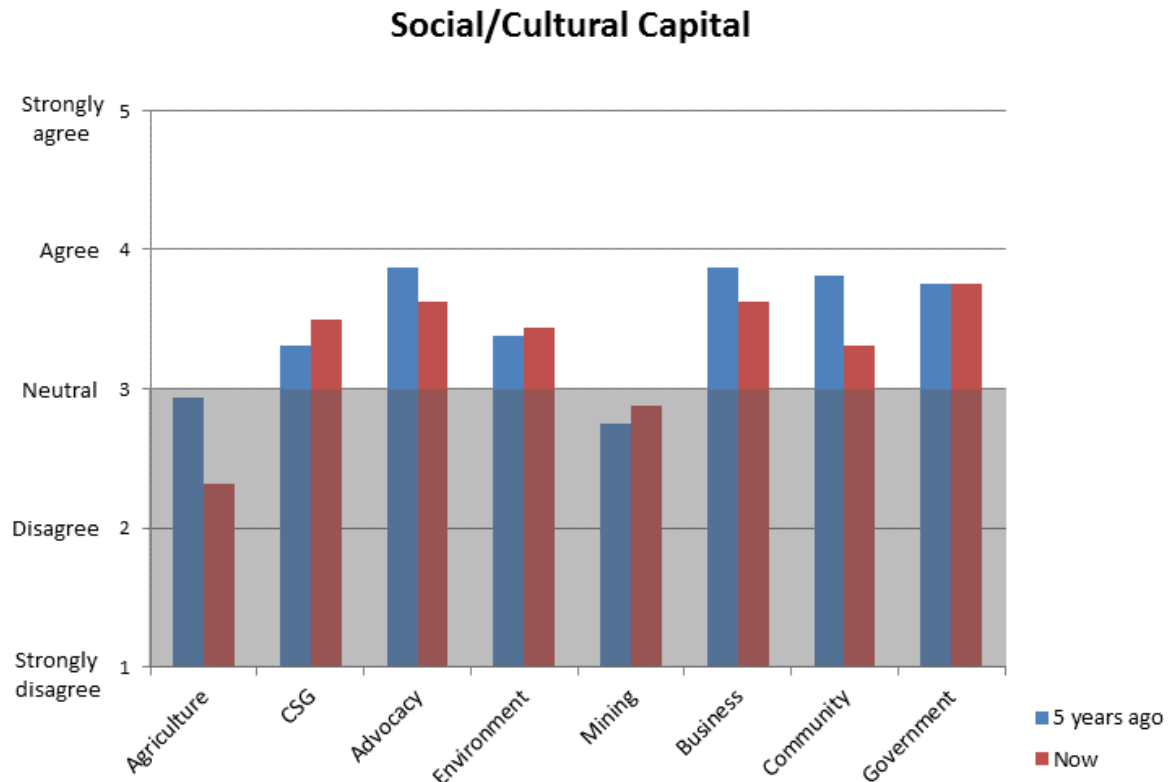


Figure 13: Average Likert scale scores of interviewees from different sectors assessing the change in social capital over the last 5 years in communities as a result of interaction between industries

High levels of social capital

In interviews, social assets were mentioned fairly frequently by stakeholders. Concerns raised in regard to the more frequently mentioned natural and financial capitals were generally strongly linked to social capital. One person suggested that this was a socially cohesive region as a result of relatively dense patterns of settlement for Australian rural areas and of interdependencies of livelihoods:

“The other thing is, the way the black soil flood plains are farmed lend themselves towards a more collective regional approach because what I do on my farm affects people downstream. So there’s an inherent tendency towards collectivism that’s different to the broad-acre grazing properties because you’ve got small blocks, in some cases still the 640 acre war [soldier settler] blocks, intensely settled, intensely farmed and a collective view emerges quite readily.”

~Resources Sector 6

Certainly, interviewees generally described relatively high levels of social capital in communities on the Darling Downs and despite the perceived downward trend mentioned above, all sectors bar agriculture and mining had positive assessments of the social capital resources of the region both five years ago and now. People emphasised family and community and frequently mentioned that people had been in the region for generations, resulting in long-standing and deep-rooted relationships between people and with the land:

“...it’s always been considered a great place to bring up children, a great place for families, good community spirit - you know, those sorts of things - always been strong in that area.”

~Agricultural Sector 5

Several interviewees felt that communities were resilient, partly because residents could access social infrastructure and facilities locally or from the regional hub of Toowoomba:

"The community is quite resilient because people can access services from Toowoomba and education opportunities are available in Toowoomba. Employment opportunities I find available as well. So that all feeds into the resilience of our community I suppose."
~Environmental Network 1

A threatened identity and traditions

Resilience was deemed necessary given recent changes, including to less tangible social and community assets such as identity and culture that were frequently mentioned:

"I suppose the biggest thing when you come to an established community – because as I say I grew up in a rural area – is when [...] it's a settled community; it knows its identity; it knows who it is; everyone knows each other; they know where their major sources of income are; the biggest industries are. I think the biggest thing I was seeing over the last six years while I've lived here is that changing identity; how all of a sudden we've had to accommodate more IDs, different sources of income. I think it's that we're not an agricultural area anymore. I think that – not so much makes me feel insecure, it just changes things. People are not sure anymore of what the future may hold. The problem with that changing identity [is that] it changes the culture of the town a little bit... So you've sort of got just a previously relaxed, calm community that knew its identity, knew where it sat in the world has sort of been tipped on its head; doesn't really know who it is; who it is to believe" ~Community Organisation 4

The farmers of the region seemed integral to the stocks of social capital, the resilience and the identity of the region. Farming was often described in terms of being a strong part of the identity and culture of the region, and it was emphasised that many farmers are strongly attached to their land. However, many interviewees said that this agricultural tradition was changing. Although many interviewees attributed these changes to the new, non-agricultural industries, others said it was because of low commodity prices and recent drought, which have made agriculture less economically viable:

"This is a very secure farming area and there are families that have been on properties for five and six generations and they can only see a future where their children would take over the family farm and continue with it. So there's no thought of moving away from those places until something like this comes ahead, and now [they're] going, 'well what does this mean for my family?' So I think it's really a negative feeling about what the future holds in terms of employment for their family." ~Environmental Network 1

"The 'Downs overwhelmingly sees itself as agricultural. But trends have been in wrong direction recently. The region has been in a gradual process of some decline in terms of population, influence and wealth." ~Resources Sector 6

In contrast to agriculture, many respondents saw the resources sector as a temporary addition to the region but one that has led to rapid change in the make-up of communities, social networks, and people's familiarity and comfort in their community. One person from the resources sector noted that this extent and rapidity of change was not easy to prepare people for:

"People that say this is an overnight thing and it's all a bit rushed, it's a good example of when it comes into the context. Three years ago we called a meeting of the people of [a small town in Queensland which is significantly impacted] and we said we'd like to talk about coal seam gas, and four people showed up. Because why would you? Imagine if you got a letter in your letterbox before all this that said, 'Come and talk about coal seam gas', you'd go, 'I don't care'. And I understand that. But it was three years ago. And now, being a bunch of engineers, they say, look this many trucks are coming through, we're going to start at this time we'll finish at this time and here's all the Gantt charts, and here's all the project stuff – they talk in project speak – and farmers glaze over and go, 'I have no idea what they're talking about'. But the trucks start

showing up, as they were predicted three years ago. And people start saying, 'hang on a minute, where did the truck comes from?' And this is a surprise." ~Resources Sector 1

Social services under pressure

The key social issues raised in interviews were pressure on housing, lack of social infrastructure and pressure on social services due to population increases linked to resources development, particularly in the areas of education and health. The large itinerant population involved in the resources sector was reported to place stress on local services. People explained that infrastructure and budgets for many social services cater for populations based on Census data but the demand is higher due to a large transient population in the region.

The strain on service providers supporting local people is exacerbated because the negative impacts of resources development disproportionately affect lower socio-economic groups:

"They're not coping, and they're dealing with people in the front line in terms of [those] who have no chance of work, or [are] losing their homes, or unwell or dying and they don't have access to health services, so they get the worst of it. Most of them are doing it for voluntary or ridiculous wages." ~Environmental Network 2

As a number of interviewees emphasised, many social services, organisations and community groups depend on volunteers and it was anticipated that the demographic changes would reduce the supply of volunteers to the detriment of the communities overall:

"I imagine that the fabric of those communities will change... They will have higher populations no doubt. But they will have populations of people who aren't necessarily committed to the local community. They are working long hours - they don't have time to put into social infrastructure of the communities. They're not involved in service clubs, they're not involved in community organisations, they're not part of the community in schools, [and] they're not interested in things like Landcare. So I imagine [that] they're there essentially because of the financial opportunities for them personally. I think that that's not necessarily a good recipe for small, rural communities." ~Environmental Network 1

Social impacts are cumulative

In general, concerns about social and community resources arose in response to both the addition of extra people and other compounding issues associated with the advent of a new industry. Services were reportedly unable to keep up with demand because of multiple interconnected issues, and 'feedback loops' were apparent. For example, it was asserted that the high cost of housing led to people seeking support services, yet many service providers had high levels of demand and limited capacity, in part because they struggle to attract staff due to the high cost of housing. Similarly, health services, such as at the hospital in Dalby, are often understaffed due to the difficulty of recruiting health professionals because of lack of housing.

Many services also face a reduced pool of volunteers which have often supplemented the capacity of NGO service providers. Interviewees emphasised that this was partly a result of landholders, community members and leaders investing time and energy in dealing with issues related to CSG development, for example, serving on consultative committees, undertaking research to fill information gaps, negotiating land access or campaigning against the industry. This was a major additional demand on their time and skills that detracted from time and effort required for their business, family and for voluntary community initiatives and organisations:

"And do you know what it has done to the community? It has taken away our time that we could be spending with our family and our community already. We don't have the time that we should be spending with our family and with our grandchildren. It's sucked up all of the people that would traditionally do the things in the community that would bring the community together. [For example] I serve on the board of a [health provider] and we've got some serious issues that

we've got to be dealing with there. I just cannot do it. I physically cannot do it. And stuff to do with the irrigators and the cotton growers. What do the irrigators and the cotton growers spend their meetings talking about? Coal seam gas. You know we don't get onto the issues about interacting with the Murray Darling Basin or the State regulations about water issues that these organisations were formed to do. We're not doing that anymore. And these organisations have some paid secretariat but they have no paid executive it's all voluntary. Those volunteers that have traditionally done that industry-type stuff that has to happen are all tied up in talking about coal seam gas and interacting with coal seam gas companies and State regulators and now the new commission." ~Agricultural Sector 4

Community investment by companies

Some respondents noted that resources companies had provided important financial and in-kind support for a wide range of community organisations. This was very valuable for communities in addressing some of the negative social impacts and, strategically directed, had the potential to enhance social assets more generally. However, others pointed to the need for greater investment in services and facilities to meet growing needs. Some stakeholders also noted that resources companies tended to invest in the more established community organisations, making it difficult for smaller organisations with limited capacity to take advantage of funding available from resources companies. This has caused some tension amongst not-for-profit actors. They also noted that communities still generally lacked volunteers and that effective investment by companies and government in capacity building and strategies for the longer-term were required:

"There's is a lot more funding available for the NGOs in those regions that are directly affected by mining. The resources companies will not put money anywhere where they're not directly operating, because they don't see that there's enough PR in there. There has been a benefit to groups like Lifeline [who have received money from resources companies] because they're providing services out in those regions. That's a good thing. But there's also an increased demand on those services beyond the initial funding because most of the funding that they get from resources companies are one-off grants. They're not ongoing. So the pressure on governments then to maintain those services beyond what's initially established increases as well. It's a short-term view. So there is an increased demand." ~Business Network 2

Although the risk of having limited community capacity and a need to rely on government funding to maintain company-initiated services and to ensure redistribution of benefits was acknowledged, some interviewees suggested that many social and community services were in fact government responsibilities and that one risk was that the community sector would become dependent on resources companies to fill the gaps in government services:

"I think what has taken a long time for companies who want to invest in the not-for-profit sector to realise that they needed to not only dish out the money but actually build capacity... So I think that's happening and I think a little bit more out of just fumbling around in the dark than any strategic direction. I know that [CSG company] specifically really wanted to build the capacity of especially the local community centres. Trying to work out how to do that without [them] becoming dependent [is a challenge] ... The biggest thing is you don't want the not-for-profits [to] become dependent on the mining company because it's not the mining companies' business, it's government's." ~Community Organisation 4

Such comments highlighted that there are blurred lines of responsibility when it comes to managing the impacts of social changes in communities affected by resources booms.

New connections and relationships

Both positive and negative aspects of cultural change or change in the 'social fabric' of communities since the advent of resources development were reported. The positive aspects reportedly include increased connections and stronger linkages between towns in the region (Dalby, Chinchilla and

Miles, for example) through sporting events and employees of the new industries socialising. Indeed some observed that communities have been revitalised due to greater populations, including younger, more socially active residents. They said that there are now more cultural events that are attended by a broader range of people, whereas region-wide events used to be limited to sporting events.

Resources companies were said to be encouraging employees to move to the region with their families and some communities are proactively seeking to integrate newcomers:

"We've got a welcoming committee going so we're very much into bringing new people into the fold and I think schools are a great place to bring new people in and local employment opportunities. So I think socially, from a community perspective, it will just be more. You'll still have your core families that have been here forever but you have your new people here and they'll mix. It will mix in eventually." ~Community Organisation 4

Interestingly, resources development has also encouraged networking and connectedness between groups with concerns about the negative impacts of resources development:

"There are perverse benefits out of it as well because communities are really coming together and finding that they've got a huge amount of energy and resources and a lot of hidden skills in terms of facing these challenges..." ~Environmental Network 1

However, not everyone saw the changes as so benign and some interviewees observed that the breakdown in perceived cultural homogeneity and familiarity between people in the region was discomfiting for some long-term residents. Many interviewees remarked that the nature of relationships between people in the region had changed, becoming more short term due to employee turnover, transient families and FIFO workers. Other perceptions of negative impacts on relationships were evident in accounts that domestic violence and family breakdown were on the rise. While some reported negative aspects, such as increased crime rates, are not supported by local statistics, social disintegration was a theme in a number of interviews.

Social divisions and disunity

Balancing accounts of new social relationships were reports of a breakdown in community cohesion or the "fracturing" of communities, partly due to increased costs of living and uneven distribution of benefits which exacerbate socio-economic differences. Interviewees also noticed that disagreement over the value of the resources industry, particularly CSG, had reduced community cohesion:

"You've got divides happening with people making profits and people not – therefore a bit of that high level tension." ~Community Organisation 4

Some felt that the rifts between community members were not just about differing degrees of financial benefit but also over different views of resources development and that, in addition, there is now tension between resources company workers and long-term community members:

"[I]n regards to a divide between people, not just landholders versus townies, but for instance I've got a lot of friends who used to work in agriculture and now work for gas companies – a lot of them. And some family members don't speak to them anymore because they're still on the land. So there's this friction and it's building up between people and some people are looking at – probably more on the side of grazing properties and dry land – that they can co-exist with coal seam gas or mining and so you're getting a bit of friction now between those guys who are okay with it all versus the intensive farmers. But even in towns now ...once you would go to the local pub in Dalby, it was all full of farmers and that sort of thing and now you've got guys in their high vis' and after a few rums things are getting ... they do, it's starting to get quite ugly. There's quite a bit of animosity going on. And agricultural communities have never been like that – they're not. And now that's building up pretty much." ~Agricultural Sector 4

Other kinds of social division were also highlighted by those interviewed. Some stakeholders mentioned a culture "gap" or "clash" between country and city values. They saw a gap between

decisions made by “bureaucrats” and corporate decisions makers located in Brisbane and larger centres and the priorities of communities on the Darling Downs. Some interviewees also felt that people coming to the region from larger towns didn’t have the same values in terms of ‘giving back’ to the community (for example by volunteering) as those born in the region. However, volunteering by the staff of resources companies was very well received.

There was also a perceived clash in behaviours and gap in understanding between CSG companies and farmers that did not enhance social harmony. Behaviours such as turning up unannounced on people’s property, assuming availability for extended meetings and discussions, and failing to shut gates offend landholders, while off-duty behaviours of contractors and even the presence of large numbers of workers in high visibility work clothes makes some town residents uncomfortable in agriculture dominated towns. To some extent all resources companies were grouped together, despite some significant operational differences between mining and CSG for instance. However, in other respects, distinctions between individual companies were made:

“Company performance is very variable – there’s a large number of resources company personnel who don’t get it right [and] systematically stuff things up. Compensation agreements with [two CSG companies] include payment for landholders’ time working with the company. The companies employ two kinds of land access officers – old ex-cookies [farmers] about same age as farmers, or young blonde women who remind you of your daughter – both set minds at ease but don’t necessarily have the full info needed. Companies with better internal communication seem to work better in the field too.” ~Agricultural Sector 1

This particular social division and communication gap – between CSG companies and farmers – was one that many interviewees thought should be bridged in the interests of regional harmony.

Summary

The Darling Downs was described as a region with a strong agricultural identity that is threatened by the development of energy-extracting industries. While people generally regard the region as having high levels of social capital, many feel this is being eroded by development pressures. These cause specific social problems and impact differentially on community members, heightening some social divisions. They also highlight the interdependence of social assets with environmental and economic ones and the ways they respond to each other.

In many respects the strongest feelings expressed in interviews related to social impacts. They included the values and emotions associated with people’s attachment to land, sense of identity and appreciation of social assets like solidarity. These were linked to assessments of the state of human capital and especially mental health. Rapid change is obviously a significant stressor when it comes to some of the less tangible and hard-to-measure aspects of socio-cultural capital. It was noticeable that few people expressed uncertainty and a need for more evidence with respect to social capital but rather had very strong feelings and considerable conviction, and many had no doubt in attributing causality for troubling social trends to the CSG industry and, to a lesser extent, mining.

Very few participants other than representatives of the resources industries thought the social fabric overall had improved in recent years. Community NGOs were reported to be struggling to cope, governments neglecting their responsibilities and community investment by companies not optimally effective. Paradoxically, the advent of new industries, especially CSG extraction, which was reported to have divided communities and severed ties, has also served to forge new bonds and connections – often to strengthen oppositional action.

Physical/Built Capital

Built capital denotes the physical infrastructure such as buildings, transport, equipment and communications utilised for economic and, equally importantly, other activities. Research participants reported their perceptions of trends in eight kinds of physical assets that constitute the built capital of the region including housing and accommodation, communications, roads and transport, power supplies, water and sanitation, hospitals, schools, public amenities and recreational facilities. Infrastructure was the only dimension that according to sector averages was uniformly perceived to have deteriorated in the last five years. Three sectors, representing over one-third of the respondents (agriculture, mining and community), have wholly negative views of the state of infrastructure five years ago and now (Figure 14). The representatives of government, environment groups and coal seam gas industry see the region's infrastructure more positively now, though not keeping up with demand.

The perceptions of change for the worse over the five year period are almost entirely accounted for by perceptions about housing and the state of roads and transport infrastructure. However, while housing was perceived positively by the majority (54%) of Perceptions Scale respondents five years ago and negatively by the majority (69%) now, roads/transport was perceived negatively by the vast majority both five years ago (77%) and now (92%). Average responses registered no major changes with respect to other individual indicators, however, communications infrastructure and public amenities were assessed to have slightly changed for the better, with an increase in the number of respondents judging these indicators positively now compared to five years ago, while indicators relating to water supplies and sanitation and the availability of energy showed a perception of slight change for the worse. Recreational facilities and public amenities were judged positively by the vast majority of respondents at both points in time and showed little change, while respondents did not agree on the state of hospitals, clinics and schools: close to 40% judged these positively and 40% negatively at both points in time.

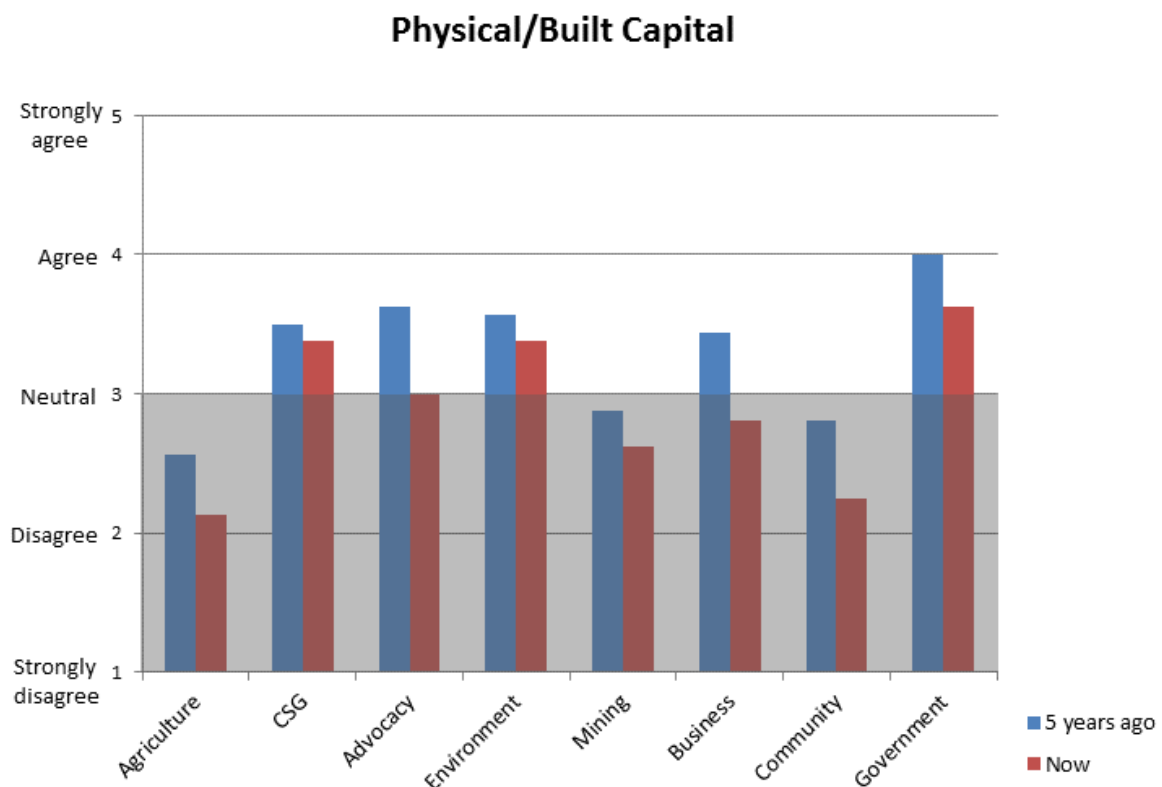


Figure 14: Average Likert scale scores of interviewees from different sectors assessing the change in physical/built capital over the last 5 years in communities as a result of interaction between industries

The adequacy of infrastructure such as housing, roads, plant and equipment is usually judged in relation to population size. In a context of population growth, associated problems are two-fold being related to both (a) supply not keeping up with population growth and (b) condition not standing up to additional 'wear and tear'. In the Darling Downs region, the multiple industries and particularly the considerable extra workforce of the burgeoning CSG and mining industries create extra demand on housing, roads, railways and other infrastructure.

Housing a growing population

In common with many boomtown situations, housing is a big concern and represents the most commonly mentioned infrastructure inadequacy partly because so many issues are connected to the supply and affordability of housing. In fact, the lack of housing in a context of population growth has led to resources companies purchasing properties above market value, causing inflated property and house prices, which in turn has led to a shortage of affordable housing, pushing lower-socio economic groups out of some towns (for example, Dalby). It also has repercussions for attracting essential service workers and professionals to work in health, education and government jobs to the region, as rental prices are high and housing availability is generally low. This in turn impacts on the quality of the services these workers provide, further highlighting the vicious cycle interlinking many issues and all forms of capital. For the same reasons, other industries are affected; for example, accommodation for tourists (in., motels, hotels and caravan parks) is in short supply, prices have risen and the tourism industry is struggling in the region.

Many stakeholders recognise that the increased population in the region is likely to be limited to the construction phase of resources development, causing concern that once the housing bubble bursts the region will be left with a number of 'ghost towns'. They drew attention to the need for some clear, informed parameters:

"I'm concerned because this has got an end date. It would be terrible if we built all of these houses, for example, and then everyone left. I just have nightmares about it. Everyone wants everything now, so I can understand the council not going out and building rows and rows of houses and in 15 years-time it's a ghost town." ~Government 1

"[Y]ou could [establish thresholds] with some of the social impacts, like no more housing in Roma until it's full and beyond that, it needs to be in camps. The fly-in, fly-out camps versus housing, it's a two-edged sword. If the industry doesn't have the longevity, we're better off having fly-in, fly-out, so then they can pack up and go. Dismantle that and you're back to where you were, as opposed to building a heap of houses that end up vacant and housing prices crashing in 20 years' time, or less." ~Environmental Network 2

Improved infrastructure – a potential legacy

In some people's eyes there has been general improvement and addition of infrastructure and facilities. For example, in some areas resources companies have contributed to the upgrade of medical and recreational facilities, although there is also a perception that infrastructure development has been reactive rather than proactive and as such is 'always behind'. The resources industry also supplies a large proportion of electricity to the region and there is potential for this energy production to contribute to financial capital if it eventually attracts different industries (for example, food processing) to the region, as has occurred in other regions in the world. However a critical need for some other infrastructure remains and many interviewees mentioned the road network – specifically a road to bypass the Toowoomba range – and a convention centre as priority infrastructure needs. The long-term outlook in terms of infrastructure was presented positively especially by business stakeholders:

I think there will be a vast improvement on [infrastructure]. That's probably the one good thing that will come out of [the resources boom]. There seems to be big moves for road improvement, eventually [...] If we get this range bypass, which I'm optimistic we will, and we've

got rail lines and facilities and there's talk of another regional airport at the moment, we'll be fine. [...] Toowoomba, I think, will be an inland port type concept, a transport logistics hub."
~Business Network 3

However, other participants noted that there is a delicate balance to ensure capacity is not overstretched and infrastructure over-burdened:

"It falls back on the prediction with the roads. Core industries like schools – our primary and secondary school are pretty full. So it's about how much they can absorb before it just gets insane. So long as the infrastructure can be maintained to not so much an acceptable level but a level that doesn't threaten human life. The roads, they're not killing us yet, but they're not far off it." ~Community Organisation 4

For the longer-term, many of those interviewed expressed the hope that operational workers in the coal mines or CSG industry and the employees of associated businesses would grow the resident population in the medium to long term in ways the larger, but more temporary, construction workforce does not. It was recognised that the quality of visual amenity and built environment in the towns would be crucial in this regard; new residents were regarded as unlikely to be attracted to establish themselves in towns without salubrious surroundings. Schools, for instance, were regarded as an important factor in attracting workers with families. However a coal-dust coating to homes, water tanks and public buildings was more discouraging.

Transport – reaching the threshold

Some transport infrastructure has improved as a result of resources industry demand. For instance there were airports constructed in towns not previously served by flights. However in general, transport infrastructure was regarded as deteriorating as a result of the cumulative impacts of multiple industries and the roads typified this situation. Increased resources industry vehicles and increased vehicles (particularly road trains) carrying agricultural produce, have a significant negative impact on road infrastructure and in many people's eyes have reached a tipping point. Both agriculture and the extractive industries require good transport infrastructure and involve considerable traffic including heavy machinery and large loads of produce. The major negative consequence in the last five years has been the deterioration of the condition of roads and highways in the region as well as increased congestion on the roads, most of which are single-lane. Recent floods have also contributed to the poor quality of roads in the region:

"The damage I'm seeing to roads is unbelievable. A lot of that is the flooding that we've had over the last two years – that's broken down the structure. But then you go putting these road trains [...] – and this year road trains are carrying six round modules [of cotton] on each trailer – so that's 12. Last year they only carried 10. I never ever see a single semi carting cotton – it's always a road train. Just driving on the roads behind them and, you know, those roads out west, you literally have to get two wheels off the road to pass a truck [...] coming towards you. You can't stay on the road. It's got really bad... The rail was wonderful because it kept so much produce off the roads, but now everything's on the roads." ~Agricultural Sector 5

Much of the extra agricultural road traffic is attributed to coal dominating (or "hijacking") available rail services forcing the agricultural industry to transport goods by road. Some participants suggested that fluctuating demand for rail transport of agricultural produce during the droughts, led the rail operators to favour more lucrative and reliable coal contracts. Although the rail link has been upgraded, there is not the capacity to cope with both coal and grain:

"We pretty well lost access to rail, because it's unreliable quantities – coal is regular and I think a certain amount of grain goes out but some years we have no grain, and it's a business, isn't it? So [Queensland Rail] made that decision that there's less loss for grain. Once they did grain and livestock. We've obviously had some droughts and we grow a fair bit more cotton, and grain has been pretty unprofitable, so there hasn't been the grain [to] go down the railway line."

It is a difficult one, but, yeah, the roads are certainly congested with lots of trucks". ~Advocacy Organisation 1.

Resources-industry infrastructure is intrusive

The changes to infrastructure compound with changes to the rural scenery and visual amenity and have ripple effects far beyond mere physical infrastructure, with people reacting strongly to the changing identity of their communities and regions as physical surrounding change and the built environment encroaches on rural spaces:

"The impact on that whole rural psyche in terms of changing your whole amenity values. You look out: you don't see paddocks or trees anymore; you see man-made structures, artificial lighting. You have noise. You have the impact of the transport." ~Environmental Network 2

Some infrastructure specifically constructed for the resources industries is not available to local residents and communities, or is a drain on their resources rather than adding to their asset base. CSG pipelines and wells, for instance, are dotted across the landscape yet information on pipelines, wells, and their impacts is not widely understood and property owners suffer the inconvenience of contractors and gas companies having right of way to the pipeline and unencumbered access to their land. So the infrastructure is visually intrusive, can interfere with livelihood activities and is an affront to property-owners' sovereignty. While some property owners complained about the way contractors or others behaved on their properties (for example, leaving gates open or not washing down vehicles for weed seeds), more complained that they can come on at all.

Another example is the short to mid-term workers' camps that have been constructed in the local area. These camps require amenities such as sewerage and waste removal and, in many cases, do not need local government development approval. Stakeholders reported that the waste associated with non-resident workers' quarters creates a burden for local government and overloads transfer stations and landfills. However, others complained that camp accommodation is self-contained with workers reportedly discouraged from leaving the camps, which limits economic distribution in the region. They suggested that where feasible, having camps located closer to towns would be more beneficial for the local economy. Similarly, while towns in the region may have run-down or non-existent recreational facilities, it has been noted that the workers' camps have a good range of facilities, which has created some tension:

"Here's a battling rural community with no facilities and there's a bitumen airstrip and Qantas is flying the people in to this thing out there and yet here's this rural community that could really do with a leg up." ~Agricultural Sector 4

Anticipation, coordination and planning

One of the biggest challenges in a period of rapid growth is anticipating change so as to prepare adequately and minimise negative effects. A key argument of many interviewees was that development of energy resources required more strategic development of infrastructure and extensive community consultation. This was seen as essential to managing growth in a controlled way so it does not create a bubble that will burst, as well as to relieve the pressure on local governments whose capacity to manage the boom has been strained. Examples were given related to all forms of infrastructure.

Concern was expressed that exclusion zones around existing residential communities did not apply to all settlements with an established equilibrium regardless of population, leaving small rural towns unprotected. Likewise the passing lanes on Warrego Highway that have recently been created were criticised by some stakeholders as being illogically placed. Towns are not currently designed by specialist town planners as mining towns and the level of investment in services and facilities to meet expanding needs is regarded as inadequate. In addition, the lack of planning with respect to housing has resulted in speculation that has pushed prices up. It was suggested that there should be benchmarking and ways of managing speculation and that both companies and government need to

build more houses to moderate demand pressures.

Though some respondents called for independent action by both the government and the resources sectors, others suggested there should be more strategic development of infrastructure through cooperation between government and resources companies that would harness their joint capacity and ensure a coordinated approach towards overall net benefits for a region. Coordination was regarded as imperative since there are multiple players involved in delivering infrastructure, including multiple State Government departments, other levels of government and private sector interests from the resources sector but also more broadly:

“Opportunities – if there’s a new rail corridor, can that help primary producers? Shared capacity needs to be holistically explored. When you’re talking transport and infrastructure, you’re cutting across four to five government departments. It’s trying to find a coordinated approach and overall net benefit to these regions. There’s no doubt there’s the economic benefit of what we’re doing here, there’s no doubt there’s the overall benefit to some of the regions where these activities are happening, but some of it is very short-term or short-lived”. ~Agricultural Sector 1

However, many respondents seemed cynical about strategic regional planning processes that have been initiated to achieve some coordination and a holistic perspective. Some expressed the sentiment that there was a planning and leadership vacuum; others noted that many responses are reacting to the current construction boom without looking ahead to the management challenges for the post-construction period. There was also a suggestion that responses reflected what was politically expedient rather than what was in the public or regional interest:

“I think we need to take the politics out of the infrastructure debate, because until we can look objectively at the infrastructure that’s required – it’s the transport infrastructure that’s the key to everything. [...] There’s no commitment in the infrastructure budget and not even in the 10-year and 20-year projections of any kind of infrastructure change in this region that’s going to help alleviate the problems that it’s causing.[...] We need government to take a more active and more committed role, and not just this rhetoric.” ~Business Network 2

An oft-cited example was the aforementioned alternative road route to Toowoomba known locally as the ‘Range Bypass’. This is regarded locally as essential because of the economic and industrial development taking place and the population changes under way. However, it was argued that there was a government preference for funding big road projects that served the populous capital cities where there were ‘more votes’.

Meeting the cost of infrastructure development

According to those interviewed, there is ‘buck-passing’ about whose responsibility it is to invest in infrastructure and no-one reported laudable examples of collaboration over the funding – or the delivery – of major infrastructure projects. A central challenge is trying to prepare infrastructure in advance before companies receive revenue flows, and before rates, royalties and taxes are flowing to various levels of government:

“The biggest change is there’s now an acute demand for infrastructure at all levels – particularly road infrastructure and transport infrastructure of all kinds – and there is little if any funding available or commitment from governments at any level to address that in the timeframes that are required... The highways are a federal responsibility, but the situation you have is that the way the legislation is drafted, the great benefit of the development in the resources sector, the royalties that are paid by those companies go to the State Government; they don’t go to the Federal government. The Federal government gets revenue through the tax system and through GST, but the GST goes directly back to the State, so once again, you can’t count that. That’s why they’ve introduced the Mineral Resource Rent Tax”. ~Business Network 2

As that quote makes clear, there are issues around how the royalties received by the State Government are deployed with various suggestions made about possible strategic infrastructure

funding arrangements. Some participants suggested that resources companies should invest in infrastructure as an advance on royalties or pay some kind of levy to council to build, upgrade and manage local infrastructure:

"The rates are not enough to develop infrastructure, on a case-by-case basis. The rate base could never accommodate what development wants, so if the developers wish to build and put pressure on existing infrastructure it's only fair they make a contribution. Otherwise we would have to put the rates up and up or just not build stuff for ten years, so we need them to contribute their share – because they might build something, but we have to maintain it. [It] might be something like: 'redesign that intersection – [it] might need lights, roundabout etc., because you are the tipping point.' It's on a case by case basis." ~Government 3

Even when the finance is available, the pace at which development is proceeding means there have been delays in construction, maintenance and repair of hard and soft (social) infrastructure with a task that may have taken three months before now taking up to 9-12 months. However, not everyone was critical of the situation, with one interviewee suggesting that it is nothing new for communities to want more or better built capital than they have, and that maintenance of existing infrastructure provision in line with population increase would be satisfactory:

"So as long as the government will put enough money in just to keep patching it up and keep – I think, like I said, it's not much different now. We always wanted a new primary school and we want this and we want that but we're coping with what we've got. So long as a little bit of money comes in with that increased population to keep patching things up or keep moving things along, I think the social infrastructure will be fine." ~Community organisation 4

Farm infrastructure

A number of interviewees contrasted the short-term, retrospective approach to public infrastructure to the way private landholders approach on-farm infrastructure-provision. They argued that when farmers have a good year, they tend to put the surplus back into built or natural capital (for example, fencing or fertiliser). They invest in maintaining their stocks of capital and keeping the land profitable:

"...they might have had a particularly good wheat season or a particularly good bull sale or something like that, and it's really interesting to see what they do with the money. [Y]ou rarely ever see the ones that pack up the family and go on overseas holidays. That really rarely happens. You'll more likely see a new shed go up or, you know, they might put in a new dam or they might clean out dams or they might renew boundary fencing or something like that." ~Agricultural Sector 5

Summary

This form of capital most concretely illustrates the challenges associated with the rapid change typical of a 'boom'. For instance, the inadequacy of stocks of certain assets when there's an increased population are demonstrated by the housing situation and the increased pressure on available assets is evident with respect to transport infrastructure. While there are aspirations that the new industries will boost the stocks and condition of the built environment, interviewees also noted that not all additions to physical/built capital associated with mining or CSG development are desirable. Reports also highlighted the significant obstacles to achieving upgraded or additional infrastructure. These include the substantial costs and advance planning that are required and the blurred lines of responsibility for delivering and maintaining much of the infrastructure.

People argued that there was little evidence that the 'limits to growth' imposed by the infrastructure and manufactured resources available to communities in the region were recognised or considered in planning. However they suggested that in terms of this category of assets, as much as with regard to natural or social capital, there are thresholds beyond which permanent damage or compromise may occur.

Human Capital

Human capital refers to assets such as the skills, knowledge, abilities and good health possessed by individuals that enable them to work, earn a living, contribute to society and thereby build other forms of capital. While it is individuals who have particular skills, knowledge, experience and capacity, collectively, a community has human capital based on the aggregated capacity of its residents. Interviewees gave their perceptions of trends with respect to seven indicators of human capital including education and training levels, physical and mental health and social diversity.

Figure 15 shows the average Likert scale scores where interviewees from various sectors rated the change they felt had occurred over the last five years in their community and in the region. Stakeholders from the agriculture, advocacy, environment and business sectors felt that there had been an overall reduction in human capital. Stakeholders from the CSG, mining, community and government sectors perceived an increase in human capital. The agriculture sector has the most pessimistic assessment of the current levels of human capital in the region and this was particularly evident in their rating of the indicators linked to the balance of long-term residents and recent arrivals and the supply of skilled or trained workers in the region. The only indicator perceived to have changed for the better from five years ago to now by the agricultural industry was levels of post-secondary school education or training. In fact, the majority of stakeholders (58%) from all sectors perceived this indicator positively now, compared to only 31% five years ago.

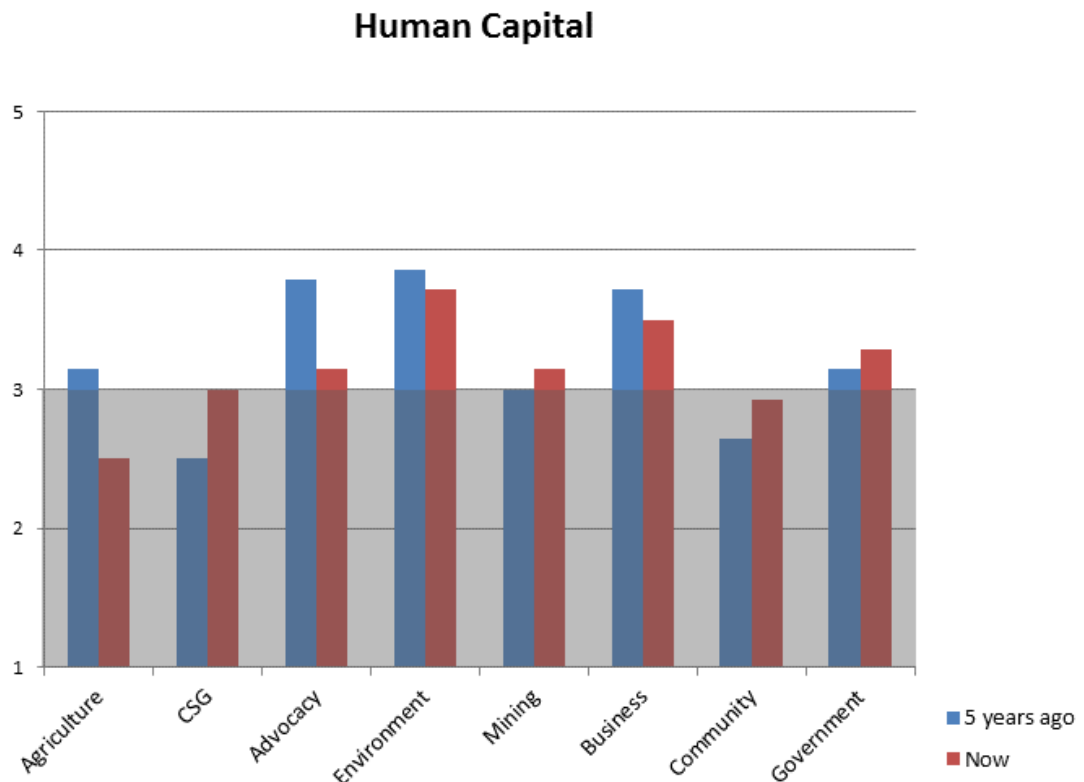


Figure 15: Average Likert scale scores of interviewees from different sectors assessing the change in human capital over the last 5 years in communities as a result of interaction between industries

Looking at the responses of respondents from all sectors to the individual indicators making up human capital, those relating to age demographics (a balance of people of different ages) and the acceptance of diverse cultures and backgrounds in the region were also seen to have improved from five years ago to now. The standard of health registered no change, but was judged positively by the majority (58%) of stakeholders at both points in time. However, the incidence of mental illness

(including anxiety and depression) was perceived to have changed for the worse. The indicator showing the most negative change related to the region supply of skilled or trained workers being sufficient to fulfil employment needs – 62% of respondents rated this indicator positively five years ago, while only 12% rated it positively now, with the overwhelming majority (77%) of respondents rating this indicator negatively now.

Ambivalence about demographic changes

Demographic change and population growth were reportedly the most significant overall changes in the region's human capital. This was seen to have both positive and negative impacts as discussed earlier. Some interviewees noticed that there are more single males in some towns as a result of employment in the resources industries. However, in other communities, many families had moved away due to either having been 'bought out' by resources companies, finding limited employment options or because of increased costs of living:

"Wandoan has lost 50 post office boxes, which means 50 families have left the area. There's 400 workers in the town. And when the council was amalgamated the town had 250 people in it. It now has 400 workers plus whoever is still left there. But the numbers in the schools have gone down dramatically in that time, because it's single men." ~Government 4

There was scepticism among some stakeholders regarding the extent to which the resources industry will attract new residents to the region. Many people felt that only a small proportion of the large resources workforce would settle in local communities with most workers being drive-in, drive-out or fly-in, fly-out. Toowoomba was seen to be an exception:

"I don't think Toowoomba is really the fly-in fly-out kind of a place, because we're too far away from it, but we might actually be accommodating more families that are working for the industries – the services industries – and accommodate those, so that obviously has an effect on our demographics, in terms of youth. And we've also got to compete with an aging population as well – and that's just a natural thing that's occurring in Australia" ~ Government 3.

Most assessments of the capacities available in the region emphasised the considerable agricultural expertise of landholders and farm labour and also of agricultural support workers that has accrued in the region over generations. Some pointed out that this was not only exceptional in regard to the specific agricultural production occurring there, and remarkable business acumen, but also in terms of political resourcefulness:

"There's a dense population of agri-politicians who've been incredibly effective in terms of not suffering in silence if they feel they're getting their toes trodden on and they have the skills and the time and the noise to turn that concern into a political momentum. And we've seen that in terms of how Strategic Cropping Land went from a sparkle in the eye of Paul Lucas to legislation very quickly. It's a different dynamic to the Queensland agricultural sector more broadly". ~Resources Sector 6

Shortage of labour

Despite the widespread views that levels of post-secondary school education and training among the region's population had increased, many interviewees reported that there were concerns in local communities that the resources industry is depleting the stocks of human capital available there in two ways: by attracting skilled workers away from essential services and employment in other sectors, and by paying wages that fuel inflation and drive low paid workers out of the region. The lack of human capital generally, in areas outside of mining, was said to be a particular issue in trades, such as mechanics and electricians. Interviewees reported that this exodus to resources jobs contributed to an increase in the costs of labour for local businesses and non-resources industries, particularly agriculture, and an increase in the cost of living for community members:

"But also as a result, I think that comes back to probably the biggest problem facing the agricultural sector at the moment is labour – is staff. It's nearly impossible to find someone that's reliable with good skills and mainly because most of them have gone to the mines because of the higher wages. So the agricultural industry [is] faced with trying to improve productivity just to stay alive, because of the increase in labour costs. ... Things like they've got staff they've got to put in town, they've got to pay those rents in order to give them a job. That's all part of it now." ~Agricultural Sector 5

Resources companies reported developing workforce training and up-skilling programs so as to boost human capital in the region. Some companies had particularly invested in training for Indigenous people. Despite such initiatives, a number of non-resources industries' employers expressed resentment that they trained employees only to have them 'poached' by high-paying CSG or mining companies. Apocryphal stories were told to illustrate this of resources company recruiters actually making alternative employment offers to people in their workplace. One anecdote holds that the wife of a frustrated employer suggested he did not necessarily have to lift wages to stem the loss of employees but could offer fringe benefits that would make working for him an attractive option for workers and their families. The story goes that his employees were enthusiastic when he followed his wife's advice and employed a gardener and a house-cleaner to perform household chores in each employee's home on a rotational basis.

Another interviewee suggested being more flexible about addressing shortages of workers in specific professions or vocations in the towns (such as mechanics in Dalby) by applying the non-resident workforce model more widely:

"So why don't we start thinking about that? People have been talking about it. So, drive them up. Why not have a bus [that] comes from Toowoomba with labour type people, maybe, council workers? Because it's cheaper to live in Toowoomba than it is in Dalby. Someone on a bus brings them out every morning, or whatever. I think there are a lot of ways we could actually be a lot smarter about what we do. I don't think all that happens. We probably concentrate too much on the negatives. I try to think how we can actually fix some of these issues." ~Advocacy Organisation 1

Despite occasional success stories and lateral thinking, there is a general shortage of non-agricultural workers in the region – particularly health professionals, teachers, council workers, and tradespeople. Rural communities have often found it difficult to attract professionals, now, the lack of skilled workers has reportedly been exacerbated as a direct result of the shortage of affordable housing, and the mining and CSG industries employing the majority of local skilled workers.

Inflow of skilled workers

In contrast to these 'workforce stripping' trends, some interviewees noted that the resources industry is bringing more skilled workers, and sometimes their families, to the region and is making it possible for younger people to come back to the region to work on and off farms because of increased off-farm employment opportunities through the resources sector. Certainly the sector itself claimed its workskills training programs and apprenticeships were designed to increase the employability of locals. It was particularly welcomed that the resources sector was creating some options for young people in rural areas. It has been difficult to encourage farm succession and attract young people into agriculture because of reduced viability and other factors. Interviewees saw opportunities to reverse the pattern whereby young people generally leave regional towns in search of education and employment:

"If there were more forms of off-farm income, say working for mining companies or whatever, it would give children of farming families an opportunity to come back and work in their own community [who] otherwise mightn't... I think if there was more opportunity and more excitement and a more positive spin on the agricultural industry, it would attract young people. It only needs to attract a few that would then attract more, if you know what I mean. I think it's a

snowball thing and I think that if there [were] opportunities there for the school leaver age or the 20 to 25 year olds – you know, if they've gone off and they've done a three or four year uni course and they've come back to the land. The more of those you get the more you will get, because it's a snowball thing.” ~Agricultural Sector 5

“The positive has certainly been employment. In areas like Tara, Meandarra and probably Miles, there is very little opportunity for our kids to gain employment, therefore our youth was deserting the towns, and that's probably halted a bit. Our youth are getting jobs in the areas now. So that's a positive thing. And it all spins down to your schools, your sporting clubs and community clubs – [they have] more chance of continuing to exist with a bit of youth coming on.” ~Business Network 3

People further suggested that, by adopting appropriate purchasing policies and using local businesses to a greater extent, coal and CSG companies could stimulate the regional economy and local business, thus creating more employment. Well patronised small and medium enterprises of all sorts – not just mining-related – make communities sustainable and viable. People suggested the flow-on effects of the new industries and consumption patterns of employees boosted business for otherwise marginal enterprises in small towns such as the pharmacies and hair dressers. One interviewee also noted the potential, with advance planning, to leverage the diversity of human (and other forms of) capital being built up over coming decades as the basis for long-term change for the region:

“In the future, you're going to have a massive number of skills out here and if we can have water, you're going to have the housing, all the infrastructure, let's plan to make use of it.” ~Advocacy Organisation 1

Negative impacts on health assets

Respondents mentioned that residents' health suffered from side-effects of mining and CSG development including noise, dust and fumes. Health concerns that some interviewees observed being raised in communities were direct health issues such as respiratory problems related to dust, disturbance from noise and concerns about the future supply and condition of water.

There were also mental health impacts reported as linked to current resources operation or anxiety about possible future CSG developments. Another emotional impact was from the high cost of housing and consequent difficulty in accessing suitable accommodation which was said to be creating rent and mortgage stress and social issues. Some respondents also noted that the extent of change to familiar circumstances, the uncertainty, the anxiety and stress that many landholders were feeling and the lack of security about land values had impacts on their health:

“The unfortunate reality of what we see is almost a fatigue. These guys [farmers and graziers] are about primary production, food producing systems. [For] a lot of them it's what they grew up doing and it's what their fathers, their grandfathers, their great grandfathers grew up doing. So you throw them a curve ball of putting half a dozen wells on their land, or a 20 million tonne coal mine on their southern boundary fence, it all becomes a bit too hard. Because these guys are really good at what they do, but it's taking them out of their comfort zone and they're confronted with dramatic change”. ~Agricultural Sector 2

The technical obstacles to be overcome to operate both industries in close proximity to one another were associated with many equally challenging non-technical problems. Study participants from all sectors were aware of these challenges, for example, one CSG interviewee spoke strongly of the

“...angst of how are we going to technically co-exist on intensively farmers land?” ~Resources Sector 2

The poor state of roads was also described as a health and safety issue by some stakeholders and because this, in turn, impacts on service levels, it illustrates yet another set of interacting issues:

“And even the degradation of the road, there’s a whole lot of other affects that has. Even in the social services provision, there are people like Lifeline now are reticent to send their employees out that way because they think the risk is too high on the road.” ~Business Network 2

Disempowerment

Respondents mentioned that many landholders felt disempowered. They perceived that landholders felt loss of control over land; invasion of privacy, fear of losing rights to access their property and distrust of people coming onto property:

“On the road past my house – and my house is right on the road unfortunately – it’s from here to your car or even closer to a rural road. During the construction phase, past my house a twelve month annual average vehicle movement will be between 49 and 79 vehicles per day – a gravel rural road. Even when the thing is installed and up and running it will be 6 to 13 vehicles per day. Now I didn’t make my home there to see 79 vehicles a day go past my home. If I wanted to do that I would have lived on the Warrego Highway or on Taylor Street in Toowoomba. So those sorts of impacts” ~ Agricultural Sector 4

Some of the landholders interviewed mentioned that initial interactions between CSG and mining companies had left them feeling that their privacy was compromised, that they had not been treated courteously and that there was little prospect of collaboration between companies and landholders. These initial impressions had improved and many of the most negative experiences were reportedly associated with contractors rather than direct employees of resources companies themselves. However, early experiences had left a poor legacy and tainted how landholders view resources companies.

Summary

During the years since 2006, the energy sector is seen to have precipitated demographic changes and commanded the mobilisation of many of the human resources in the region. The advent of new industries was reported to offer opportunities to attract new people with new skills to the region and potentially boost the overall stocks of skills and education. However, it has also depleted stocks of certain skills that are not as well recompensed and has ‘poached’ skilled workers from other industries. If not managed effectively the net effect on education and training may be significantly imbalanced.

There were negative reports of impacts of recent changes on other human assets, such as the health of the population, with the emotional well-being and mental health of many residents apparently declining in the face of the uncertainties and fears about proposed developments. This highlighted that there are aspects of human capital that are hard to quantify or measure but are nonetheless relevant considerations. A major challenge for those seeking co-existence of agriculture and energy-production, therefore, is factoring in emotional and subjective issues. These human dimensions emerged as being just as influential in building trust and adapting to change as volumes of scientific data.

As is the case with other forms of capital, the feedback about human capital reinforced the interconnections, interaction and aggregation of many changes and the ways in which they are experienced and responded to. While they may not pose a barrier to co-existence of resources development and agriculture per se, they certainly pose challenges in terms of effective management so as to protect the region’s human capital for decades to come.

5. What are the barriers, challenges and opportunities that inform current thinking and behaviour in relation to the co-existence of resource extraction and agriculture?

The concept of 'co-existence' is that resources and agricultural industries can operate in the Darling Downs region together while maintaining and even enhancing the condition of natural, social/cultural, human and built assets in the region. This implies that all those industries can be productive and financially profitable in the same region, without exceeding sustainable limits of physical infrastructure, social systems or the environment.

It is evident that alongside scientific and technological challenges, there are significant social barriers to achieving co-existence of agriculture and resource extraction and that these are not easily overcome. Divergent perceptions, contrasting values and associated lack of common language as well as a prevailing lack of trust underpin many of the key challenges confronting those responsible for managing the changes associated with development of new industries such as mining and CSG extraction in predominantly agricultural rural areas. Social barriers exacerbate the broader challenges posed by the incomplete, contested and ambiguous data available as a basis for informed decision-making, the cumulative nature of the impacts and the complexities involved in supporting balanced development that enhances all five categories of assets.

Hence the ultimate challenge is a question of effective governance and adaptive management of the issues and the regions. This issue is explored in Section 6, which considers the roles and responsibilities of various parties. However, prior to that, in this section we further discuss the barriers and challenges and then outline opportunities for satisfactory co-existence of contrasting land uses that were identified in the course of the study.

Contrasting values and language

Interpretations and language used to describe the same or similar phenomena differ between stakeholders, exemplifying the conflicting priorities and values of different individuals and groups. For instance the different terminology used to describe agricultural land embodies different connotations even though all demonstrate a primary interest in economic productivity. The resources sector tended to refer to "intensively farmed land" while the State Government referred to "strategic cropping land", with the difference being that one description focuses on the current human activities on the land while the other focuses on the properties and potential of the land and its intrinsic value. Similarly, the agricultural industry's reference to "prime agricultural land" or "highly productive lands" stressed the exceptional properties of the soil types while local Government's classification of "good quality agricultural land" had utility in zoning.

Underlying these differences in language are different criteria (and different weighting of criteria) by which different stakeholders judge both the issues at hand and ways of managing the issues. For example there was general agreement that benefits should be "fair", however, interviewees' 'measures' of fairness were not the same. Likewise there was general agreement that prime agricultural land should be protected but disputes over what constitutes prime agricultural land, who should set the criteria and what the criteria should be.

From this scoping study, the fallacy of presuming that all those from a particular sector hold uniform values is clear. Many attempts to encompass different perspectives use a stakeholder grouping approach such as we adopted. However this can mask the range of different interests and the nuances of the influential underlying values that were evident in the interviews.

The interviews highlighted that it is important not to ignore such values, subjective perceptions, and emotions in managing the co-existence of resources development and agriculture. Equally, since no change is all good or all bad and definitive solutions are elusive, many situations will not result in a win-win solution for all stakeholders. This necessitates decision-making based on negotiation which

respects multiple perspectives and diverse experiences.

Lack of trust

'Trust' was a key term used throughout the interviews, and lack of trust or confidence in both the government and companies was presented as a key obstacle to satisfactory co-existence of resource extraction and agriculture. The absence of trust resulted from a complex interplay of factors and took many forms that all posed challenges including:

- General lack of trust of other sectors and industries, exacerbated by contrasting values and language;
- Lack of trust in the independence of authorities and institutions managing resource extraction and their ability to protect the public. For example, the State Government was perceived as both a beneficiary and referee of the resources industry by some interviewees, and as such its actions were viewed with cynicism. Similarly, there were claims that the GasFields Commission was not set up in a way that engenders trust in the State Government or the Commission itself.
- Lack of trust in data informing policies and processes for managing resource extraction, particularly in relation to natural capital. The evolving nature of science and data, gaps in knowledge and conflicting information have fuelled this lack of trust and resistance to accepting any data as accurate, 'independent' and unbiased.
- Lack of trust in both technical and non-technical processes. For example, people doubt the safety of hydraulic fracturing processes and many do not trust CSG drilling technology to ensure seals that maintain the separation of aquifers and prevent contamination of vital underground water supplies. With respect to non-technical matters, people are equally suspicious of the negotiation of land access compensation agreements, with confidentiality clauses said to fuel considerable distrust both between landholders and companies and between neighbours. Most significantly in the non-technical arena there is a crisis of trust in processes for making decisions about risks, limits and the public interests.

Trust is something fragile that must be nurtured over time. Unfortunately historical interactions between resources companies and landholders have not provided a good foundation for trust between these two groups. There was a widespread perception that resources companies, and especially CSG companies, operating in the Darling Downs have made many 'mistakes' in the past, particularly in relation to engagement strategies with farmers and access to land. While many have improved their approaches and practices, rebuilding trust and earning a social license to operate with that legacy represents a major challenge.

The record of various authorities has similarly provoked cynicism in the region. Hence it was suggested that the government needs to regain the trust of agriculturalists and the community more broadly in order to improve the current situation, particularly with respect to setting limits, and conditions to manage the impacts of resource exploitation on community assets. This would be a difficult and time-consuming process since building trust typically requires considerable time and effort from all parties. However, the pace of change does not accommodate lengthy processes well.

Independent evaluation was suggested as a way of dealing with lack of trust, however, this would require agreement about authorities and bodies deemed 'independent' by all parties which itself presents another major challenge. Given the prevailing suspicion, there is a compelling need for both government and the resources sector to build trust by developing new ways of communicating with locally-based stakeholders founded on transparency and openness, particularly in regards to communicating scientific data and risks and uncertainties in a way that is meaningful on the ground and provides a basis for negotiation and informed decision making.

Emerging divisions and connections

The interviews revealed that there are many separate and often conflicting priorities and interests among stakeholders with respect to the co-existence of resource extraction and agriculture, with divisions apparent between food producers and energy producers, between sectors, between levels of government, and even between neighbours taking different stances. Understanding and managing these divergent expectations and opposing interests are key challenges to achieving effective co-existence of resource extraction and agriculture. Such social rifts also make it hard to include all stakeholders in the management of the region's assets.

Some antagonisms were pre-existing, while others have been created or exacerbated by the advent of mining and CSG in the region. The latter divisions were linked to disruptions to the region's rich farming history, which was often expressed beyond economic or financial terms. The sense was that the symbol of the hardworking, community-orientated rural Australian was now threatened as long-standing 'city versus the bush' oppositions manifested within rural communities where rapid population growth resulted in the presence of many 'strangers' in town. A prominent discourse of organisations advocating on behalf of graziers and farmers portrays the CSG/mining and agricultural industries as mutually exclusive with no opportunity for co-existence. However, while some farmers are steadfastly against any type of resources development in the Darling Downs, it was reported that there are also a number of individual farmers willing to negotiate and work either with or for the resources sector for financial gain. Hence, the financial benefits that some farmers are able to obtain by negotiating with CSG companies have been a key factor in creating of divisions at the local level. We met people from both groups, and interviewees described how farmers who have agreed to compensation payments or sold land to resources companies are often regarded by those opposing resources development as having 'sold out', an impression exacerbated when former landholders have moved away from the region after disposing of land. One expression of this sentiment represents the resources industries as a threat and unwelcome intruder and the agriculturalists as unwitting victims. This discourse illustrates the conflicts that create barriers to co-existence.

Another long-standing tension that poses challenges to effective management is that between the State Government and local councils. While the State Government has the power to approve and place conditions on projects, it was reported that the local governments are the ones who have to deal with the on-the-ground impacts and resulting community backlash. The lack of control or influence by local government over State-level decision making processes appears to exacerbate a sense of being ignored by higher authorities. Tension was particularly evident in respect to physical/built capital such as highway maintenance, housing, and local-government provided services (for example, water and waste). Local governments in Queensland (as in other States) have previously lobbied State Government for a share of royalties to help them cope with the added pressures associated with resources development. Although a form of 'royalties for regions' scheme now makes more State money available in regional areas, the amounts are viewed by many as inadequate for the scale of the issues. Besides inadequate financial resources, local governments also lack the capacity and human resources to deal with the myriad of issues associated with the so-called 'resources boom'. However, the amalgamations of local councils (in 2008), while raising challenges themselves, were said to have positively affected connections to State Government, encouraging a more regional focus and giving local councils additional leverage.

Despite many widening rifts like those described above, the agricultural community has, interestingly, made connections with their former foes in the environmental movement in their mutual antagonism towards the resources industry. In this sense, while the resources industry is frequently accused of causing divisions in the Darling Downs, it has also, somewhat paradoxically, fostered connections. Mining and CSG companies have also attempted to foster direct connections by forming community consultative committees which usually involve a cross-section of stakeholders. Such company-community reference groups and committees consisting of a variety of stakeholders (such as representatives from the agriculture sector, NGOs, government and universities), like other multi-

sectoral bodies (for example, catchment management groups, Regional Development Australia committees and Regional Planning Advisory Committees) offer a venue for transparent communication, although there are varying perceptions of their performance.

Cumulative Impacts

Cumulative impacts were a common concern for interviewees across all sectors and tended to be focused on natural capital and social/cultural capital, although both of these link directly to financial and physical capital. Cumulative impacts were commonly framed in terms of the impact of resources development; few interviewees conceived of *both* the agricultural and resources industries as having combined and interacting effects on the natural environment and neighbouring communities. As previously raised, the prevailing assumption was that agriculture was the un-impacted or natural state prior to resources development.

Effective management of cumulative impacts is much more challenging than management of direct impacts in a limited time and space. Many of the concerns that emerged in the interviews related to changes happening over time or with the accumulation of multiple operations beyond the spatial boundaries of operational sites and extending beyond the duration of production. These concerns about cumulative impacts were commonly based on a fear of their potential unintended, irreversible and long-term nature. This was particularly evident in terms of the impacts of CSG development on groundwater. Concerns were aggravated by the aforementioned lack of trust in the resources industry, combined with the government and resources sector's imperative to expedite development despite uncertainties.

The complexity of the interconnected and interacting issues associated with managing cumulative impacts is magnified by several factors. The pace and scale of change mean that the accumulated changes are not only more severe, but also impossible to deal with in isolation, instead demanding a systems approach. The disruption to the system is further compounded by natural variability. For example, farmers in the Darling Downs managed their properties through the millennium drought followed by record floods over the last few years. The added stresses of negotiating CSG activities and understanding the likely consequences for natural systems are likely to be heightened during times of increasingly variable climatic conditions. Because of such factors, the ability to track impacts across time and space is essential and it is imperative to have access to reliable spatial and time series representations in a timely manner. This applies to the mapping of catchment or river basins and groundwater indicators as well as to time series of monitoring data with appropriate interpretation in terms of both natural and anthropogenic factors. There was a call for the 'ground truthing' of the models used to determine impacts and the application of these to set limits on development in terms of natural capital, as well as alternatives to linear ways of aggregating impacts and recognising interactions.

Social interactions and systems are equally intricate. For example, with increased demand for housing, homeowners reap benefits, while renters struggle with related inflation, which causes a ripple effect in other social and economic spheres. In the area of employment, skilled workers have gained employment in mining/CSG while there are skills and labour shortages in other industries.

By definition, understanding and managing cumulative impacts presents some specific challenges. One of these is attributing responsibility or causality and this is certainly the case in the Darling Downs given the tangled network of stakeholders and patterns of interaction. If there are multiple operators and/ or multiple industries all discharging to or extracting from a catchment or an aquifer for instance, calculating the responsibility of individual operators is very difficult, especially when different standards, conditions, reporting and monitoring requirements prevail and different regulatory bodies are involved.

A second complication with cumulative impacts is trying to define the system that is being changed. In this case, the diversity of perceptions meant that, on one hand, the environment and society in certain communities or the region as a whole were regarded as the impacted asset base, while on the other

hand, a much more focussed perspective considered the agricultural industry or even individual farms to be the 'natural' system experiencing impacts. Such differences influence not only the nature of the changes tackled and priorities of stakeholders but also the strategies employed to manage the issues. A final challenge is aggregating chosen indicators of effects in a way that accommodates the connections between factors and the stores of and flux in various forms of capital (Moran et al 2013). This is especially challenging given the temptation to separate out the contributions of various parties by disaggregating effects, which is counter to the approach needed to increase understanding of a given situation.

Because of the complexity of cumulative impacts, whether social, environmental, or economic, issues are often oversimplified or misrepresented. This is particularly evident in the media which tends to emphasise graphic negative impacts rather than presenting the complexity of the considerations and trade-offs relevant to decision making.

The nature of available data

Land use decisions were criticised as being based on partial, inappropriate or inaccurate data. Given that social and environmental impacts occur within very complex systems as detailed above, the data in regard to the impacts of resources development are ill-defined, presenting a major challenge to managing co-existence. Stakeholders were concerned that the full consequences of many interventions and actions will only be known once it is too late to avoid undesirable impacts and develop mitigation strategies. Many repercussions are impossible to predict accurately but are irreversible or not easily corrected after unsatisfactory outcomes. Since complete knowledge is not available in advance, good management requires not only sound risk management strategies but also the best available data (and understanding of its limitations), and robust prediction and modelling. Given the well-established shortcomings of prediction and forecasting (evident from weather forecasting, gambling and share trading) and the established imperviousness of people to evidence that contradicts their preconceptions (March 2006), no arrangements for evidence-based decisions are likely to satisfy everyone in the Darling Downs, therefore decisions will require ongoing flexibility and adaptation.

Currently, decisions are regarded as based on data that is uncertain, ambiguous and incomplete or contested. Stakeholders' concerns in relation to resources development and particularly its effects on natural capital relate to factors that are 'unknown', such as the long-term impact of CSG extraction on groundwater given that future rainfall and surface flows are themselves uncertain. These data inadequacies do not always result from lack of science or a shortage of information. There are now volumes of data building up about certain matters, but it is clear that more and more data will not necessarily improve understanding given that contradictions and complexity emerge as often as clarity. It is the quality (rather than the quantity) of data that is crucial. In addition, knowledge and information is not always collected and presented in a way that can be compared to and combined with other available data to provide decision-makers or those affected with a comprehensive understanding.

In coal mining, farming and especially the more recent industry, CSG extraction, operators are practiced at making decisions without full certainty and taking calculated risks, but there is no evidence yet of decision-processes being mutually appreciated or of the articulation of acceptable margins of uncertainty, given uncertainty is inevitable in any natural, social or economic system. In these industries individually, let alone when they are located in the same areas, many technical problems do not have clear-cut, unambiguous solutions. Further, resolving a physical or technical limitation often requires consideration of non-tangible factors such as land rights, invasion of privacy and cultural heritage which involves very different forms of 'data' and knowledge.

A number of factors were said to cause dissatisfaction with the state of knowledge amongst stakeholders including:

- companies' resistance to sharing knowledge due to commercial sensitivity;

- the piecemeal collection of data by a range of individuals or bodies that do not use common or comparable units or frameworks;
- the application of generalised data that is not sensitive to the unique conditions in each situation; and
- the use of different data and different criteria for different industries.

However, the efforts of companies, government, researchers, community groups and individual landholders are all bringing more information and knowledge into the public arena. Certainly, continual learning, disclosure of information and transparency were key management strategies suggested by both landholders and the resources sector alike. Confidence in actions based on some data limitations will be increased by demonstration of rigorous risk assessments and application of the precautionary principle at times, as well as evidence that strategies and conditions will be adjusted in a considered way as knowledge emerges.

The widely expressed concerns about water – especially in relation to CSG extraction – demonstrate many of the data-related challenges. To some extent this issue, which was often couched in terms of lack of scientific data, provides an apparently objective anchor for other concerns that may be equally contested, but less amenable to objective definition and definitive solutions that will be satisfactory to all. Hence it encapsulates the dilemma of seeking a rational, evidence-based solution where values, informed consent (or voluntariness), control and fairness are equally important considerations. This has led some to portray effective management decisions as encompassing inseparable logical and emotional components (for example, Frieze and Wheatley 2011).

Nevertheless, water is a ‘tangible’ asset for which processes such as Environmental Management Plans impose clear requirements on resources companies for mitigation strategies. Consequently it commands the attention of the resources sector, and it is notable that farmers, CSG companies, environmental authorities and different levels of government have all invested in improving knowledge of this issue. The agricultural sector itself has dealt with water scarcity for a long time and is used to the rationing of water quantities through irrigation licenses, though not so much to any conditions for managing water quality.

The anticipated impacts of CSG development on underground water are based on theory and modelling, which in itself is of concern to some stakeholders, as it is not perceived by them as reliable and incorporating the accumulated wisdom of locals. Consequently this issue is one of the many that require a synthesis of scientific and experiential knowledge from various sources, some of it regarded as more reliable and relevant than others, much of it incomplete, ambiguous or even contradictory.

Not only do sound decision-making processes require the incorporation of different kinds of knowledge from a range of sources, but the way that data is processed, interpreted and applied to shape conditions and strategies can often influence people’s perception of the data itself and their acceptance or rejection of it. This highlights that the selection of data, the means of aggregating data, transparency about thresholds based on integrated systems knowledge, and robust processes for risk management and decision making in a context of incomplete, ambiguous and contested data are as important as collecting more data if not more so.

Opportunities for co-existence that enhances all assets

Despite these obstacles and challenges, those we interviewed endorsed a common desirable outcome in very general terms. Most sectors expressed an expectation that rural activities should make positive contributions to multiple forms of capital, including providing opportunities for the regional economy and environmental management to ensure the viability of rural communities (Clark 2006). However, for a proportion of interviewees this meant they dismissed any prospects of satisfactory co-existence because they rejected the notion that the extractive industries presented any such opportunities for the region. Even among those who could see opportunities, there was fairly widespread resistance to the notion that the mining and CSG industries should have precedence over

agriculture in decision making simply because of their potential for higher rates of financial return in the short to medium term. Nevertheless, most interviewees gave pre-eminence to the economic functions of various assets, including natural assets. In this respect the region appears to demonstrate “embedded social attitudes that construct the rural environment principally in terms of production” as described by Cocklin et al (2006).

On the Darling Downs, agriculture is portrayed by those involved in the industry as not only producing marketable food (such as wheat and beef) and fibre (such as cotton or wool) but also having the potential to sustain rural landscapes, protect biodiversity, generate employment and contribute to the social fabric of rural areas (McCarthy 2005). Interestingly, the other function implicitly acknowledged was a very personal and subjective one of providing emotional well-being and identity. For co-existence to be achieved, other industries would need to serve a similar range of functions meaning that local livelihoods, identity and culture would need to be thoroughly interwoven with production of coal or CSG as they are seen to be with agricultural production. Ecological functions, food and energy security and broader rural development would be equally important goals of co-existent rural activities. The result, in the words of Cocklin, Dibden and Mautner (2006 p.204), would be:

...a more sustainable rural development trajectory – a more spatially variable rural space, founded on genuine social, economic and environmental integration at local and regional levels.

However, the opportunity to achieve a variable rural space and expanding local asset base has not been realised and many interviewees described more recent industries as eroding some dimensions of the asset base and displacing the pre-existing industries rather than complementing or adding to them.

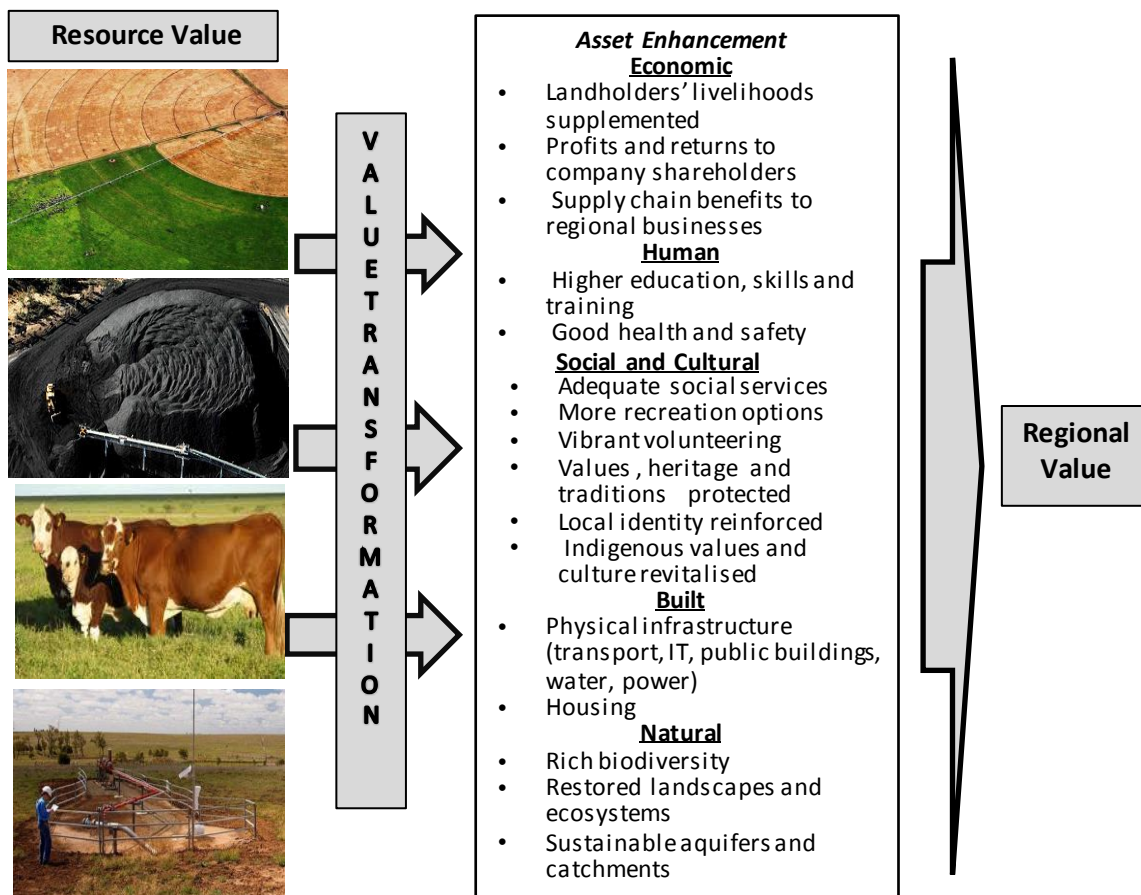


Figure 16: Potential for co-existence? (Adapted from Newman, Armstrong and McGrath, 2005 p. 7)

Some examples were given of positive potential for co-existence, namely farm-scale opportunities such as farmers gaining some by-product CSG water for stock, aquifer recharge or irrigation. One company claimed to have 600 current conduct and compensation agreements with landowners and cited one affected property as containing 170 CSG wells. There was also reference to the opportunity to graze stock on mining leases and potentially use rehabilitated land for forestry with biodiversity or carbon-farming benefits. Another specific example of local arrangements that was reported as constituting co-existence was mechanical businesses servicing both farming and mining clientele. The description of some innovations that are currently being implemented for dealing with impacts suggests that further such opportunities exist.

In broader terms, because the extractive industries rely on a finite resource and will therefore be a temporary addition to the region, some interviewees noted opportunities to plan for a post-extraction future that may involve different land uses to those prevailing pre-extraction but may leverage the temporary boost to human capital, infrastructure or other assets associated with the 'boom'.

6. What are the roles and responsibilities of various sectors and organisations in managing the cumulative impacts of resource extraction and agriculture in rural regions such as the Darling Downs?

The challenges outlined above make management strategies and governance important. Governance, though, implies much more than government action. It alludes to:

...institutional structures, administrative arrangements, information flows, formulation and implementation of policies, public participation, plans and strategies, property rights and regulations (Valeria & Haslam-McKenzie 2010: 135).

In this sense governance is at the heart of strategies for managing regional development. Stakeholders identified the strategies for managing resources development in a predominantly agricultural region as, in the main, involving roles and responsibilities for either Government or resources companies. Specifically, few strategies were raised where the agricultural industry would be the primary agent. This outcome is in line with the general notion arising throughout the interviews that the agricultural industry has cultivated the landscape and been the main livelihood for generations in the Darling Downs region and is therefore 'intrinsic' to the region. It was represented as part of the equilibrium that is disrupted by the changes associated with other industries, which management should seek to restore. As such, the responsibility for strategies to respond to changes seemed to be allocated to those perceived as party to causing the changes.

Along these same lines, few recommendations were offered around how the advocacy, community, business, environment sectors or individual landholders could assist with achieving effective co-existence of agriculture and the resources industry in a sustainable region. However, it was noted that it would minimise negative impacts if these sectors were meaningfully engaged in the search for solutions and if they adjusted to changing circumstances, for instance if the business plans of local businesses targeted a different marketplace and NGOs worked together to develop a health and community workforce plan to attract and retain staff in a tighter labour market. Similarly, interviewees called for more effort through agricultural industry bodies to be pro-active in responding. For example, the Grains Research & Development Corporation and Cotton Growers Association could share knowledge, participate in decision-making forums and processes and adjust practices in their industries.

Within the emphasised roles for resources companies, there was apparent consensus around some universally applicable arrangements. Notably, those interviewed called for clear lines of accountability and responsibility and protection against conflicts of interest. They stated that the resources sector should not be able to define the rules by which its industry is governed. Many interviewees remarked that the current situation does not meet their expectations of 'separation of powers' because the resources industries are very influential and similarly the government is both regulator and beneficiary of resources development. In this vein, some noted that there are related issues around industry-funded research that, in their view, could skew results, undermine the reliability of findings or call into question the independence, impartiality or integrity of researchers.

Many of the strategies that companies and government authorities could adopt to enhance better relationships between the CSG, mining and agricultural industries exceed what resources companies are currently legally required to undertake. Certainly, there are clear expectations that companies should go beyond compliance with the letter of the law. This expectation of extra effort on behalf of companies is partly evident in comments that government was slow to act in the initial phases of resources development in the Darling Downs; so private sector efforts were warranted to fill the gaps. The call for additional efforts by the resources industry can also be traced to widely perceived norms of corporate social responsibility and the dispersal of responsibility in a governance situation.

Although separate roles and responsibilities for companies and government are outlined below, one of the key messages was that initiatives should be complementary and consistent and that collaborative efforts and joint action are needed on many issues. This in itself poses a challenge of defining appropriate and productive levels of collaboration that are not seen to compromise the independence of any sector and where the consistency achieved is not regarded as overly supportive of sectoral interests.

Responsibilities and roles of resources companies:

Distributing benefits

There was a call for economic benefits to be distributed by companies alongside benefits to other assets, such as environmental benefits. Companies distribute direct economic benefits through various mechanisms, including compensation payments to landholders, wages to employees, business development initiatives and local supply and procurement contracts. Other benefits were recognised as coming through company-supported social investment programs or community development initiatives. Interestingly, the key message that emerged is not just that the benefits of resource extraction need to be shared between the companies and others, especially those in the impacted region, but also that the companies, or other responsible bodies, need to ensure that benefits are distributed fairly – so as to benefit the maximum number as well as those most negatively affected currently and in the future. Distributing indirect benefits associated with mitigation measures (for example, water treated for beneficial re-use) similarly need to be equitable, though it is not a simple matter to take into account all relevant considerations, including current allocations, areas of greatest need and matching actual impacts and losses. Non-tangible benefits (for example, a community's appeal as a tourist destination, high community morale, increased employability of young people, and quality of health care services) are particularly hard for companies to contribute to and plan for if working alone.

In some respects the line between recompense and benefit is blurred. Stakeholders noted that as well as general community benefits, some companies provide financial and in-kind support to landholders and others in the community for consultation and other processes including contract negotiations and EIS processes. This provision too can be more than is required for regulatory compliance. However such additional assistance is not regarded as a 'benefit' since it is only useful in the context of coping with the new developments.

In terms of broader community benefits, many observed that resources companies have tended to invest their voluntary contributions in hard infrastructure (for example, roads and swimming pools), even though less tangible assets, for example, human resources in healthcare, or capacity building for community organisations are often the most needed. Though companies are often subject to popular pressure for short-term, visible projects, they increasingly value more strategic and sustainable investment – such as through community-managed funds – rather than a proliferation of ad-hoc sponsorships and donations. Companies report a desire to invest in a balance of 'hard' and 'soft' social infrastructure and consider where the money is best spent in terms of strategic community priorities.

Understanding and managing side effects

Interviewees noted the importance of measures designed to specifically address negative impacts directly related to the resources industry. However, many of impacts mentioned in the interviews are not tangible and so are not easily measurable, nor are they always direct and easily attributable to specific actions or specific operators. Although there were calls for investment in 'soft' infrastructure such as social services and capacity building as well as 'hard' infrastructure such as roads, and for 'compensation' including subsidies for housing for essential service personnel and alleviating inflated transport costs (for example, for the beef industry), quantifying appropriate amounts and determining the lines of responsibility are not straightforward processes. Handling side effects, including the

cumulative impacts of multiple resources companies and other operations, therefore requires resources companies to do more than comply with regulation, undertake close monitoring, and follow through with make-good provisions. It requires companies to play a role in assembling the evidence on which to base holistic and long-term strategies. However collecting data about side effects as well as ground-truthing theoretical understandings of impacts to provide suitably sophisticated modelling is complicated.

As documented earlier in this report, there is a widespread perception that there is a dearth of data about some regional assets in the areas where resources operations are proposed or commencing. While companies are not regarded as a suitable coordinator of such data, the detailed information collected by companies is sometimes the most comprehensive record available.

Stakeholders suggested many ways in which companies could help increase knowledge or analyse it in different ways to facilitate the identification and mitigation of negative impacts and to enhance opportunities to protect or improve natural capital or find potential solutions to problems related to other forms of capital. Besides individual resources companies playing a role in increasing understanding, peak industry bodies can collate data and run information sessions for stakeholders, including from their own sector, to understand their impacts in the context of both legal obligations and the realities of producers and residents to whom they relate.

Although impacts cannot always be reduced to 'objective' measures and analysed via simple, linear models, more comprehensive data provides a basis for science to create technological advances to help in managing side effects. Resources companies that have created effective models of their impacts, which have been validated in settings where causes and impacts were thoroughly measured and well understood, face better prospects of social acceptance than those not regarded as adding to the understanding of impacted systems. For example, interviewees noted that some CSG companies are developing and implementing practices for purifying and enabling re-use of the salty water that comes from their wells and developing other innovative ways of reducing impact in areas where soil quality is high, such as minimising surface operations in favour of underground activity.

Besides the difficulties of measuring and attributing side effects, another challenge mentioned during interviews was that many side effects, especially social ones, fall outside the domains of expertise of resources companies. For instance, impacts on the housing market have resulted in Coordinator-General's conditions encouraging resources companies to act as property managers for social and affordable housing in ways more appropriate for local governments than companies. This points to the need for greater understanding of companies' optimal contribution to management strategies, which in some cases may be mainly by providing funding to those with the relevant expertise.

Behaving respectfully

A further responsibility articulated for companies related to behaviour. In a few cases the relationships between specific landholders and companies were commended, as was transparent sharing of information (where this exists) and timely attention to stakeholders' concerns. However, stakeholders also stated that the behaviour of some company staff suggested a lack of understanding and respect for others in the community, including landholders, local councils and local businesses. Behaviours such as failing to shut farmers' gates after entering or leaving their property, not giving neighbours advance notice of blasting schedules and not washing down vehicles carefully to contain the spread of weeds had created a negative impression for many people. There were calls for the mining and CSG companies to train their staff and contractors in order to moderate such behaviours.

Good communication and transparency were regarded as desirable behaviour. Non-company stakeholders sought improved engagement and communication between resources companies and landholders and communities and preferred open, advance communication rather than reactive communication. In addition, they wanted an opportunity to provide input into management of issues and decisions that affected them including land access provisions, technical processes, policies and legislation and they want to be listened to and develop genuine relationships:

"I think some of the input has been relatively well received in the community consultation meetings. I can't say that a lot of the issues we bring up are always addressed immediately... I think the change of staff in those big companies – there seems to be that lack of continuity. We just get to know somebody, who seems to be the water person, or the infrastructure person or the corporate CEO, and the next meeting that person has changed. So there has been that lack of continuity has been frustrating for me as a community person trying to provide that input."
~Community Organisation 1

Almost all interviewees noted that communication has greatly improved in recent times, with companies having developed more effective consultative mechanisms and better relationships with landholders. These improved processes invite increased input from landholders into issues around land access, technical processes, policies and legislation. This improvement has been due to both greater understanding and a more respectful orientation of companies as well as landholders being more proactive and comfortable with engaging with companies. However, there have been setbacks in relationships when undertakings are not adhered to, such as timelines for installing gas pipelines being much longer than promised. Despite stakeholders noting improved engagement involving government, companies, communities and agricultural stakeholders, there remained calls for a range of improvements in communication and other interactions.

In terms of the role of companies in managing cumulative impacts, there was a level of consensus amongst stakeholders on the importance of the following:

- sharing of benefits and knowledge;
- fairness in distributing benefits and mitigating impacts;
- openness in communication;
- collaboration with government and community initiatives;
- courteous and respectful behaviour; and
- going beyond minimal compliance with regulation in all of these respects.

Responsibilities and roles of Governments:

It was not regarded as exclusively the responsibility of companies to distribute benefits of resources development fairly and to manage the side-effects of these industries. There were also high expectations that governments at all levels, and especially State Government would safeguard the public interest in respect of these developments. Indeed in many respects, government was described as bearing ultimate responsibility and even industries and their peak bodies (in both the resources and agricultural sectors) looked to them for action and resolve so that they can act with confidence.

Pre-eminently government was regarded as responsible for planning, legislation, establishing rules and regulations (such as the code of conduct for land access), ensuring coordination and cooperation, distributing public benefits and revenues and managing side-effects, especially through monitoring. While State Government is in charge of imposing, monitoring and enforcing the conditions for approval of CSG and mining projects, the local government deals with the pressures of major projects on communities and on regional infrastructure.

In terms of the roles that relate to guiding development trajectories and company behaviour, the interviews endorsed a role for government at all levels as proactive, neutral, consistent, and consultative. They are expected to provide the parameters for the pace and scale of development as well as a framework for managing cumulative impacts.

Planning

Stakeholders claimed that comprehensive and extensive planning that established baselines as well as thresholds and 'limits to growth' imposed by the stocks of capital available to communities in the

region was a crucial precursor to development of resources projects. This was seen as part of integrated planning and management of impacts to natural assets and also impacts on human, social, and physical assets and the local economy. Hence part of State and local governments role in the regional Natural Resource Management plans, land use planning, economic development plans and social plans undertaken by various authorities, provides the basis for considering any potential resource extraction activities.

Government planning and leadership were not just seen as vital in the establishment phases of new industries but throughout the life-cycle of the resources projects given they will operate for a finite period. Planning for the post-construction, or operational, phase of resources development for instance should begin during exploration and should already be well underway for existing mines and CSG fields on the Darling Downs. From the outset, plans should be based on a conception of the preferred legacy of these industries and post-closure regional futures. There were particular concerns that evidence-based planning for the project life-cycle and beyond should occur with respect to groundwater management in terms of both quantity and quality given the existing over-allocation of surface water and the flow-on impacts of all water management and pollution on economic productivity and on biodiversity and native vegetation. An underlying message here was that agricultural interests protect – and profit from – their water rights, and that newer industries are likely to place further constraints on the access to water for maintaining natural capital as well other forms of capital, so government as well as non-government organisations need to protect these assets. There was qualified endorsement of science-based planning being undertaken or initiated by government in this respect, for example, the Murray Darling Planning Process and Underground Water Impacts Report of the National Centre for Groundwater Research as well as the Queensland Water Commission report.

Although these environmental matters are largely in the hands of State Government, the social impacts associated with extractive industries place new demands on both State Government departments and also affected local councils. Social planning needs to be based on calculations of how many people the social infrastructure and housing of a town can handle and what support services and facilities would be needed for various population levels recognising the nature of transient populations and using measures of real population rather than Census data. Many councils historically lacked the capacity to handle planning aspects of major projects and had no dedicated economic development section. In most cases such specialist staff members are now in place in affected local government areas, with one council reporting four or five positions in a section dealing with EISs and associated community-level ramifications. Nevertheless, there is a concern that their efforts are not evident to, and appreciated by, rate-payers¹⁰ and their wages are not being compensated as yet by any flows of mining, oil and gas revenues to local government:

“I think we as a council and not just our council but any council that’s going through this huge change and all of a sudden has to have all this extra stuff and all of this extra things that we have to do now, but our rate base isn’t really changing that much, and for it to be on the heads of everyone who’s paying rates is difficult. We as a council have got some really good staff who are working hard at trying to make it so that those that are causing the problems are paying the rates – paying their fair share – but some of it should be and could be coming from State and Federal Government – they’re the ones getting the taxes from all the [developments].”
~Government 4

One example of a response expected of local government that poses challenges within the existing rates base is the provision of affordable housing in an area where housing costs are rising. The boom conditions have had serious impacts on the capacity of local governments to manage a range of demands at the local level. Some observers stated that local councils have experienced a steep

¹⁰ Rates are property taxes levied by local government on property owners and are a major revenue source for local government (along with grants from higher levels of government).

learning curve, and, even when specialist staff were employed and impacts understood, it took time to align planning schemes, development approvals and council operational plans with those understandings. Similarly State Government's planning capacity was regarded as inadequate partly because relevant departments have experienced a drain of human resources as a result of the boom, political changes and general constraints in the public sector.

In addition to the need for a boost in government capacity to prepare adequately for rapidly accelerating development and to plan for the whole life-cycle of resources projects, overall there was disquiet expressed about the execution of government planning responsibilities especially by State Government, with performance regarded as compromised by a number of factors. One of these was contradictory priorities with fiscal pressure outweighing other responsibilities:

"[State] government are focussed on the State deficit and that priority displaces environmental and community issues even though jobs and some benefits will flow to the community."

~Environmental Network 1

Other hindrances included the time lag between the social demand and the boost in revenues to responsible levels of government. State royalties and many local government revenues are associated with the production phase of resources projects but advance planning must be funded well before that. There was also a perceived time lag between introduction of adequate regulation, policies and legislation and the initiation of major projects. Where legislation has been introduced to cope with evolving circumstances, this was regarded by many as being reactive rather than proactive and as containing loopholes, perhaps because it was prepared too quickly on a presumption that project delays should be minimised. This, in itself, was perceived as demonstrating that government had a pre-disposition to approve development of energy projects which undermines the thoroughness with which they consider applications. As well, there are perceived problems with structural arrangements including lack of clarity about the authority of various levels of government, departments and other bodies, some of which are recently created with uncertain life-expectancy. In fact the proliferation of planning bodies and plans was itself seen to add to complexity and confusion:

"We've had the State produce this Surat Basin Development Plan. We've had local governments producing their plans. We've had the Maranoa Statutory Plan. We've had half a dozen. We're about to have a Darling Downs Statutory Plan. All the EISs and so forth. There's been millions of dollars wasted on planning."

~Environmental Network 2

Distribution of benefits

Public revenue is supposedly a key benefit of the extractive industries. Governments secure revenue from mining and CSG companies through taxes, royalties, lease payments, and other means. There was dissatisfaction with governments' means of distributing these benefits back to impacted regions. Nevertheless there was a strong sense that collecting suitable revenues from resources companies and reinvesting and distributing taxes, royalties and other payments into benefits for regions where resources development is taking place is both possible and desirable.

"We as a council ... are working hard at trying to make it so that those that are causing the problems are paying the rates – paying their fair share. But some of it should be and could be coming from State and Federal Government – they're the ones getting the taxes from all the [resources developments]."

~Government 4

Rules and regulation

The planning and benefits distribution responsibilities of government linked to the primary responsibility of State Government that was characterised as establishing and enforcing regulation, setting standards, and monitoring. These mechanisms were seen as a way to control behaviours and shape the nature of regional development. Some interviewees expressed a desire for policy to prioritise the public interest rather than applying productivist values that focus on generating maximum financial returns from both agriculture and resources industries. Favouritism toward the

resources industry was noted as a potential consequence of an overemphasis on financial assets due to it being the more lucrative industry in tax and trade terms.

There was a call for ongoing improvement to legislation and policies in relation to moderating the rate of development, creating buffer zones, safeguarding food security, maintaining access to water for various purposes, regulating criteria for land access, enshrining a 'no-worse-off' principle and constraining resources development on quality agricultural land. The latter, quarantining of good quality agricultural land, was widely accepted as a key management mechanism. However, some thought this required recognition of any land that is currently intensively farmed; others thought the nature and value of the crops on the land warranted consideration and others wanted governments to recognise areas that could potentially be cropped, even if not currently utilised in that way. Consequently, although a range of stakeholders had been consulted in drafting the Strategic Cropping Land legislation, the eventual criteria and classification were not universally accepted.

There was equivocal feedback about government execution of its regulatory responsibilities. It was claimed during the interviews that the regulatory regime for mining is not as strict as it is for CSG and that neither of these industries are subject to the water management regime of the Queensland Department of Environment and Heritage Protection that regulates other industries in this region, notably agriculture. Where legal requirements have been put in place, some of them fairly recently, there was not consensus about the appropriateness and effectiveness of these measures, and concerns were expressed about their limitations:

"The Strategic Cropping Lands legislation has loopholes – it is not watertight. But it has held up the Ambre Energy Initial Advice Statement so that's a good result" ~Environmental Network 1

Examples of contentious measures included acceptable dust limits for coal mines, 'make good' provisions for long-term impacts on groundwater from CSG wells, and designation of exclusion zones that prevented location of CSG wells and mining close to sizable settlements and on prime agricultural land. Interviewees argued that the value of recent initiatives and current priorities could not be assessed as yet, but expressed strong views that the rhetoric of 'adaptive management' should not be used to legitimate a reactive approach to fixing potentially irreversible negative impacts that should be avoided or minimised by suitable anticipation and risk management.

Managing side-effects

Stakeholders noted the importance of government being proactive rather than reactive in managing and mitigating impacts. One example of such a management strategy was the establishment of an exclusion zone around existing communities with an established equilibrium. Interviewees also saw monitoring impacts of mining and CSG extraction on water quality and water levels, soil quality, land subsidence, wildlife corridors and gas leaks as being a key part of government's role in managing side-effects. Similar monitoring and potentially consequent intervention by government was seen as relevant with respect to more than just natural assets. For instance, it could assist in managing speculation that distorted the housing market and in providing suitable community security measures to protect local residents.

In particular, government was seen to have an essential role in managing cumulative impacts in the region, by assessing, attributing cause or source, and mitigating the aggregated and interacting effects of multiple industries on social, economic, physical and environmental assets. An example cited was in the domain of housing, with companies and government being called on to build more houses as a way to manage increased real estate and rent prices resulting from added demand and speculation. However, there was inadequate information about the likely costs and consequences of such initiatives to evaluate that proposed solution.

Consistency, coordination and cooperation

Stakeholders noted that most responsibilities, including managing side effects, planning and regulation, need to be coordinated, integrated and strategic rather than reactive, siloed and

piecemeal. Many spoke of the prevailing confusion and inconsistency evident, for instance, in different property rights to above-ground resources and below ground ones, and for various kinds of title holders (freehold, leasehold, native title etc.). The different rights and responsibilities of different industries (for example, with respect to tree clearing, water extraction, occupational health and safety) and the different rules applied to different size operations were other examples given. As well, the overlapping authority of various bodies including State, federal and local government, different departments and non-statutory organisations added to the lack of coherence. In addition, government back-downs and reversals because a course of action results in unpopular, unintended and undesirable consequences were reported to have become common.

Interviewees also mentioned needless duplication of effort and inefficient provision of infrastructure and services as a result of poor cooperation between departments and between levels of government which affected social, human and cultural capital. For example, transport and infrastructure provision involves four or five government departments and ideally their efforts would be consistent and coordinated. As well, integration was needed so that various government initiatives were not contradictory. For instance the Queensland Government's carbon-farming initiative is designed to reduce greenhouse gas emissions at the same time as other departments are sanctioning the sale of coal (and CSG) which will provide an energy source but also increase global atmospheric carbon emissions. Perceptions of a lack of coordination as well as a lack of political will were revealed in references to the multiple planning initiatives undertaken at the State, regional, and local levels, to little effect. Interviewees called for governments to play a more proactive role in steering joint efforts and engage in more strategic budgeting and planning.

A particular role for government was articulated that involved coordinating data, knowledge and research so as to avoid what one interviewee called "death by a thousand studies and reports" (Environmental Network 2). While more data, quantification and modelling were frequently called for, reflecting the prevailing uncertainties and perceptions of incomplete or inaccurate data reported earlier, there was evidently a need for coordinating various data sources and for what could be called 'quality control' of available data. This could facilitate improvements to assessment of environmental and social impacts, standardisation of various reports, comparison and combination of different datasets, integration of various aspects into a holistic, systems understanding and management of time series data from pre-resources development baselines.

As is the case with data, it was apparent from the interviews that it was not necessarily *more* planning, *more* regulation, *more* money or even *more* coordination that was required to address the challenges faced. It was the quality of these mechanisms rather than the quantity of them that was crucial and government could play a key role in ensuring quality, finding synergies and identifying the conditions for and limits of co-existence.

It was not just different government departments and levels of government that were regarded as needing to work more closely together, some of the cooperation necessary for careful and strategic development of infrastructure, management of impacts and effective planning was between government and resources companies in consultation with communities. A coordinated approach toward overall net benefits for a region was seen as desirable:

"[Get] the right minds from local government, State Government, community and industry in a room, and don't let them out until you've got an agreed proper plan for the region"
~Environmental Network 2

Responsibilities of government are, in sum, seen to lie in planning, in distributing benefits, in coordinating and finding synergies to prevent needless duplication of effort, and in regulating or controlling activities and side-effects of industry. In addition, there is a lament that government has not been more pro-active, but a hope that more coherent and strategic governance is possible. By being proactive and fostering cooperation, encouraging integration of all dimensions and coordination of disparate initiatives and responses, government is expected to increase the possibility for co-existence of resource extraction and agriculture in at least parts of the Darling Downs region.

7. How can agriculture and energy production ‘co-exist’ in ways that create a better future for communities?

Co-existence suggests many options, yet it remains a highly contested concept and practice. Perceptions of what is possible and what is viable in the long term depend on one’s point of view and interests as much as on biophysical understandings.

Co-existence does not inherently require that all land is dedicated equally to each of the multiple productive purposes: food, fuel, and fibre. Rather it encompasses a wide range of options for operating together while maintaining the viability and productivity of all categories of regional assets. Agriculture and resources development may be present concurrently in the same landscape, such as when coal seam gas wells operate on appropriate agricultural land with fair compensation and effective mitigation. It may also include zoning decisions that permit resources operators to access land exclusively, such as in open cut coal mine development, again with adequate compensation and impact mitigation and practices appropriate to the operation being a ‘good neighbour’. Alongside that, some areas may be demarcated for exclusively agricultural uses with resources development prevented there. Meanwhile, there may be other areas where neither farming nor extraction of energy resources can occur as these areas are reserved for recreational purposes or ecosystem services. Another co-existence scenario would involve sequential use of specific land areas by alternative industries, a process that would necessarily rely on sound rehabilitation of mined land.

The study confirmed that: (1) co-existence is very contentious, and (2) a proportion of landholders and others opposed to resources development consider that no form of co-existence is possible. For those prepared to entertain the possibility of co-existence, negotiation would be essential. However, attempts to negotiate trade-offs and manage impacts to achieve co-existence necessarily evoke emotions and involve subjective considerations about fairness, risks to water and land values and concerns about legacy, identity and culture. They also involve interpretation of data that is not – as illustrated throughout this report – undisputed.

The perceived potential for co-existence is also highly contextualised. There is considerable variation between different resource extraction practices, such as open cut coal mining, underground coal mining and coal seam gas extraction. Variations in how these extraction processes occur, which depend on factors such as the nature and location of the resource deposit, change apparent co-existence options.

Of note is that CSG and mining were often conflated and spoken about as a single industry. However, CSG and mining have markedly different physical characteristics and footprints. A dispersed geological resource like CSG involves development of a patchwork of facilities with staggered development timelines and infrastructure and impacts spread across a wide landscape. Multiple land-users and communities are faced with potential nearby infrastructure and activities for drilling, laying pipes, and operating compression stations, for example. In contrast, mining often involves one exclusive-use site with a small number of adjacent land users and communities somewhat removed from the operation (often through land purchase around facilities).

There are equally diverse agricultural production systems, such as extensive grazing of beef cattle, dryland cereal production, more intensive summer crop production, irrigated cotton growing and cattle feedlot operations.

Given these variations in how agriculture is conducted and how resources are extracted, general comments about co-existence often involve simplification of the various opportunities and options. The need to avoid misleading oversimplification presents challenges for conventional approaches to regulation and management, which involve applying ‘standard’ rules in all situations.

Achieving co-existence, our interviews show, depends on a wide range of physical, personal and political factors. These factors include not just the logistics of land use and ‘make-good’ provisions for

impacts on water, but also the quality of communication, respect and engagement. Instances of co-existence that were cited depended on negotiation and collaboration between resources companies and other residents of the region. They also encompassed innovative ways of dealing with the multiple and varied impacts of resources development on a variety of assets and at multiple scales, from the highly localised paddock level to the whole region. These considerations about land use practices in resources and agriculture and experiences of co-existence suggest general principles and some common themes.

Principles

Basic principles that are broadly considered to be essential to the effective relationships implied by the term 'co-existence' include:

- **Fairness:** confidence by landholders and community members that the process for accessing resources and any associated conditions and consequences are fundamentally fair and that resources companies do not have preferential treatment.
- **Accountability:** ensuring that companies are held accountable for any damage to assets and having mechanisms in place to ensure that the resources sector and agriculturalists manage their operations responsibly and with due care for the environment and other assets.
- **Respect:** the needs and priorities of agricultural and resources enterprises are respected by each other and people are treated respectfully.
- **Transparency:** information is disclosed fully and openly with clear processes of consultation and engagement.
- **Empathy:** ensuring that resources companies and landholders understand the motives, priorities and constraints that their counterparts face.

These principles align closely with those identified by Zandvliet and Anderson (2009) in their scrutiny of numerous resource extraction operations in other regions. While the emphasis in the principles above is on them being applied to relationships between operators of agricultural and resources enterprises, similar standards are expected of government. For instance, governments should be accountable for distribution of resources revenues. They should undertake this distribution in a way that is fair and achieves an equitable outcome, and they should be transparent in providing information and be inclusive and responsive in consultation and engagement processes.

Themes

The key themes related to achieving co-existence that emerged were:

- collaboration and collective action;
- integrated landscape management approaches;
- on-going, open communication and engagement; and
- commitment to enhancing community assets.

Collaboration and collective action

Collaboration between resources companies, government, agricultural industries and communities was frequently mentioned as the key way for differences to be resolved, common goals to be identified and progress toward co-existence to be achieved. Indeed, co-existence was not conceived of as something that could be achieved by unilateral action from any sector. Some specific instances

were raised as having led to positive outcomes for both resources companies and agriculturalists, such as the Queensland Government having employed Agforce to implement community educational and engagement programs about CSG and mining issues. Local examples of successful collaboration between resources and agricultural operators were also reported, but broad scale, genuine collaboration is still quite limited.

The collaboration called for was envisaged as occurring at multiple scales and involving various parties. Many interviewees saw the need for different resources companies to work together to avoid replication of programs and work, to share learnings, and especially to assist in dealing with cumulative impacts. There have been instances of such collaboration occurring, such as contact between technical specialists in different companies and day-to-day liaison between company staff. However, some interviewees mentioned institutional and cultural barriers to collaboration between companies, such as the competitive cultures between companies and license conditions requiring each company to have almost identical community consultative arrangements.

A second form of collaboration – collaboration between companies and landholders – also occurs in various ways. On one hand, there are clear examples of collaboration, such as one CSG company arranging for agricultural producers to monitor their gas wells. On the other hand, there are anecdotes of social sanctions being applied to producers who “cooperate” with companies. Generally, the main form of collaboration emerges from negotiation over access to land and incorporating landholder needs in resources development plans. Thus landholders, in some cases reluctantly, have been actively involved with companies, particularly on logistical and technical issues, such as the siting of CSG wells and infrastructure or the timing of specific activities.

Government involvement in collaborative endeavours was also called for. The research revealed that more engagement involving companies with both local and State Government is necessary as well as collaboration among different levels of government. In addition, interviewees saw the need for companies to work more closely with existing community organisations to build their capacity to deliver services. They stressed the need to avoid having one sector working in isolation when dealing with interrelated community issues.

One area where collaboration has been fruitful was research. Interviewees mentioned that conducting research on the issues of resources development in communities and landscapes has been one area that has, or could, foster trust between stakeholders, and build a sense of shared responsibility and increased ownership of policies and approaches. They suggested that government involvement in research could help ensure that findings are translated into successful policies.

In summary, collaboration is seen to break down barriers and build understanding; remove duplication and inefficiencies; harness diverse capacities and complementarities; suit complex, interrelated sets of issues; and provide access to more comprehensive knowledge. In these respects, it addressed many of the challenges associated with managing the co-location of these contrasting industries. However collaboration also places significant demands on sectoral representatives and as such must be focussed on genuine mutual benefit.

Integrated landscape management approaches

The need for collaboration is underscored by the perceived need for interactions between resources development and other land uses to reflect an integrated approach to land management as a system on a landscape scale.

Co-existence may occur where agricultural and resources priorities are consistent or where incompatibilities, competition and negative impacts are minimal. For example, the siting of CSG wells on low quality, extensive grazing areas is more likely to be acceptable than on high value, irrigated properties. Co-existence is more contentious where there are competing high-value land and asset

uses. As a result, it is clear that an integrated approach requires consideration of diverse factors and strategies that reflect combined insights from different kinds of expertise.

Approaches to co-existence also need to be considered in terms of whole systems at multiple scales, from the property and site scale to catchment, administrative and landscape scales. On most of these scales, a key consideration is zoning. That involves characterisation of land that is appropriate for various functions, including resources development and agriculture, developing contingencies to mitigate the impact of resources development, and stipulating legislative controls appropriate for development projects.

Many development conditions are currently addressed by environmental authorities, licence conditions, and compliance and monitoring regimes, and they are situated within a broader framework of statutory planning. However, there are still areas that remain contentious, particularly the criteria for strategic cropping land and methods for assessing the likelihood and consequences of various hazards occurring. Also contested are the validation of models to effectively describe and possibly predict impacts and risks, the incorporation of agricultural and other land uses in mine and CSG planning, and the incorporation of time dimensions in models and criteria.

Fortunately, integrated catchment management approaches have successfully addressed similar challenges with respect to natural resource systems. They are seen as offering a basis for other multi-criteria, multi-stakeholder management of complex systems, such as our focus here, the conjunction of mining, CSG extraction, cropping and grazing.

Communication and engagement

In addition to a need for collaborative and integrated approaches, communication and engagement are seen as essential. It was widely reported by interviewees that relatively poor communication and engagement by companies early in the development of projects contributed to antagonism, particularly with regard to CSG development. Uncertainty and concern in communities was exacerbated by flawed communication and the limited scope of genuine engagement between landholders, community members and companies.

Interviewees consistently raised the importance of communication and transparency and mentioned the consequences of poor communication. For example, communication practices such as perceived misinformation from critics and 'spin' from companies create a situation rife with emotive information and communication that is perceived as agenda-laden. This apparent bias and disingenuousness, in turn, limits opportunities to foster mutual understanding and achieve constructive co-existence in many situations:

If the two [industries] could learn to grow together and work together, it definitely would make it easier. It would make it, into the future [that] the two can co-exist beside each other – or on top of each other – and to make it work... [They need to] keep that avenue of communication open in an honest way, being sensitive to the needs of the communities..." ~Business Network 1

Hence, co-existence is framed as requiring communication between resources companies and rural communities that includes personal contact and relationships between companies and agricultural landholders. Productive relationships are hard to cultivate because of landholder concerns about resources development, organised opposition, and insufficient respect for different perspectives, experience and knowledge.

Personal relationships between company staff and landholders are the basis for gaining trust and developing cooperation and collaboration. Relationships are facilitated by continuity of contact between company staff and landholders. The same people interacting consistently gave landholders confidence with the information they were being given and it left a feeling that decisions would be followed through. Turnover of staff threatened this continuity and hindered the development of

productive relationships and genuine communication:

“So it’s not just a case of having explained it to communities. Communities actually need to be in a position to process the data and be interested in it. It’s not enough to say to someone, ‘you should be interested in this topic, it’s going to happen to you in five years-time’ if they’re not ready to do that. And the same people who didn’t go to community sessions [three years ago] are now saying ‘it’s all a bit quick, can we slow down?’ So it’s a lesson at least in my mind about how you communicate with people.” ~Resources Sector 1

It seemed essential that stakeholders in a respectful relationship ‘co-produce’ knowledge and learn together, whether from their peers or opponents. For instance, companies, government and landholders could work together to pool expertise and combine different forms of knowledge so as to develop technical solutions supporting co-existence by modelling based on farming practices as well as scientific expertise. In such circumstances, where positive outcomes can be seen to emerge from joint effort, stakeholders develop the confidence to communicate less defensively.

Commitment to enhancing community assets

The ability to engage one another with integrity and with an aim for an integrated approach to land management was called for, in concert with a commitment by all parties to a shared goal: enhancing community assets. According to community feedback, co-existence relies on resources companies, landholders and government sharing a commitment to maintaining the environment and fostering the long term future of communities, rather than focusing on a short-term or self-interested objective. For many interviewees, this balance was framed as a trade-off, where possible environmental harm from resources development was seen to be tolerated within certain limits in return for greater local employment, infrastructure investment and other benefits. However, others insisted that a ‘do no harm’ principle was the appropriate standard for all operators of CSG, mining and agricultural enterprises.

Agriculture was seen as the long term mainstay of communities, not just economically but socially and culturally. The resources sector as the change agent and new part of the landscape presented four main concerns. First, it was seen as a threat to agricultural and natural assets, particularly groundwater but also soils and biodiversity. Second, the resources sector was seen as disrupting established social networks and economic systems that have been built up by agricultural producers and support industries. Third, it was regarded as receiving unfairly preferential treatment from the regulator. For example, some of the controls on landholder access to groundwater and the clearing of vegetation do not apply to mining or CSG companies. Hence, landholders saw resources companies’ clearing of pipeline easements and dewatering of aquifers as not just potentially harming a resource, but also being fundamentally unjust. The fourth, and arguably most challenging concern raised by interviewees, was that resources expansion changed the identity and culture of communities. Interviewees mentioned that agricultural towns were becoming mining communities. They were profoundly disturbed by changing social networks, a ‘high vis’¹¹ culture, and the potential dominance of young male newcomers to the region. These personal and emotive concerns – mostly reacting to superficial appearances – were often mentioned ahead of economic or environmental impacts.

Potential for co-existence thus requires resources companies to appreciate their impact on community identity and culture while demonstrating genuine commitment as a long term community stakeholder to the protection of shared resources, such as infrastructure, water and vegetation, rather than seeing it as a trade-off. While funding programs for communities were greatly appreciated, interviewees cited a need for “cheque-book engagement” to continue to evolve into long-term relationships.

¹¹ Employees of mining and CSG companies typically have high visibility (shortened to ‘high vis’) work clothes, with for example fluorescent or reflective strips, as one of the personal protection and safety measures adopted throughout a safety-conscious industry.

In conclusion, themes emerging from our interviews suggest that engaging with integrity and a collaborative, integrated approach to land management – among resources companies, agriculturalists, and government – need to be accompanied by genuine commitment on all fronts to shared community goals. Thus, the interviews underline the notion that assets of land, water, infrastructure, economy, human, and social capital need to be maintained in concert.

8. Conclusion

This scoping study was undertaken as a precursor to a research program for regions that host extractive industries and agriculture. It used a small but diverse sample in a specific region that is appropriate to increase understanding of issues that manifest differently in each unique context. It makes no claims to statistical representativeness. It *does* provide more detail around many of the concerns reported in the media and provide some lessons, particularly for resources companies and governments, as well as pointing to priority areas for future research.

Despite the fact that in aggregate, respondents reported minimal overall change in the asset base, they individually recorded significant changes in some dimensions. As well as some common perceptions there were a number of marked differences often resulting from different values and priorities rather than different amounts of knowledge. It was clear from comparing the quantitative and qualitative responses that averaging responses on a sectoral basis, assuming homogeneous views or aggregating multiple indicators of one class of assets can mask differences and the full complexity of situations when it may be more important to amplify differences and render nuances visible.

One general conclusion of the study is that challenges to co-existence cannot be resolved merely by gathering more data, defining issues more clearly, developing more plans, increasing spending, segmenting the issues and working piecemeal or trying to focus on logic and ignore emotion and subjective considerations. These conventional solution processes, along with approaches that simply try to appease the majority, can exacerbate conflicts and negative consequences. This is partly because they assume a scenario with linear cause and effect and single ‘culprits’ and ‘victims’ when there are innumerable interconnected factors contributing to these challenging situations. The research highlighted that rather than needing sophisticated scientific analysis, the challenge of co-existence is fundamentally one of contrasting values and interests and so requires a social solution that is inclusive, multidisciplinary, exploratory and adaptive and examines the issues “as a whole through a panoramic social lens rather than a scientific microscope” (Xiang 2013:2).

Future research to increase understanding of how to manage multiple-industry contexts should therefore include:

- development of indicators of a regional asset base that are widely accepted as credible and salient;
- assessments of cumulative impacts of multiple industries on various categories of assets at multiple scales from farm-level to regional;
- application of systems and risk based models that identify thresholds, tipping points and limits for the various categories of assets;
- identification of effective processes for integrating different dimensions, disciplines and forms of knowledge while factoring in values, emotions and subjective considerations; and
- characterising governance arrangements suited to the management challenges of these contexts.

If researchers develop greater insight into these matters and companies and governments act on their perceived responsibilities as described in this report and apply the principles and themes identified, the conditions and limits for the co-existence of resource extraction and agriculture will be clearer and more effective management strategies can be applied in multi-industry regions.

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Appendix A: Perceptions Scale

ENERGY RESOURCES FROM THE FOODBOWL: AN UNEASY CO-EXISTENCE

IDENTIFYING AND MEASURING THE CUMULATIVE EFFECTS OF MINING AND AGRICULTURE

Survey: Stakeholder assessment of cumulative impacts of multiple industries with respect to indicators of selected community assets.

To consider cumulative impacts we need to examine the net effects and interactions between social, environment, built and natural environment and financial opportunities. In your region, the balance of trade-offs and benefits from the co-existence of mining, gas production and agricultural activities is likely to depend on existing assets (sometimes called capitals) within the region's communities - e.g. human, social, physical, natural, financial capital – and how they are being affected by changing activities. Below we would like you to evaluate the status of these capitals at two different times to indicate what the trend is. We've suggested **5 years ago** (i.e. before recent changes such as the introduction of large scale mining and CSG activities in your region) and **now** (i.e. during those changes).

- **Human capital** refers to the availability of labour, people's levels of education and skills, the average age and health condition of people in the community that enable them to work and earn a living.
- **Social capital** is composed of social contacts, networks, relationships, levels of trust and reciprocity, and virtues that keep communities together, enables people to cooperate and interact positively and make them resilient to external influences.
- **Physical capital** is comprised of assets that allow production processes and the creation of wealth in a community. Examples include infrastructure such as buildings, road and rail transport provisions, equipment, technology, irrigation channels, roads, dams, factories, etc.
- **Natural capital** comprises land, forests, water and their biological resources used by people for lifestyle purposes and to generate production and income.
- **Financial capital** refers to the available revenue streams and financial resources that people hold or can access.

Please read through the statements on the following pages and give a quick response about the extent to which you agree with these general statements about your community by ticking one box in each row on the right hand side:

Capital/ Assets	Indicator	Time	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Human	Most people have some post-secondary school education or training	5 years ago					
		Now					
	People of all ages enjoy a high standard of health	5 years ago					
		Now					
	The population has a good balance of people of different ages	5 years ago					
		Now					
	The incidence of anxiety, depression and mental illness is low	5 years ago					
		Now					
	There is a good balance of long-term residents and recent arrivals.	5 years ago					
		Now					
Social	There are sufficient skilled or trained workers in the region to fulfil employment needs	5 years ago					
		Now					
	The region is an accepting place for people of diverse cultures and backgrounds	5 years ago					
		Now					
	We have a safe community with low levels of crime and violence	5 years ago					
		Now					
	This is a cohesive society without divisions	5 years ago					
		Now					
	We have access to quality health services	5 years ago					
		Now					
	There are a number of active clubs and associations	5 years ago					
		Now					
	There is a range of entertainment and cultural opportunities, events and activities available here for people of different ages and interests	5 years ago					
		Now					
	This is a resilient community that copes well with change and challenges	5 years ago					
		Now					
	Families are stable and happy	5 years ago					
		Now					
	The level of public services provided (e.g. welfare, financial services, training opportunities, childcare, ancillary health services etc.) matches the total number of residents in our region	5 years ago					
		Now					

Capital/ Assets	Indicator	Time	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Physical	There is an adequate supply of housing and accommodation	5 years ago					
		Now					
	There is good communication infrastructure	5 years ago					
		Now					
	Roads and transport infrastructure is in good condition	5 years ago					
		Now					
	Energy is available to all community members at a reasonable price.	5 years ago					
		Now					
	The sewerage and water supplies in our towns meet the community's requirements	5 years ago					
		Now					
	Hospitals, clinics and schools here are well maintained and have adequate capacity and modern equipment	5 years ago					
		Now					
	Public amenities (footpaths, lighting, public toilets, dumps and waste disposal) are provided and maintained	5 years ago					
		Now					
	There are good recreational facilities (e.g. sports fields, swimming pools, libraries, cultural centres, parks)	5 years ago					
		Now					
Natural	The extraction and use of natural resources from the earth occurs in way that neutralises harmful effects to people and/ or the environment	5 years ago					
		Now					
	The region's ecological system, biodiversity and the state of natural resources are protected or enhanced	5 years ago					
		Now					
	Our region has good risk management strategies to control weeds and pest under changing conditions (including new industrial activities)	5 years ago					
		Now					
	Our fertile soils are well protected against degradation by good agricultural management, appropriate land uses and supportive regulation	5 years ago					
		Now					
	Air quality is good with low levels of pollution, dust and chemicals in the air. .	5 years ago					
		Now					
	We have liveable communities with pleasing landscape and no real eyesores	5 years ago					
		Now					
	There are adequate water supplies to meet the community's requirements for town supplies, irrigation and industrial use	5 years ago					
		Now					
	Our surface and ground water are free of pollutants that could harm people, stock or the environment	5 years ago					
		Now					
	There is general confidence in the community that our water catchments are well managed	5 years ago					
		Now					

Capital/ Assets	Indicator	Time	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Financial	There are plenty of employment opportunities in a variety of satisfying jobs	5 years ago					
		Now					
	The price of land accurately reflects its value	5 years ago					
		Now					
	Housing and accommodation are affordable	5 years ago					
		Now					
	The cost of living is reasonable	5 years ago					
		Now					
	Businesses providing agricultural goods and services are thriving	5 years ago					
		Now					
	Businesses providing goods and services to mining, oil or gas companies are thriving	5 years ago					
		Now					
	Wages are in line with the cost of living and generally equitable.	5 years ago					
		Now					
	The region has a balanced and diversified economy.	5 years ago					
		Now					
	There are many viable locally owned and operated small and medium enterprises in our region	5 years ago					
		Now					
	Levels of debt for local households and businesses are manageable	5 years ago					
		Now					

Thank you for your participation. If you have any questions or comments about this survey, please feel free to raise them during the interview when there will be a chance to elaborate on your view