



National Environmental
Research Program

TROPICAL ECOSYSTEMS *hub*

Interim Report

The Social and Economic Long Term Monitoring Program (SELTMP) 2013

Drivers of Change in the Great Barrier Reef



Erin Bohensky, Matt Curnock, Sarah Gillet, Jeremy Goldberg, Margaret Gooch,
Nadine Marshall, Petina Pert, Lea Scherl, Samantha Stone-Jovicich and Renae Tobin



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Great Barrier Reef
Marine Park Authority

Reef &
Rainforest
RESEARCH CENTRE

The Social and Economic Long Term Monitoring Program (SELTMP) 2013 Drivers of Change in the Great Barrier Reef

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Australian Government

Department of the Environment

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2014

SELTMP 2013: DRIVERS OF CHANGE IN THE GREAT BARRIER REEF

Introduction

The Great Barrier Reef region, including the people and industries it supports, is influenced by a range of drivers from global to local scales. We define a driver as any natural or human-induced factor that directly or indirectly causes a change in the GBR system (see SELTMP 2011 for a more in-depth discussion of drivers).

Drivers are important to monitor so that we are able:

- To **understand** mechanisms of change in the variables we monitor
- To **anticipate** and begin to predict outcomes
- To **document the** context or “backdrop” of change – in 25 years’ time, what will we need to know to interpret change?

These drivers themselves change over time (Figure 1) and the direction, magnitude and speed of change can be uncertain; hence monitoring programs need to be adaptive (Lindenmayer and Likens 2009).

In this chapter we:

1. Present drivers that were identified in eight SELTMP end user meetings in 2011, the first year of SELTMP, and then present comparative data from a workshop in 2013.
2. We then show how we categorised drivers identified in 2011 and from this, define six driver categories to be monitored. We focus on indirect drivers of change (MEA 2003) – underlying causes of pressures on the GBR – which are most relevant to the social and economic dimensions of the reef. Direct drivers such as biophysical processes of climate change and run-off are monitored by other research programs. However, SELTMP is interested in perceptions of climate change and policies to address it, for example.
3. Present “wishlist” indicators identified by the Drivers of Change Working Group or in the literature for each of the six key categories of drivers, and some of the data collected. Some categories, such as social and cultural drivers, and politics and management, are not easily generalised, and can be highly specific to the GBR region and the different end user groups.

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Introduction - In a nutshell:

- SELTMP is monitoring six inter-connected categories of drivers that influence the Great Barrier Reef and its social dimensions
- Change is often uncertain, increasingly rapid and more global in reach
- Understanding these drivers can help better interventions to be designed that account for uncertainty, rapid change and multiple scales
- Drivers exert their influence in numerous and complex ways; for example, a rise in the value of the Australian dollar may benefit some Great Barrier Reef users but be detrimental to others. Other technical reports in this series will detail how some of these drivers play out for the reef's diverse end user groups.

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Key issues over time



Australian Government
Great Barrier Reef
Marine Park Authority



Figure 1. Concern over issues facing the Great Barrier Reef has shifted over time.

Source: Reichelt/GBRMPA, NATSHIP Conference 2012

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Approach and Methods

While many studies and management programs have identified drivers, little guidance exists to advise researchers or managers on how drivers might be identified for a monitoring program. In line with the overall SELMTP approach, we employed both “bottom up” and “top down” approaches to driver identification, combining expert elicitation in the first case with an established scientific framework from the Millennium Ecosystem Assessment (MEA 2003; Figure 2), and cross-checking this with other literature in the second (Figure 3). Expert opinion was elicited in eight end user meetings in October-December 2011, and again in a combined workshop in October 2013. The first of these was a dedicated Drivers of Change workshop to identify broad-brush drivers across the GBR region, followed by meetings for each of the seven end user groups where more sector-specific drivers were identified.

As noted previously, monitoring drivers is a ‘moving feast’. For readers interested in comparing this report with SELTMP 2011 and 2012, we note that some datasets reported on in earlier years were not available at the time of this report’s production, notably ABS population data. Additionally, some data sources used in previous years were no longer accessible and alternative methods were required to obtain the relevant information.

Since 2011 we have been monitoring and analysing print and web-based media – itself a key driver category – to track changing patterns in coverage and narratives used to frame and communicate about key drivers in the GBR. This has included tracking news articles as well as public interest through tools such as Google Trends, Socialbakers.com and other sites. Beginning this year a targeted, in-depth media analysis is being undertaken to supplement survey and interview data related to perceptions.

Drivers methods in summary:

Expert opinion elicited through workshops (broad-brush and sector-specific)	Cross-checking with literature and other secondary data sources (e.g. media)	Comparison, amalgamation, refinement
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Words listed by workshop participants in **2011** when asked "What are the three biggest drivers of change affecting the Great Barrier Reef?"

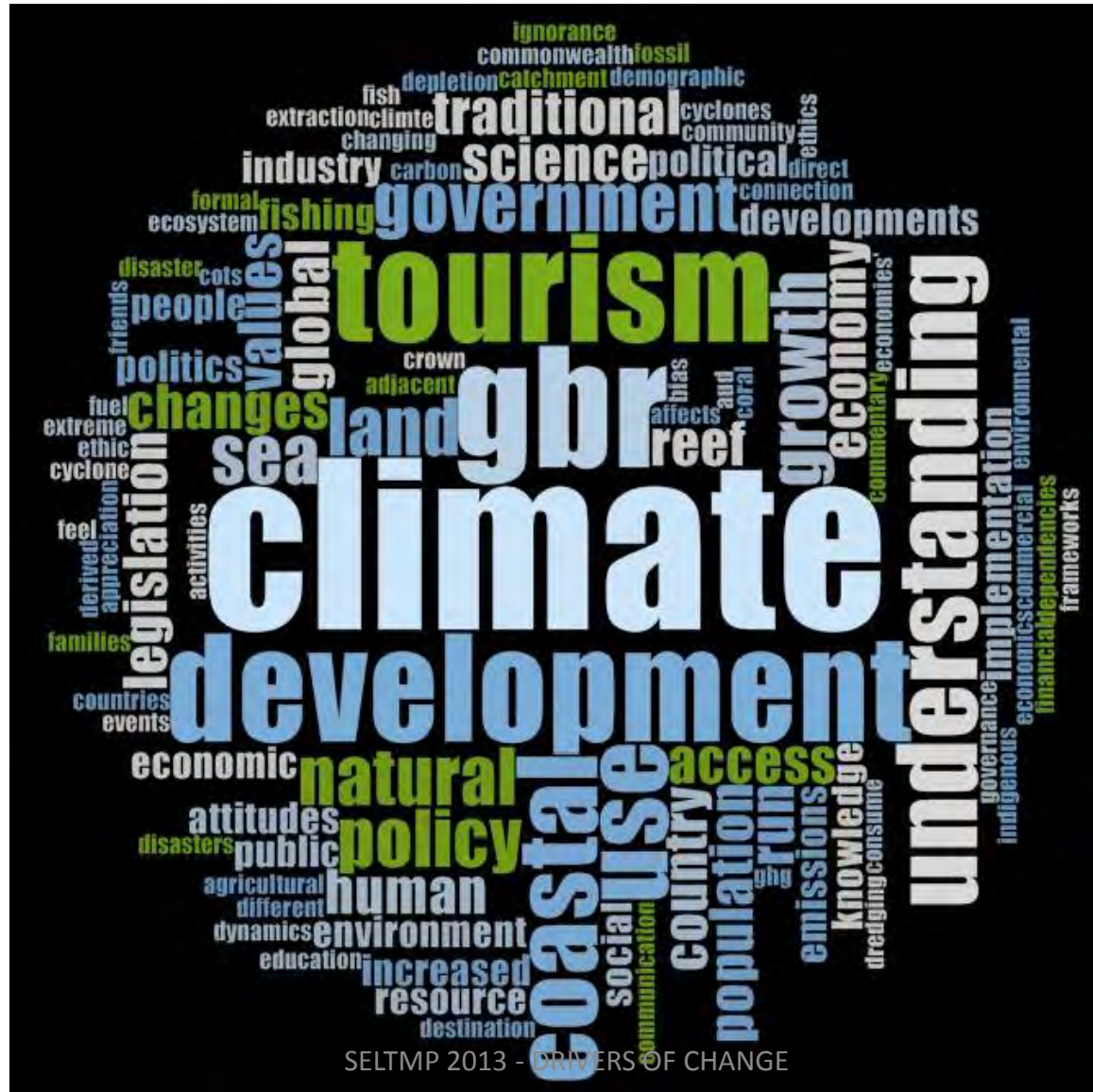
* Word size indicates frequency word was listed; "change" was removed from data set



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Words listed by workshop participants in **2013** when asked "What are the three biggest drivers of change affecting the Great Barrier Reef?"

* Word size indicates frequency word was listed; "change" was removed from data set



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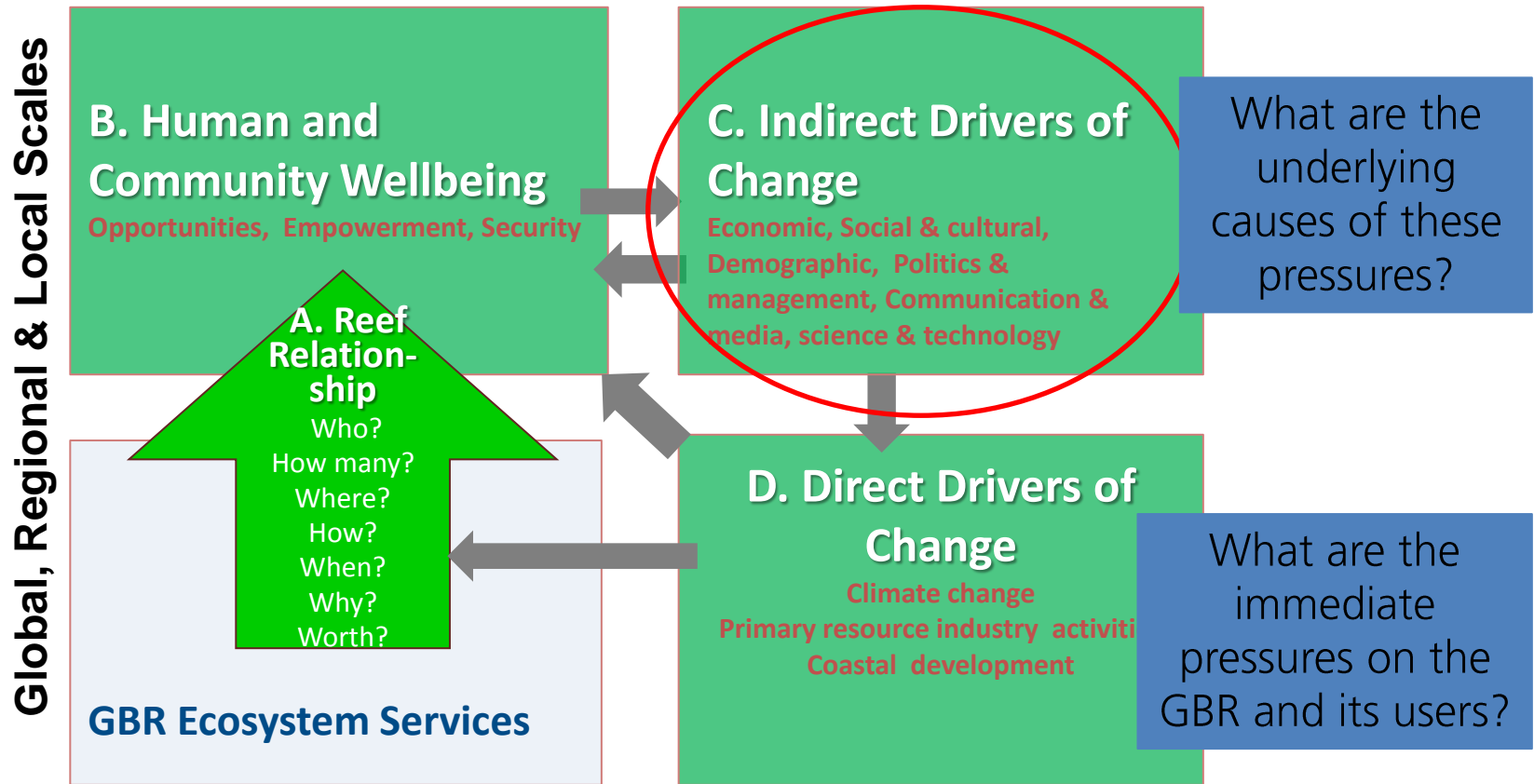


Figure 2. Modified version of the Millennium Ecosystem Assessment framework that describes indirect and direct drivers and their relationships with ecosystems and human well-being (MEA 2003). This report focuses primarily on Indirect Drivers of Change.

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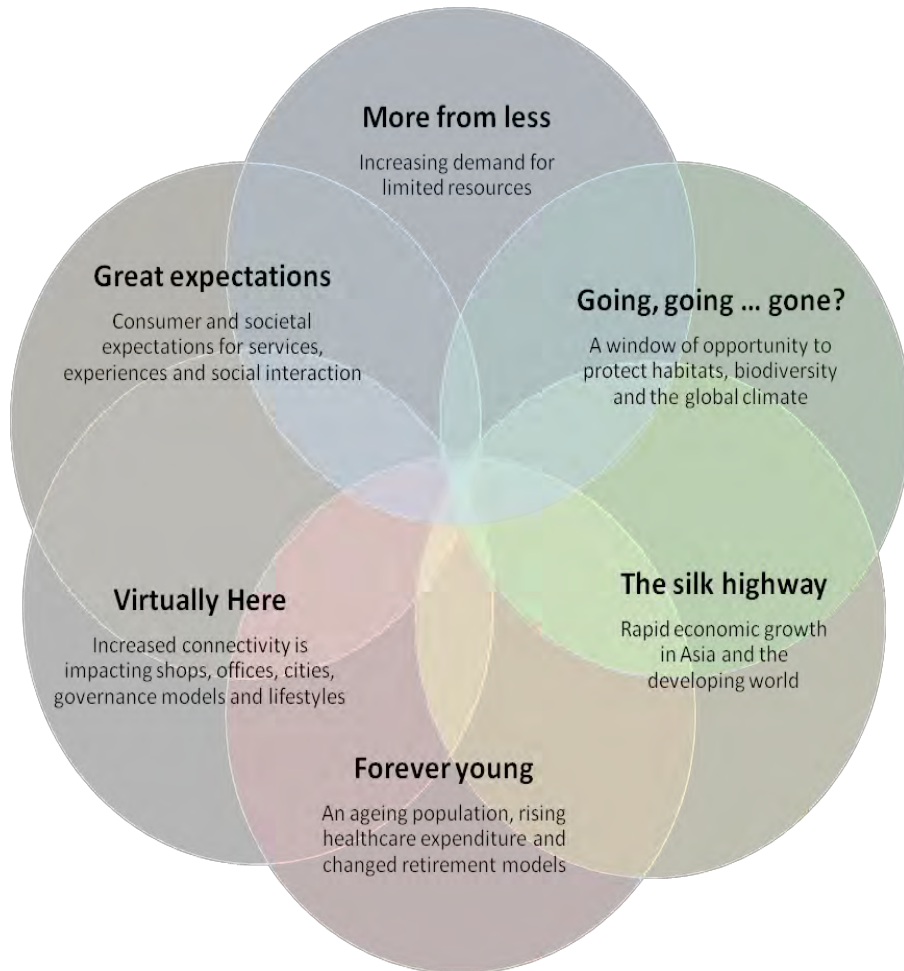


Figure 3. SELTMP driver categories were validated by cross-checking with other literature, such as CSIRO's 'Our Future World' report which describes six megatrends that may change the way people live. CSIRO plans to update the megatrends report biennially, with the next one due in 2014. Source: Hajkowicz et al. 2012.

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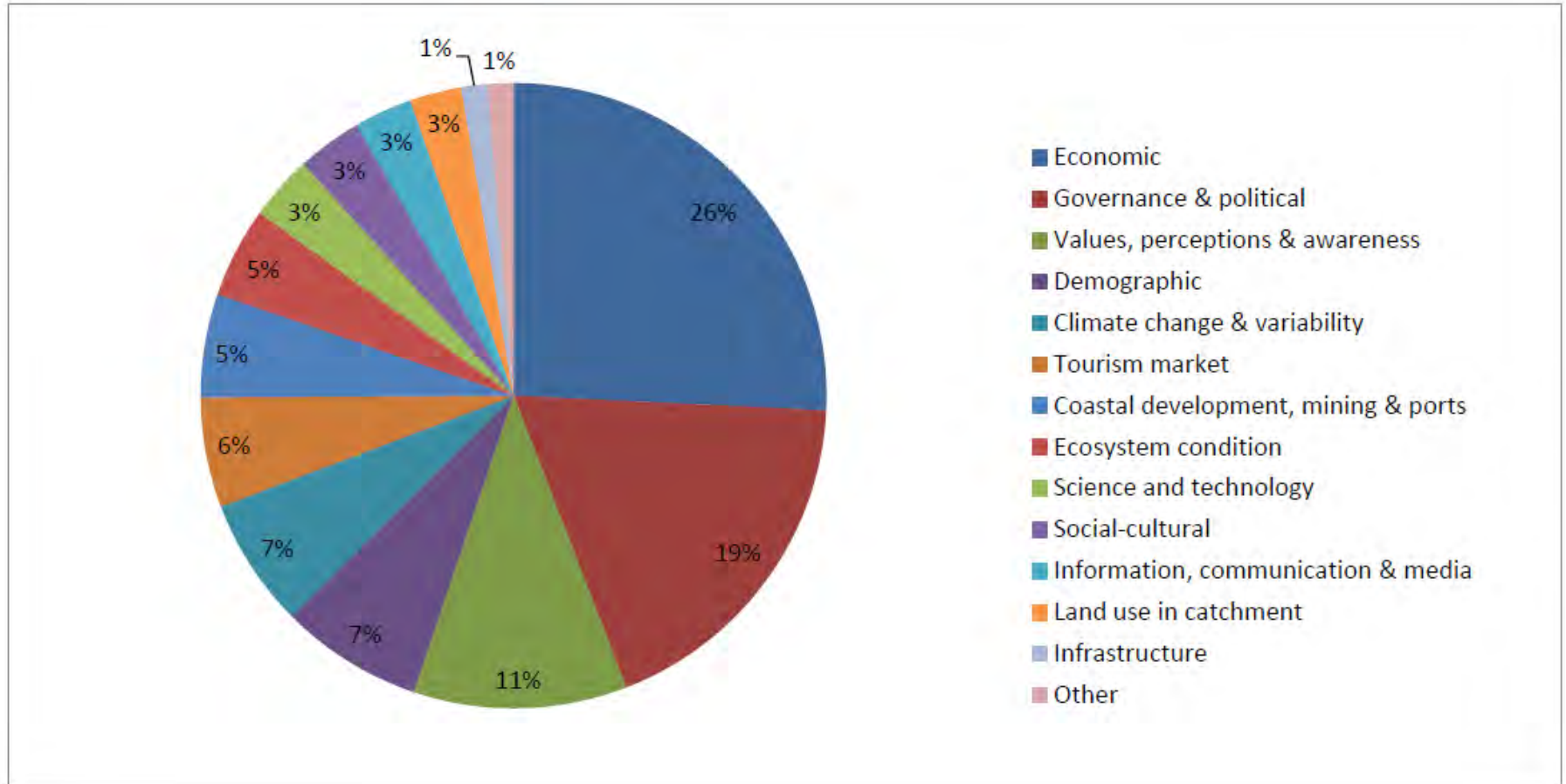


Figure 4. Categorisation of drivers identified in eight end user workshops held in 2011. For this report we focus on six indirect driver categories which are most relevant to the variables being monitored in SELTMP: Economic, Social and cultural, Demographic, Politics and management, Communication and media, and Science and technology.

Driver categories for monitoring

1. Economic
2. Social and cultural
3. Demographic
4. Politics and management
5. Communication and media
6. Science and technology

1. Economic

***Economic** drivers span various issues and scales, from global to local. Global economic growth and its distribution by country, sector, and individual affects relationships between people and the Reef. How growth is distributed determines the character of demand for ecosystem services.*

Represent **26%** of the drivers identified as most important by the working groups (SELTMP 2011).

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1. Economic Drivers

User Group	Examples of economic drivers identified
Commercial Fishing	Economic profitability, exchange rate, market access/product form, US\$ and global market problems, world fish prices, input prices, internationalism
Recreation	Cost and perceived benefits of using the GBR, global and regional economic conditions, disposable income
Tourism	Air travel (costs and flight paths), peak oil/fuel costs, cost of product, strength of AUD, relative cost price, interest rates
Ports and Shipping	China and India's economic expansion and resource needs, world economic demand
Traditional Owners	Competing interests (best interests of the nation), economic outcomes
Coastal Communities	Economic reliance on and connection to place, economic situation down south (NSW+ Victoria), international economic situation, job opportunities
Catchment Industries	GDP and exchange rates of importing countries, relative prices of key commodities, production costs, market fluctuation, terms of trade, property prices, employment, services, technology costs, price squeeze, sugar mill viability, international competitiveness, industrialisation of India and China

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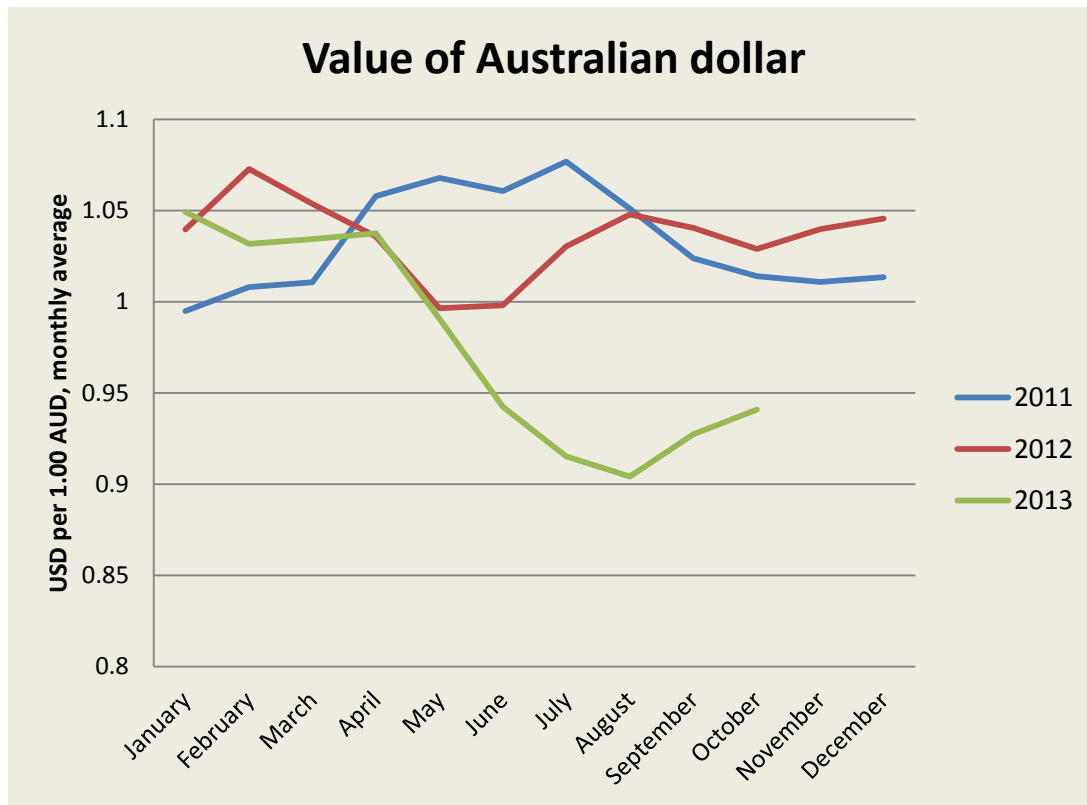
1. Economic Drivers

“Wishlist” indicators monitored by SELTMP

- Value of AUD
- Interest rates / inflation
- GDP growth rates
- Centre of world economic “gravity”
- Input, fuel, commodity prices
- House prices
- Equality (Gini index, index of socioeconomic disadvantage)
- Demand (e.g. for fair trade products, experiences)

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1. Economic Drivers: Exchange rate



Average annual values:

2011 1.032460

2012 1.035767

2013 0.977328

Figure 5. Economics: A key indicator is the value of AUD trading against the USD. While the yearly averages for 2011 and 2012 were similar, monthly averages differed significantly. Source: <http://www.x-rates.com/average/?from=USD&to=AUD&year=2013>

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1. Economic Drivers: Inflation and interest rates

UNDERLYING INFLATION



Figure 6. Consumer prices rose by only 0.4 per cent in the first quarter of the year, the lowest underlying figure in more than a decade. Source: <http://www.theaustralian.com.au/national-affairs/policy/inflation-blow-to-budget-recovery-as-rate-cuts-in-frame/story-fn59nsif-1226629032831#sthash.2DdsSnQE.dpuf>

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1. Economic Drivers: GDP Growth Rates

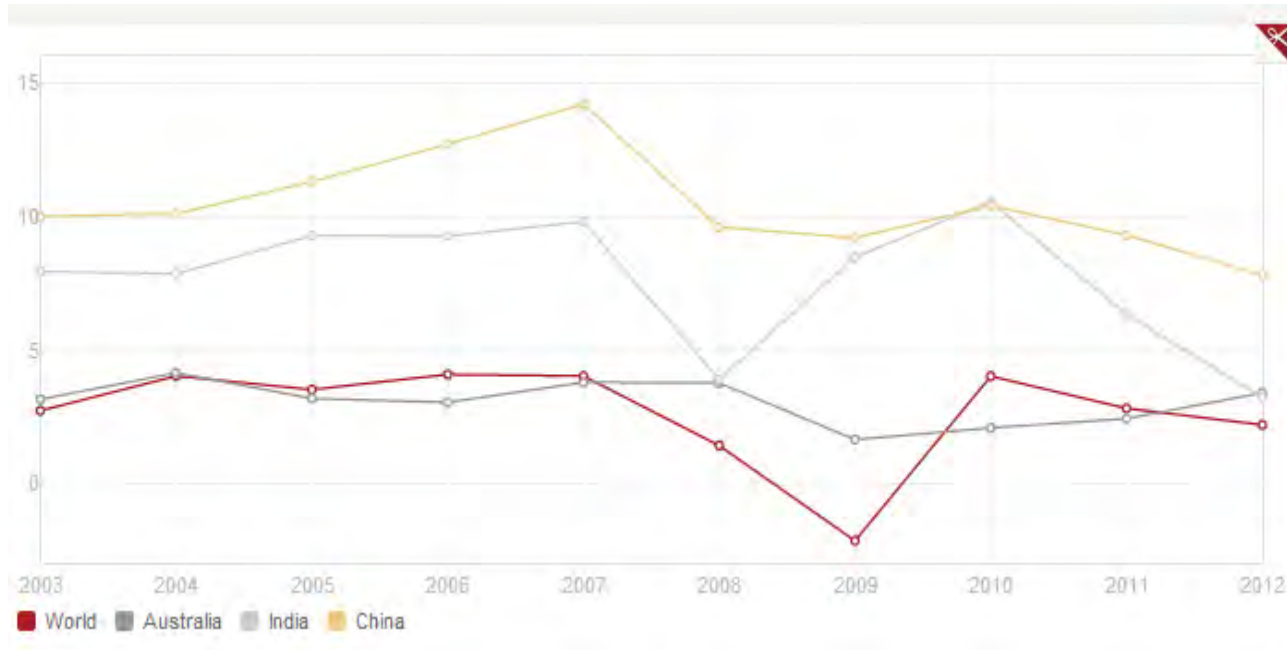


Figure 7. Annual GDP growth rates (%) for Australia, India, China, and the world. For 2012, Australian growth increased despite declining growth globally and in India and China. Data not available for 2013 at time of writing.

Source: <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/countries/1W-AU-IN-CN?display=graph>.

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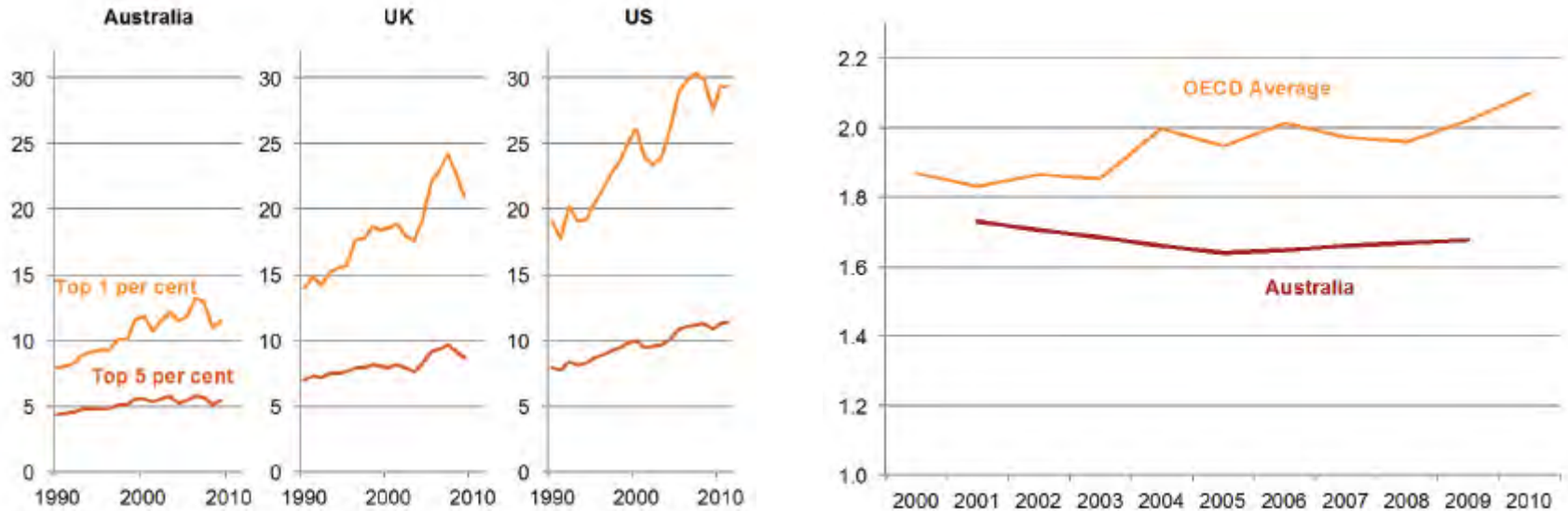
1. Economic Drivers: Shifting World Economy



Figure 8. The centre of gravity of the world economy is the geographic hotspot of income generation based on the distance-weighted gross domestic product of 700 locations. Source: Quah 2011

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1. Economic Drivers: Equality



Source: Grattan analysis of Alvaredo et al (2013)

Figure 9. Left: Average incomes of the top 1 and 5 percent; multiple of average income for bottom 90 percent. Right: Earnings premium for higher education. Earnings of workers with bachelor degree as a multiple of earnings of workers with only upper high school education. Inequality may well rise after the mining boom ends, creating pressure to increase welfare payments, a trend evident overseas when inequality has grown. Ref: Daley et al. 2013.

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1. Economic Drivers: House Prices

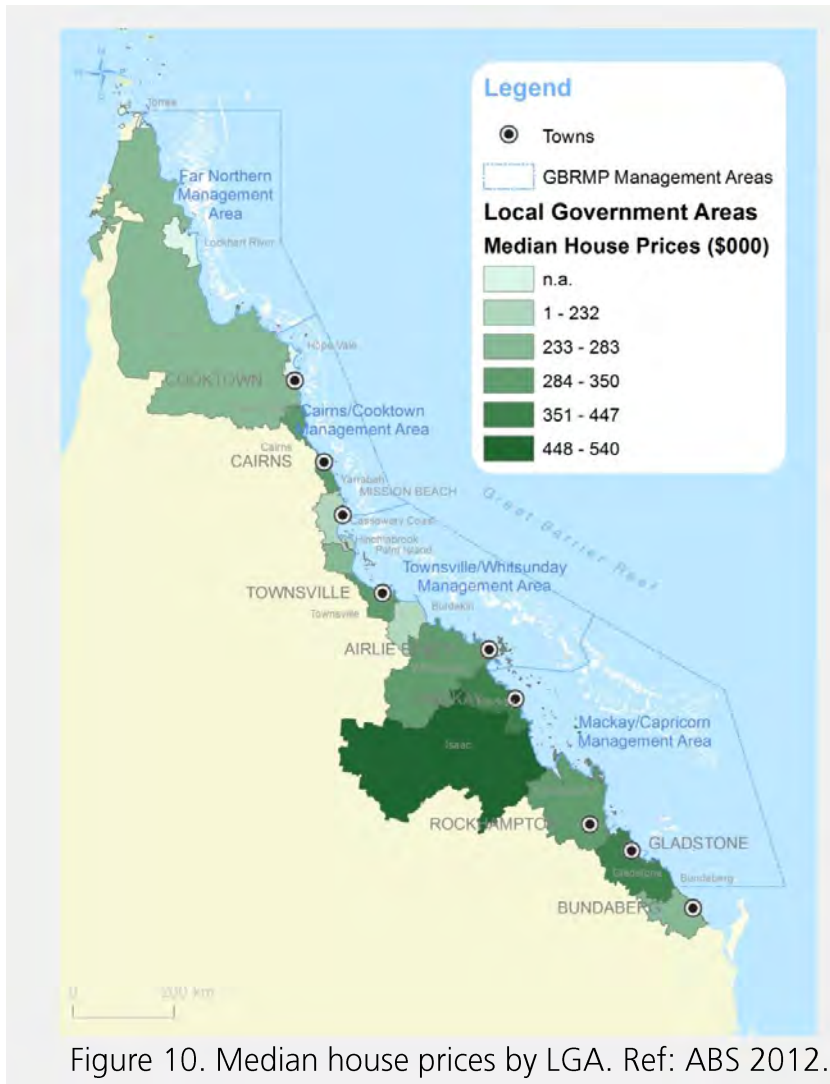


Figure 10. Median house prices by LGA. Ref: ABS 2012.

2. Social and Cultural

Social drivers include how society thinks and behaves in relation to the reef. **Culture** refers to the values, beliefs, and norms that a group of people share. Culture conditions individuals' and societies' perceptions of the world, influences what they consider important, and suggests courses of action that are appropriate and inappropriate.

"Wishlist" Indicators

- Environmental awareness & values
- Participation in environmental initiatives
- Perceptions of reef condition and threats
- Resource dependency
- Adaptive capacity

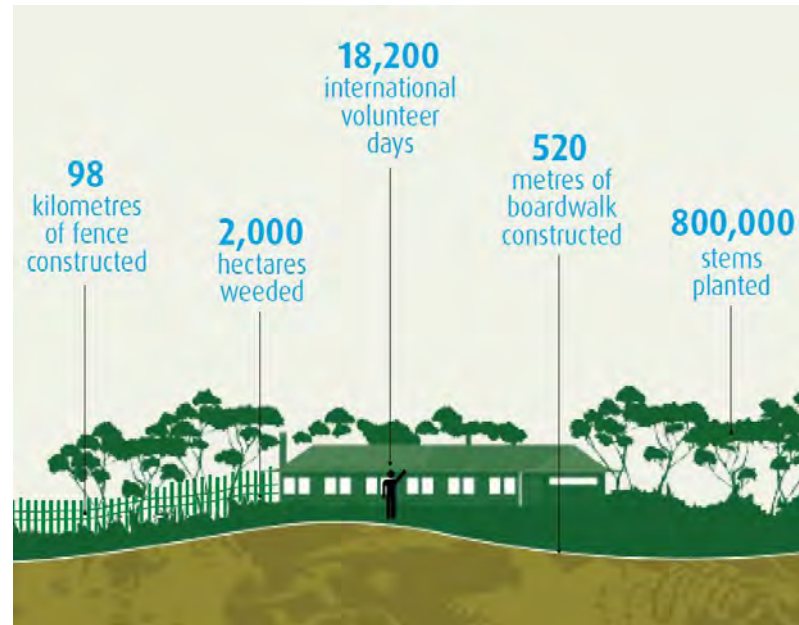
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2. Social and Cultural Drivers: Participation in environmental and research initiatives

Conservation & stewardship initiatives

Conservation Volunteers achievements in 2012: (see image, right)
Total volunteer days: 60, 000
Environmental monitoring surveys: 104
Species monitored: 38
Projects undertaken in GBR Region: 3 (Gladstone, Mackay, Townsville and Cairns)

Ref: Conservation Volunteers Annual Report 2012



Citizen science involvement

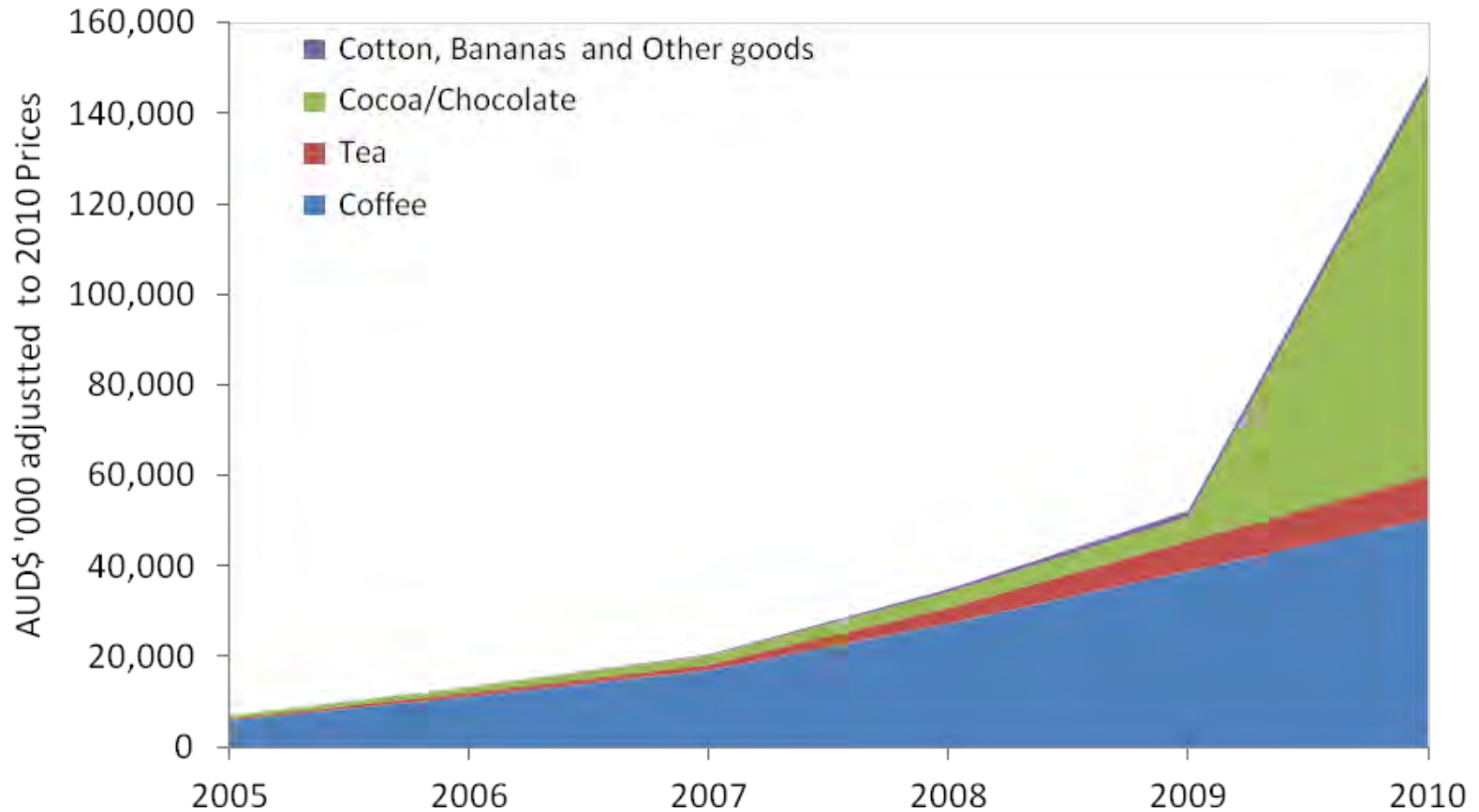
Have had some involvement, or are currently involved in citizen science projects:
Managers: 70%
Scientists: 77%

Ref: Chin 2012

“**Citizen science** (also known as **crowd science**, **crowd-sourced science**, or **networked science**) is scientific research conducted, in whole or in part, by amateur or nonprofessional scientists. Also called public participation in scientific research.” (Wikipedia)

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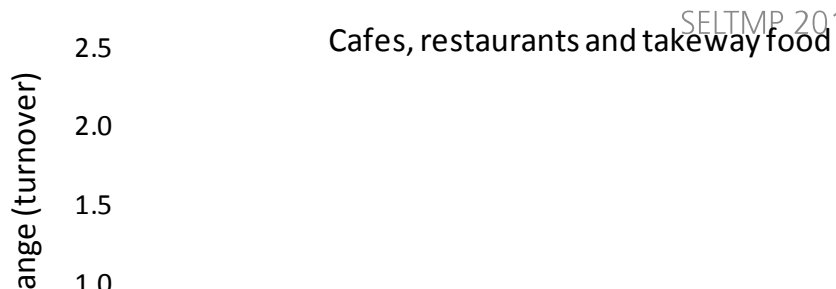
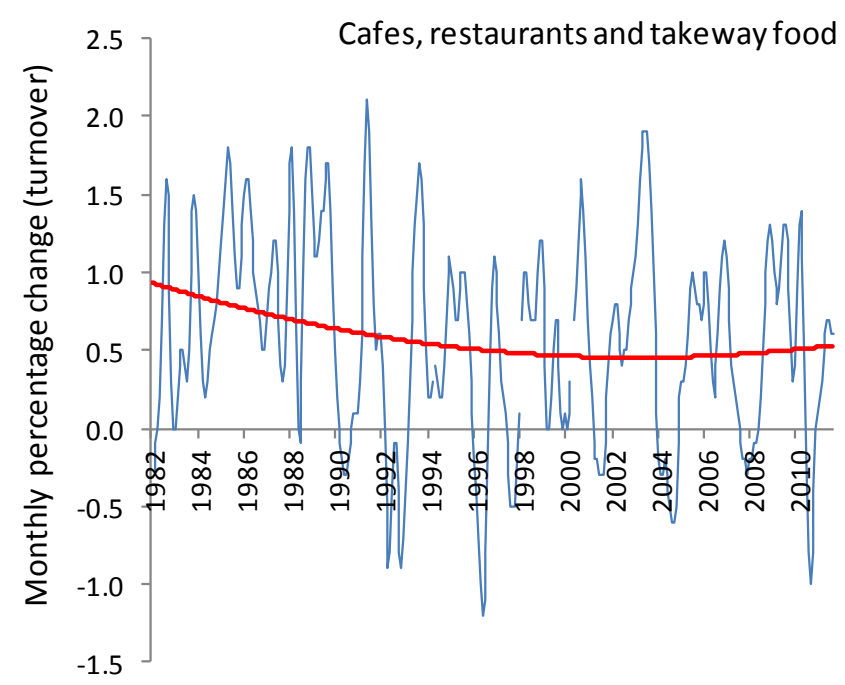
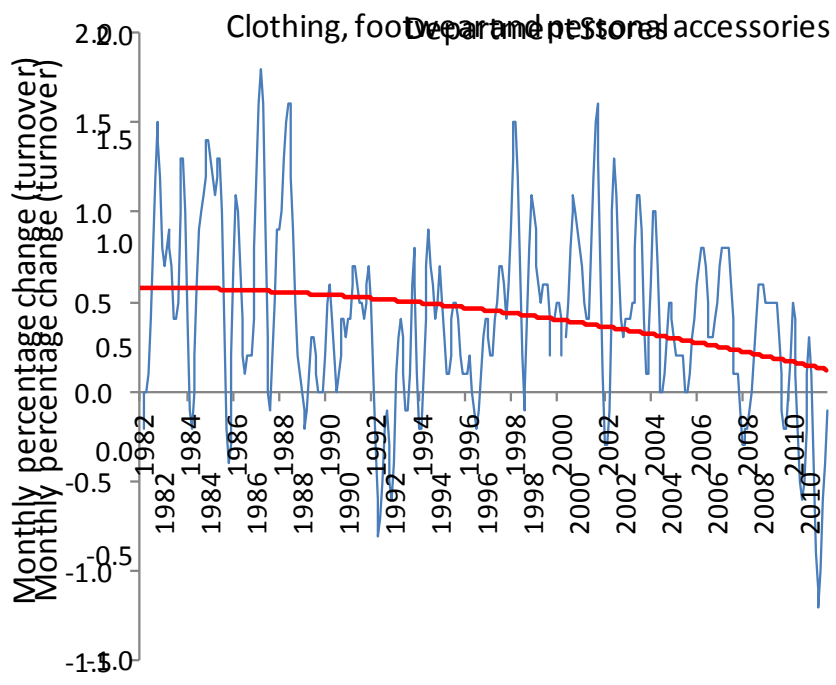
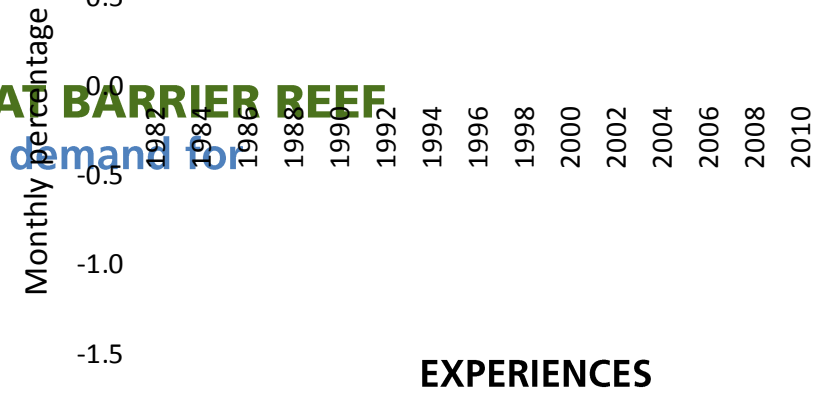
2. Social and Cultural Drivers: Fair Trade Logo Sales Revenue



SELTMP 2013 - DRIVERS OF CHANGE

SELTMP 2013: DRIVERS IN THE GREAT BARRIER REEF

2. Social and Cultural Drivers: Increasing demand for experiences



SELTMP 2013 - DRIVERS OF CHANGE

SELTMP 2013: DRIVERS IN THE GREAT BARRIER REEF

2. Social and Cultural Drivers: Perceived threats to reef

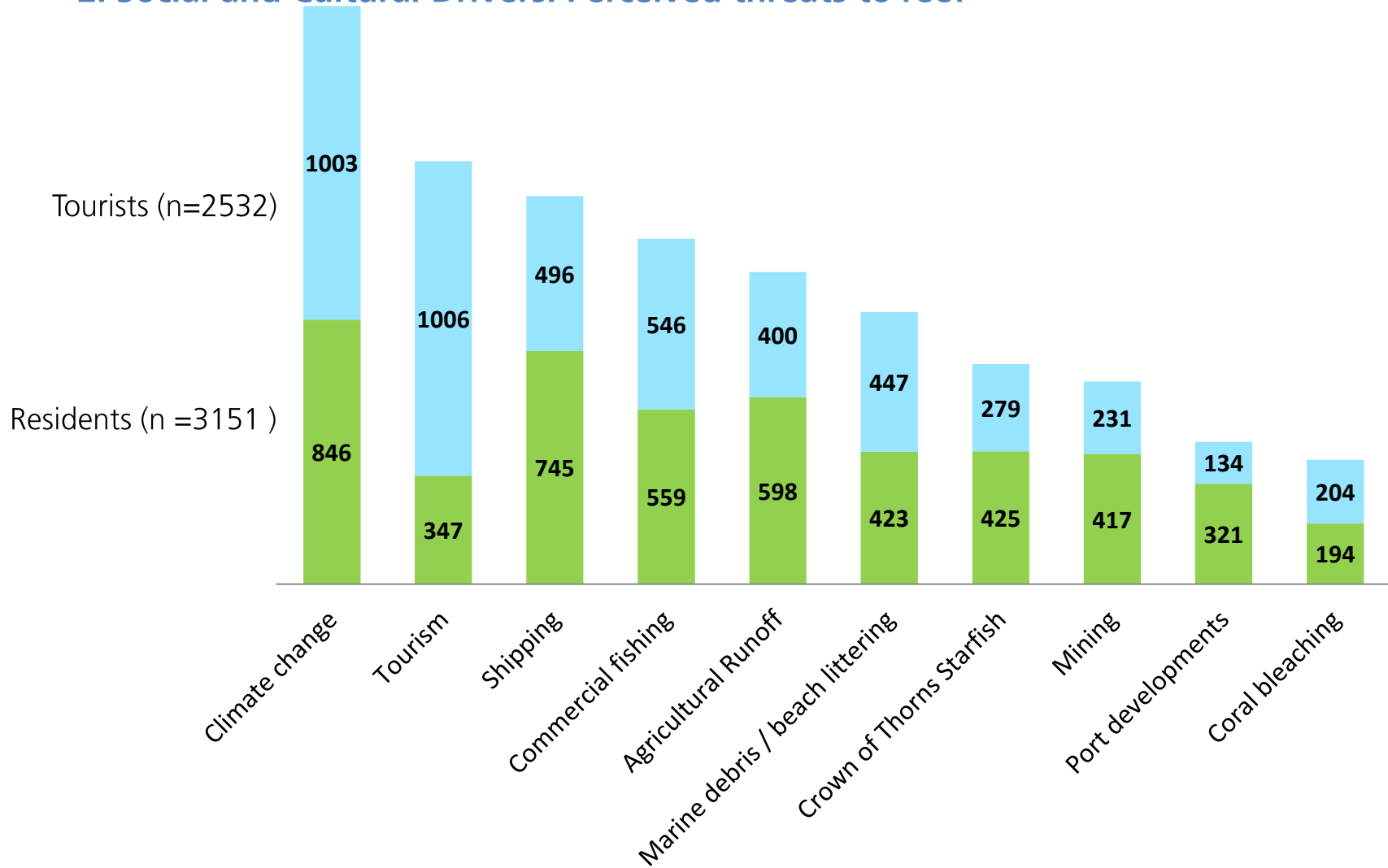


Figure 13. Ten most frequently identified threats in response to the question: "What do you think are the three most serious threats to the Great Barrier Reef?" SELTMP tourist and resident surveys 2013.

SELTMP 2013: DRIVERS IN THE GREAT BARRIER REEF

2. Social and Cultural Drivers: Perceived threats to reef

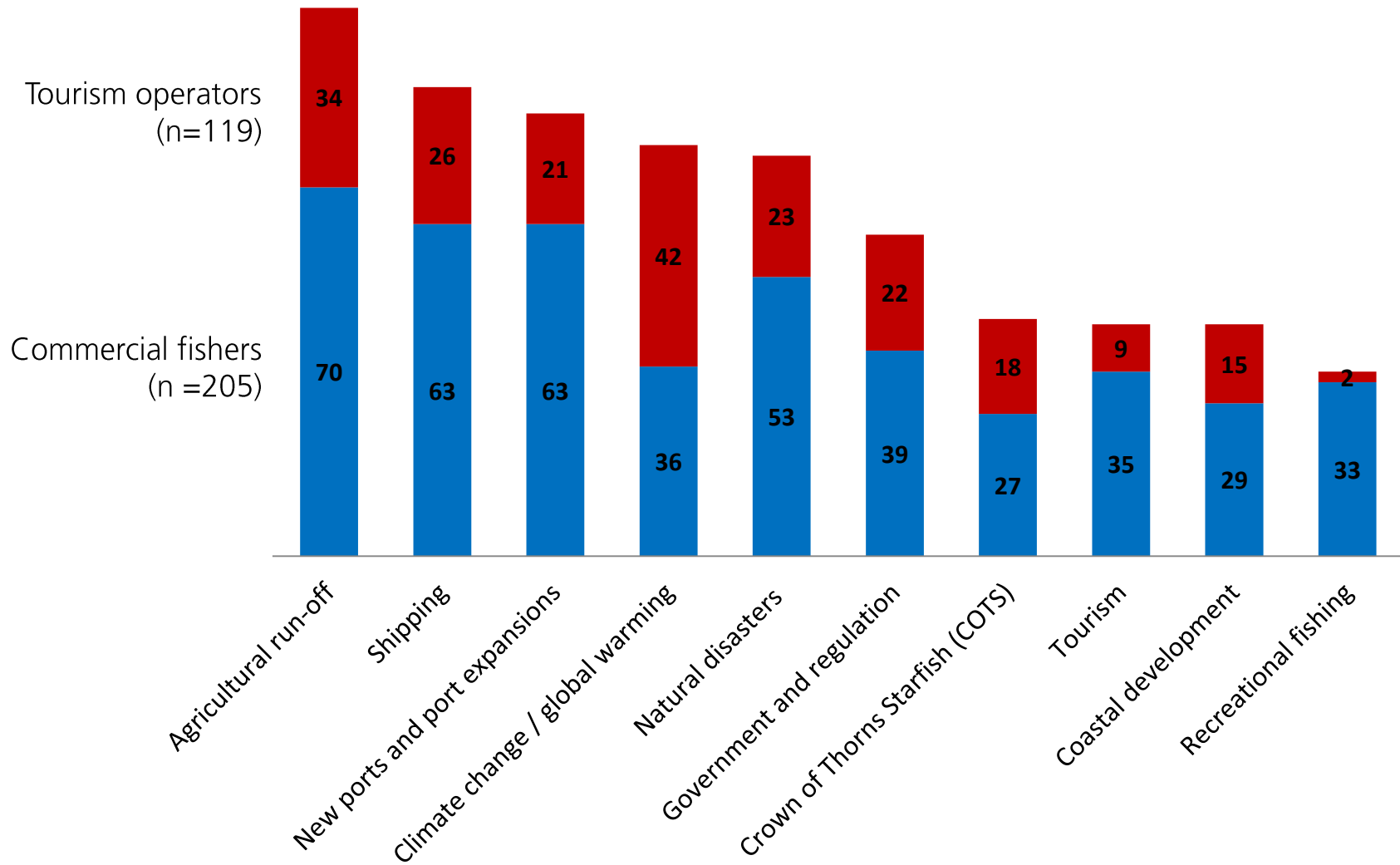


Figure 14. Ten most frequently identified threats in response to the question: "What do you think are the three most serious threats to the Great Barrier Reef?" SELTMP tourism operator and commercial fisher surveys 2013.

3. Demographic

*Population size and other **demographic** variables influence the use of the reef and its ecosystem services. Increases in population decrease the per capita availability of resources.*

“Wishlist” Indicators

- Population age structure
- Population growth rate
- Population movements/mobility
- Number and source of migrants

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3. Demographic Drivers: Australian population age structure

Year: 2012
Total: 22,683,573
Males: 11,280,804
Females: 11,402,769

2013 update

Estimated Resident Population as at 31 March 2013:

23,032,700

Increase in past year: 1.8%

Natural increase: 40%

Overseas migration: 60%

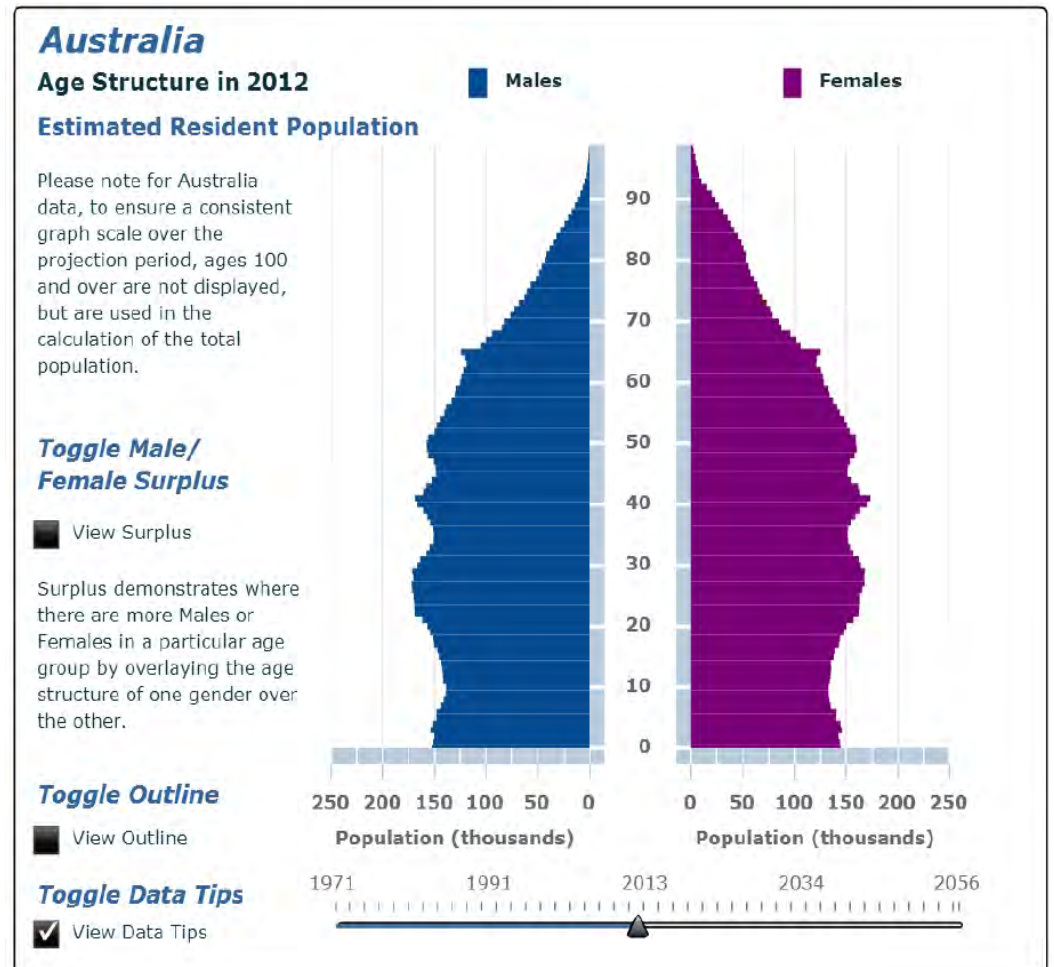
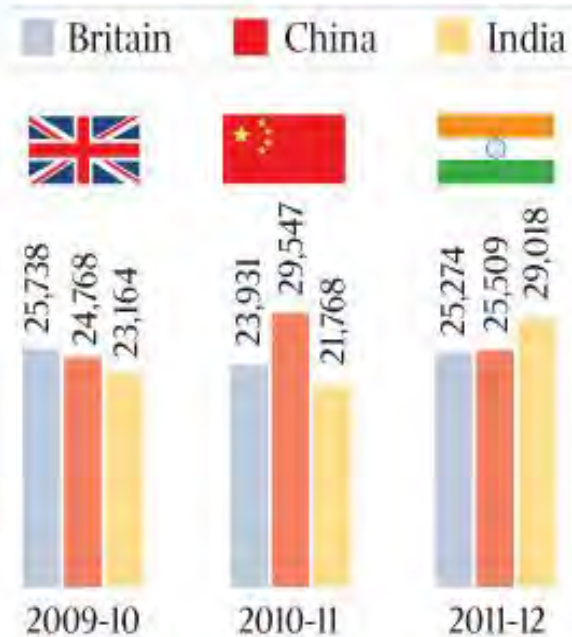


Figure 15. Population age structure by gender for Australia, 2012. Source: Australian Bureau of Statistics 2012
<http://www.abs.gov.au/websitedbs/d3310114.nsf/4a256353001af3ed4b2562bb00121564/ca0b3137794a766bca256f6c0078cb0b!OpenDocument> (Accessed 24/05/13)

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3. Demographic Drivers: Migration

Leading sources of migrants



Source: Immigration Department

India

- Largest source of immigration to Australia for the first time
- **15.7%** of total immigration
- Thought to be due to former international students who were educated in Australia.
- Expected to continue to be a source of skilled migration with 500 million people under 25.

Figure 16. Source:
<http://www.theaustralian.com.au/national-affairs/immigration/indians-now-our-top-migrants/story-fn9hm1gu-1226430407750>

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3. Demographic Drivers: Global population distribution

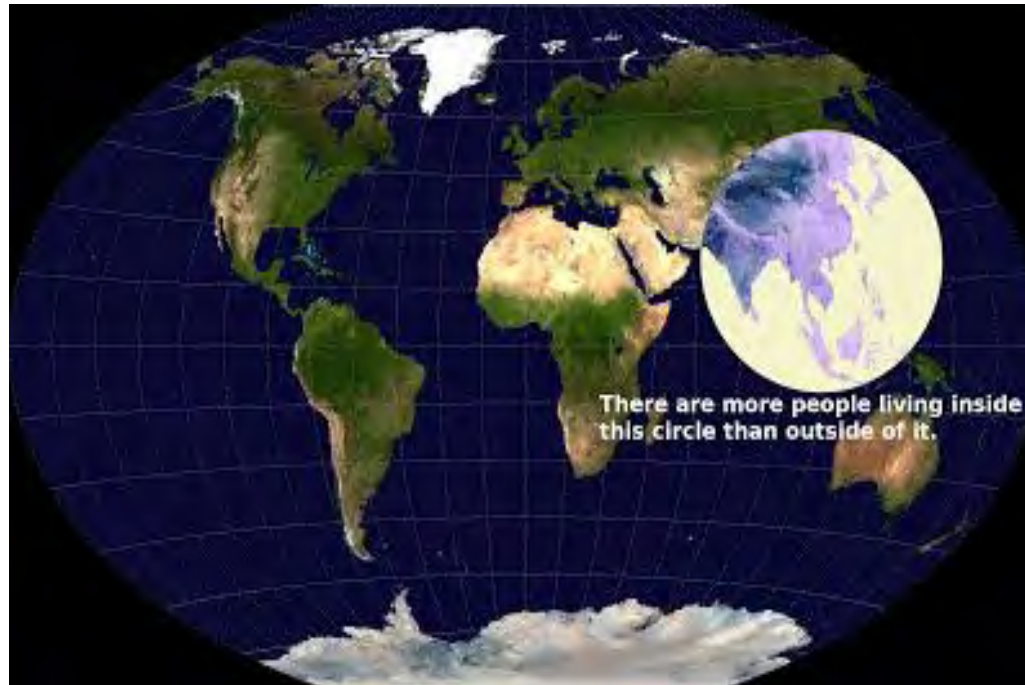


Figure 17. This 4,000km radius around Hainan Island in the South China Sea is only 25 mn sq km, or one-sixth of the world's total land area. Source: Myers 2013. www.globalpolicyjournal.com/blog/05/09/2013/global-hegemony-one-picture and Quah 2013. www.globalpolicyjournal.com/blog/05/09/2013/global-hegemony-one-picture. Accessed 08/10/13.

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3. Demographic Drivers: Short-term visitation

Short-term visitor arrivals, Australia - calendar years by country of residence

Country of residence (a)	2002		2007		2012	
	'000	%	'000	%	'000	%
1 New Zealand	790.1	16.3	1138.0	20.2	1201.2	19.5
2 China (excludes SARs and Taiwan Province)	190.0	3.9	357.6	6.3	626.5	10.2
3 UK, CI & IOM (b)	642.7	13.3	689.0	12.2	593.8	9.7
4 United States of America	434.5	9.0	459.7	8.1	479.0	7.8
5 Japan	715.5	14.8	573.0	10.2	354.0	5.8
6 Singapore	286.9	5.9	263.8	4.7	343.7	5.6
7 Malaysia	159.0	3.3	159.4	2.8	262.6	4.3
8 Korea Republic of (South)	189.7	3.9	253.3	4.5	196.7	3.2
9 Hong Kong (SAR of China)	150.9	3.1	147.0	2.6	176.7	2.9
10 India	45.0	0.9	95.2	1.7	159.3	2.6
All Other Countries	1237.0	25.6	1508.1	26.7	1752.2	28.5
Total	4841.2	100.0	5644.1	100.0	6145.6	100.0

[www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/3401.0Media Release1Dec 2012?opendocument&tabname=Summary&prodno=3401.0&issue=Dec 2012&num=&view=](http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/3401.0Media+Release+1Dec+2012?opendocument&tabname=Summary&prodno=3401.0&issue=Dec+2012&num=&view=)

Figure 18. Short-term visitation. Australia tripled in popularity with Chinese and Indian visitors in 2012, compared to figures a decade earlier. In the same period US visitors increased in number, but its share of visitors declined. Source: ABS, 3401.0 - Overseas Arrivals and Departures, Australia, Dec 2012.

4. Politics, Management & Governance

Political and management drivers – governance – affect the use of and access to reef resources. Includes management structures, frameworks, institutions and processes; legislation and regulation; decision-making and the role of the public in decision-making processes.

“Wishlist” Indicators

- Financial resources allocated to environment and reef management programs
- Number of regulations passed
- Subsidies
- Compliance with regulations
- Staff turnover in government agencies
- Ownership of regional businesses

SELTMP 2013: DRIVERS IN THE GREAT BARRIER REEF

4. Political Drivers: State government allocation of resources

QLD 2013-14 budget:

Change from 2012-13: **-\$5.3 billion**

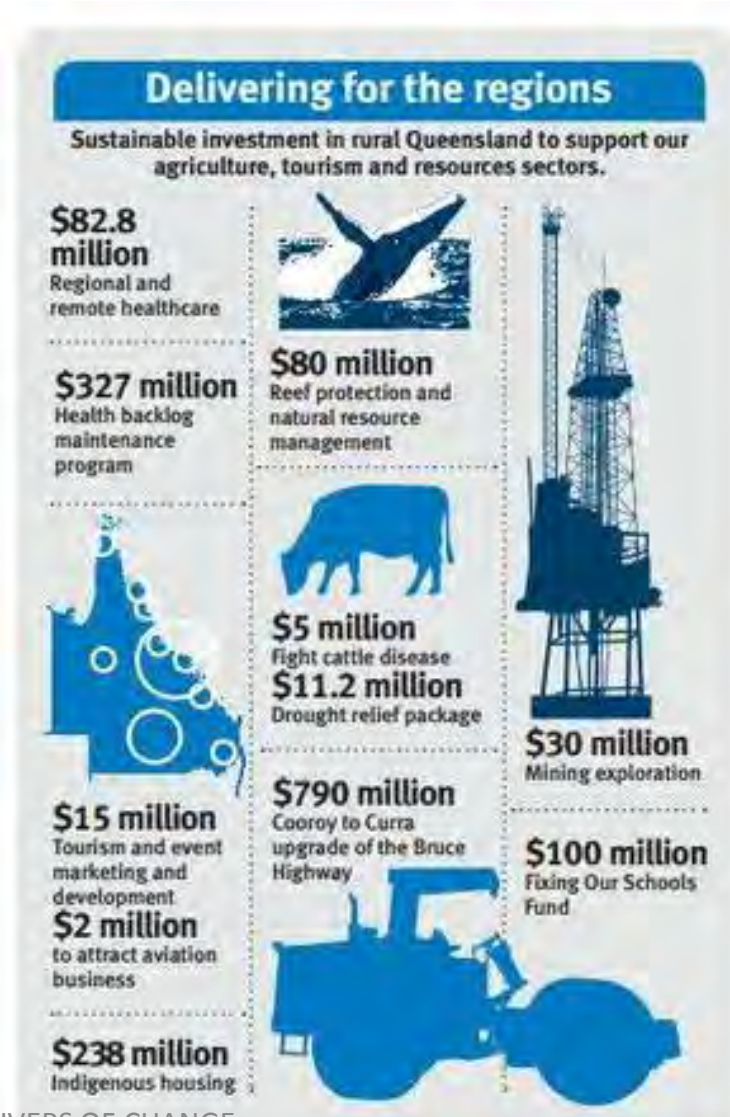
State government support and resources for Reef protection and NRM: **\$80 million (of total budget of \$504.68 billion)**

Local government support and resources: For a joint Queensland and Australian Government project to develop irrigated agriculture opportunities in the Flinders and Gilbert River catchments: **\$732,000**

For GBRMPA for the Marine Parks Field Management Program: **\$8.4 million**

For activities under the Reef Water Quality Protection Plan 2009, in partnership with the Australian Government: **\$880,000**

Ref: QLD Treasury and Trade 2013
<http://www.budget.qld.gov.au/current-budget/index.php>; accessed 18 Sept 2013



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4. Political Drivers: Federal & State allocation of resources

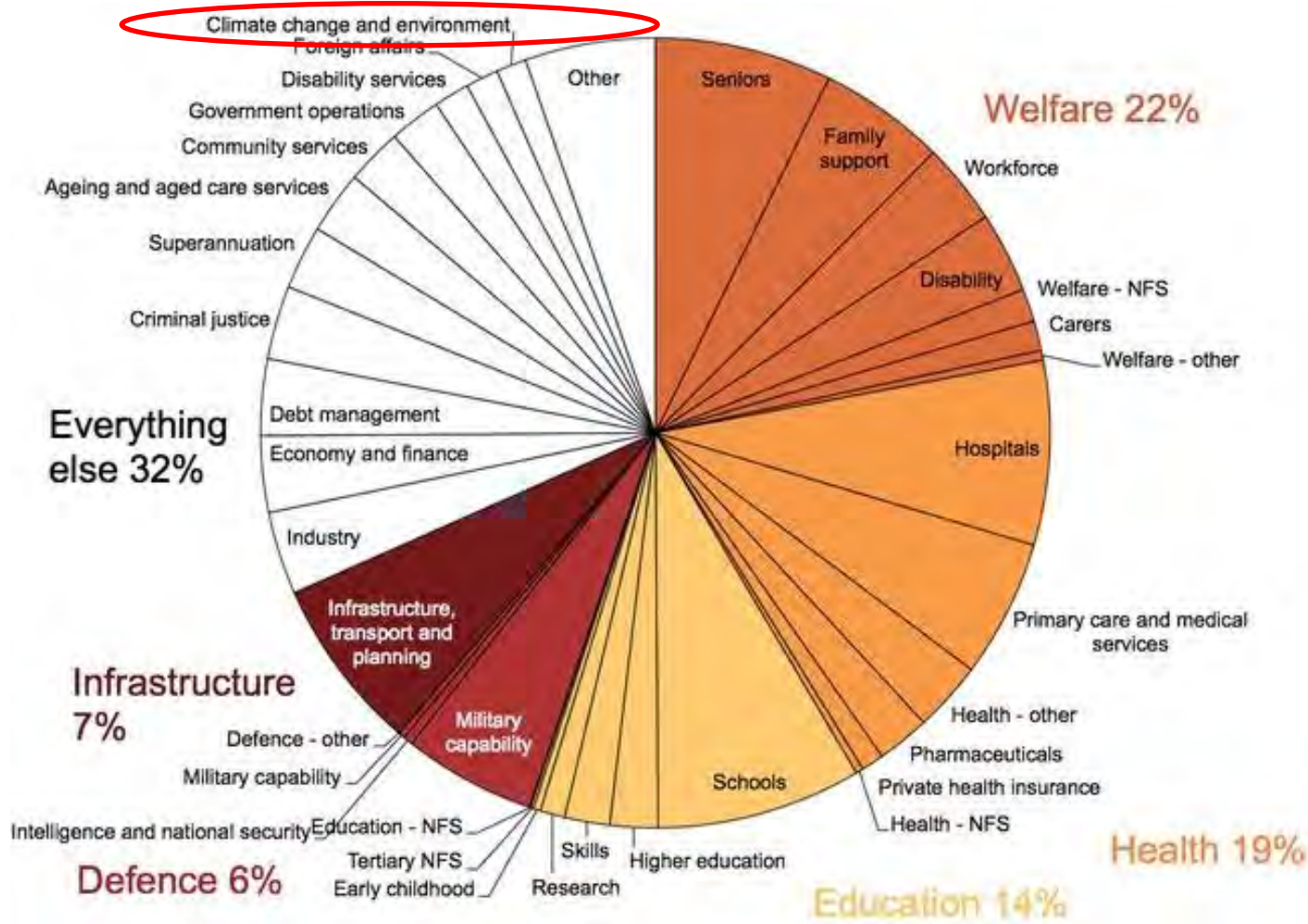
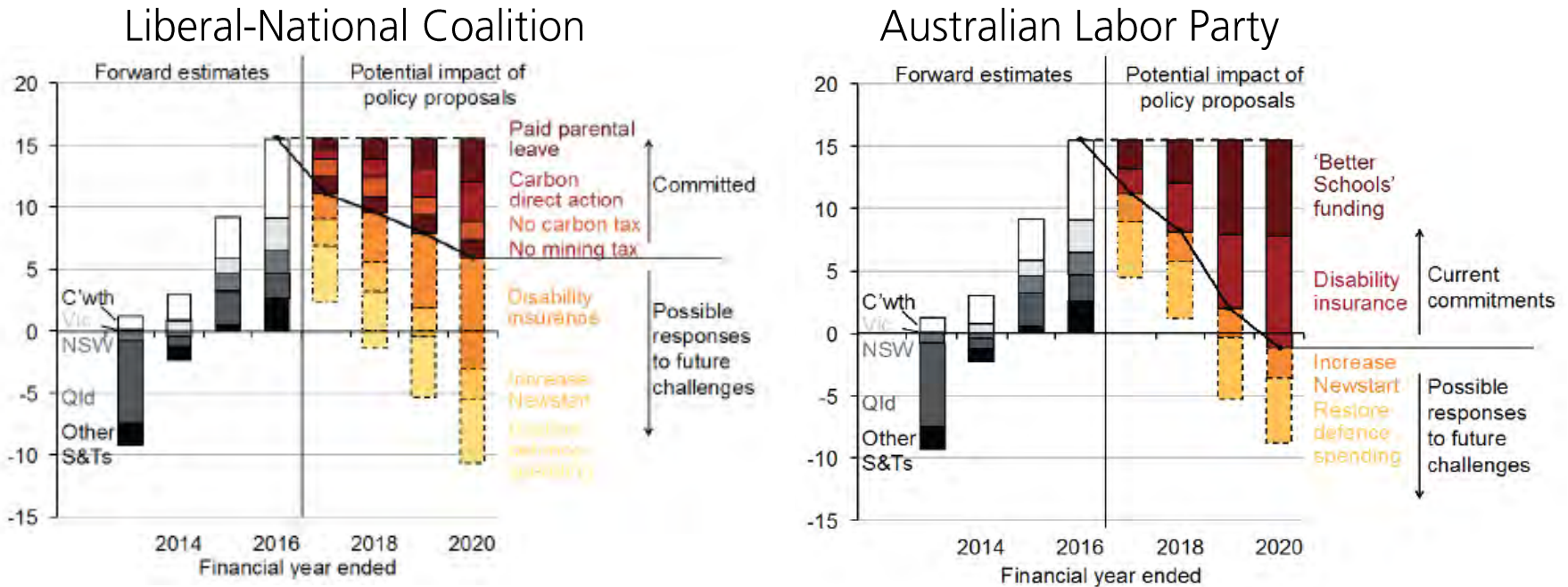


Figure 19. Australian governments' combined expenditures as % of total, 2012-13 budget. The 'Climate change and environment' category is highlighted. Source: Daley et al. (2013).

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4. Political Drivers: Budget impacts of major political parties



Future budgets will come under pressure from:
 Rising political expectations and specific policy promises
 Social & economic trends – increasing demand for health services
 Rising inequality – additional welfare spending

Figure 20. Budget impacts of committed and potential policy proposals. Ref: Daley et al. 2013.

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4. Political Drivers: Legislation and regulation

Regulations 2012-13

Legislation, regulation or plan	Implementing agency and level
Great Barrier Reef Climate Change Adaptation Strategy and Action Plan 2012-2017	GBRMPA (Federal)
Strategic Plan 2012-16	GBRMPA (Federal)
Great Barrier Reef World Heritage Area Strategic Assessment	GBRMPA (Federal)
Reef Water Quality Protection Plan 2013	Australian Government/QLD Government (Federal/State)
QLD Ports Strategy (released for public comment 2012)	Department of State Development, Infrastructure and Planning (State)
QLD Ecotourism Plan	Department of National Parks, Sport, and Racing (State)

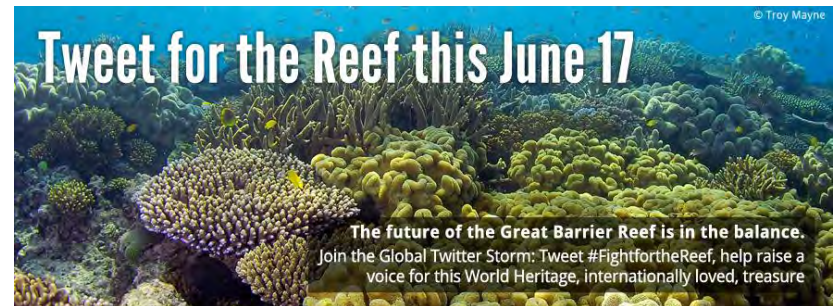
Table 1. Legislation, regulation or management plans commencing in 2012 and 2013 relevant to GBR region stakeholders. GBRMPA and Department websites, accessed 18 Sept 2013.

5. Information, communication and media

*Information is at the core of decision-making, and **communication and media** provide mechanisms for information flows among and between managers, resource users and the public. Media outlets regulate visibility of information, and are instrumental in reflecting and shaping public perceptions about the reef.*

“Wishlist” Indicators

- Top news stories
- Web searches
- Use of social media
- Media representations of GBR
- % of population using internet for information
- Sources of and trust in information and networks



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5. Information, Communication & Media: Top news stories in Australia 2012

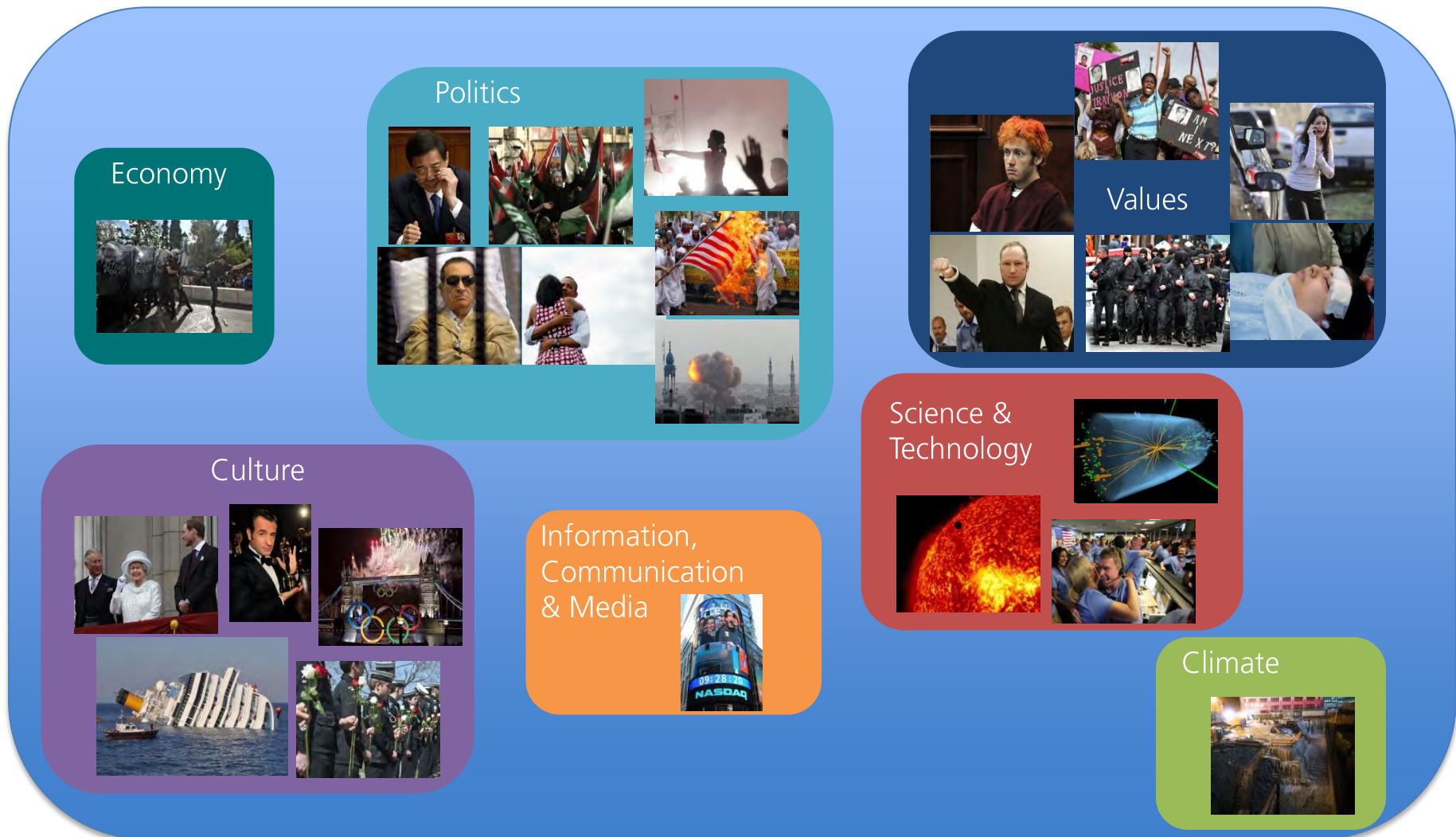


Figure 21. Key news events of 2012, grouped into driver clusters. Modified from *The Australian*. 2012: The Year in Review. Not available for 2013 at time of writing. <http://www.theaustralian.com.au/news/world/gallery-e6frg6so-1226539782922?page=1>.

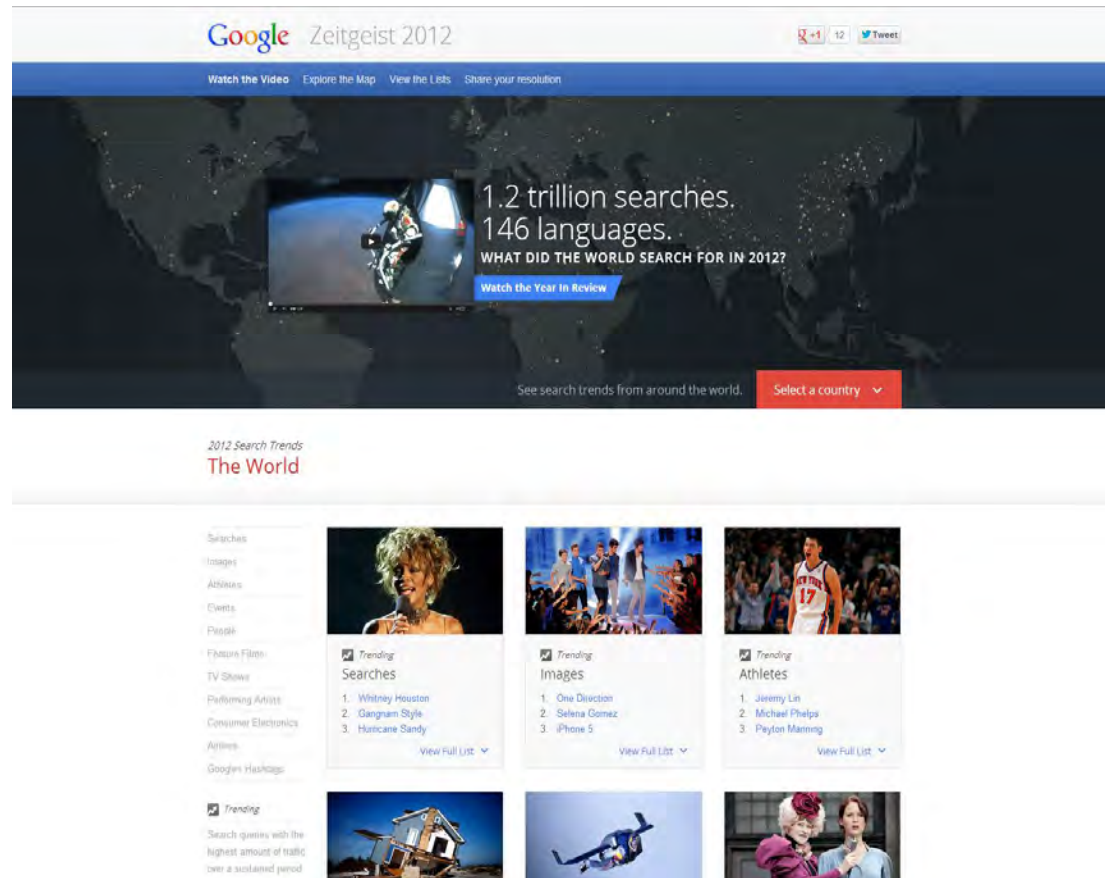
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5. Information, Communication & Media: Google searches

What did Australians search for on Google in 2012?

Australian News Moments

1. Hurricane Sandy
2. Julian Assange
3. Felix Baumgartner
4. Transit of Venus
5. Melbourne Earthquake
6. Misogynist
7. Hawaii Tsunami
8. Diamond Jubilee
9. Cruise Ship Sinking
10. Nasa Curiosity



Source: Google Zietgiest 2012. Not available for 2013 at time of writing. <http://www.google.com.au/zeitgeist/2012/#the-world>

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5. Information, Communication & Media: Social media trends

Australia Facebook Statistics

Socialbakers > Facebook Stats > Australia



Here you can see all Facebook Pages that we are currently monitoring in Australia. You can also find the TOP 10 Facebook Pages of specific groups like brands, celebrities, places, etc.

Make sure to check out our advanced social media measurement tool, **Analytics PRO**, for analysis of specific Facebook Pages, Twitter Profiles, or YouTube Channels.

TOP 10

#	Place	Likes	Checkins	Were Here Count
1	Sydney Airport	59 612	700 423	1 566 095
2	Melbourne Cricket Ground (MCG)	128 605	342 802	1 064 196
3	Brisbane Airport - Domestic Terminal	5 338	332 419	639 979
4	Qantas Club	17 606	306 247	452 419
5	Brisbane Airport	19 859	277 421	531 416
6	Crown Melbourne	79 717	265 438	821 222
7	Adelaide Airport	17 747	258 077	561 861
8	Perth Airport	6 465	206 138	159 902
9	Darling Harbour, Sydney	45 570	186 146	967 689
10	Sydney Opera House	421 279	145 038	1 023 056



Facebook data:
 Socialbakers.com <http://www.socialbakers.com/facebook-statistics/australia>. Accessed 23 October 2013.

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5. Information, Communication & Media: GBR media coverage

Media coverage of GBR

Number of news articles about GBR in:
 2011: 3444
 2012: 4506
 2013*: 3417
 *as at 14 Oct

Ref: Proquest Australia & New Zealand Newsstand

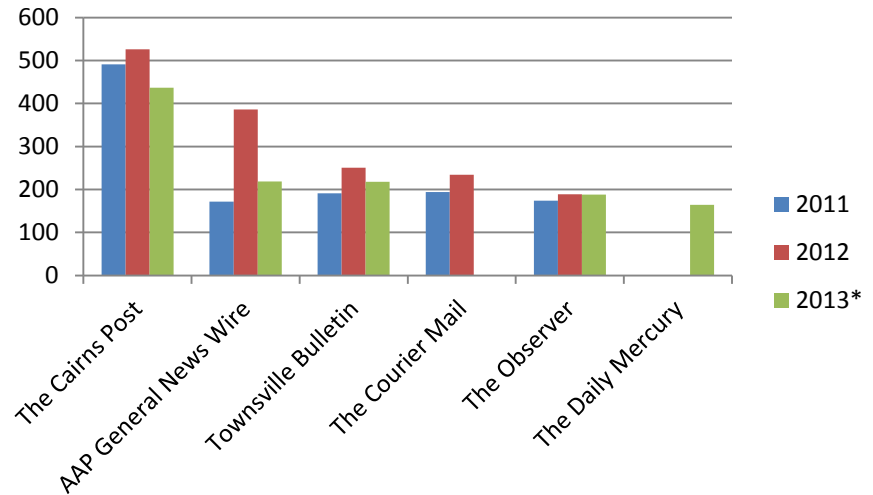
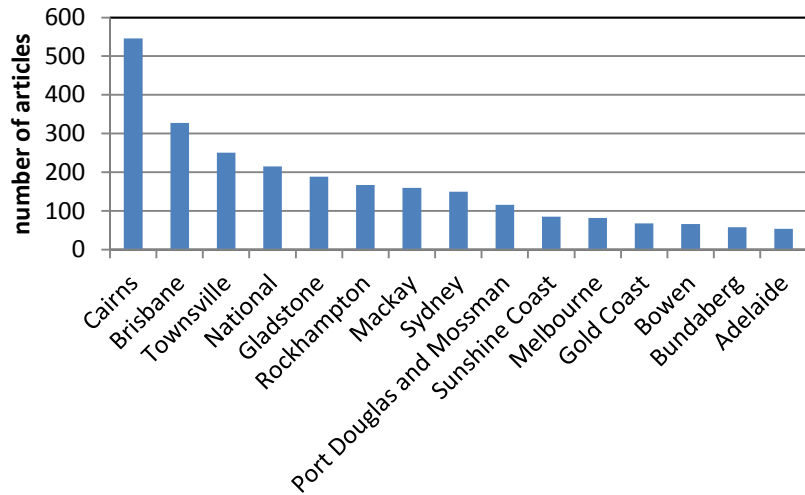
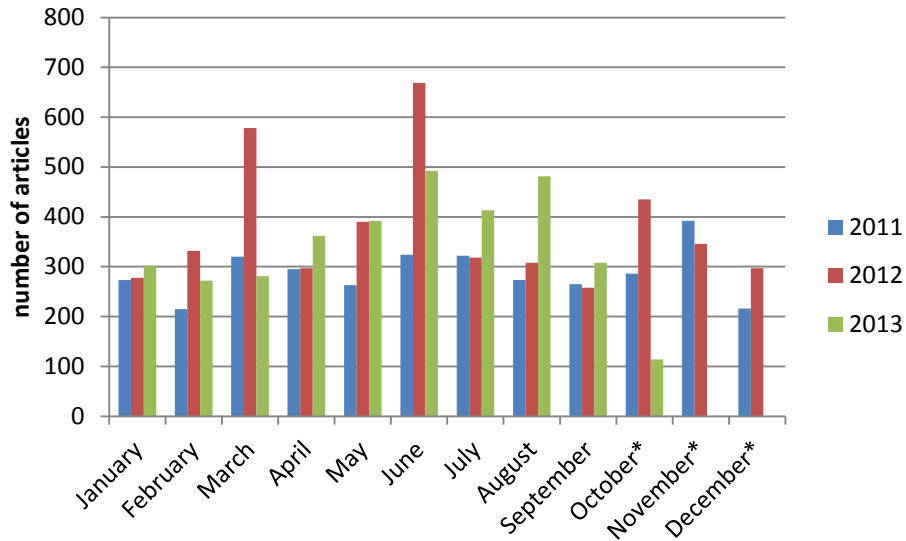


Figure 22. Proquest Australia & New Zealand Newsstand Search results for articles containing "Great Barrier Reef" in text. Top: Articles by month. Bottom Left: Articles by community/region (2012 only). Bottom right: Articles by publication (top 6 only). *2013 articles as of 14 October 2013.

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5. Information, Communication & Media: Outlook threats

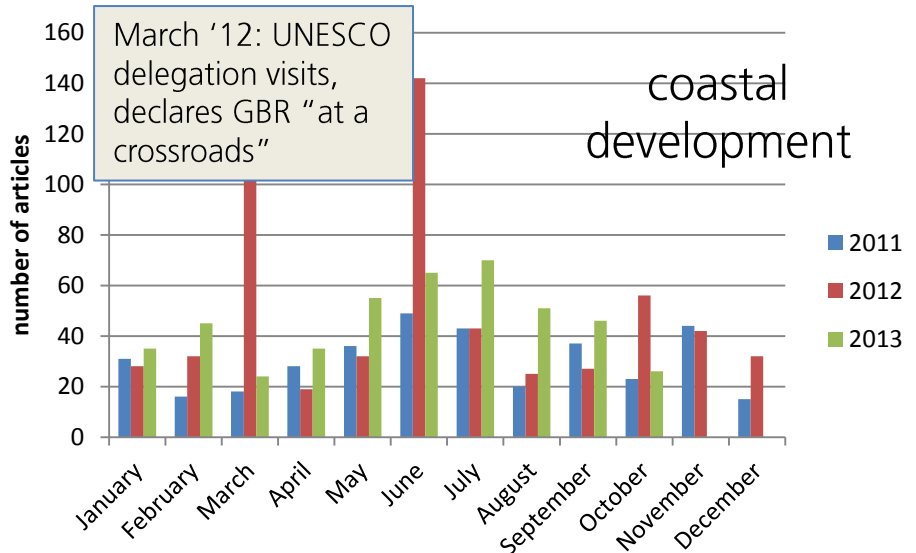
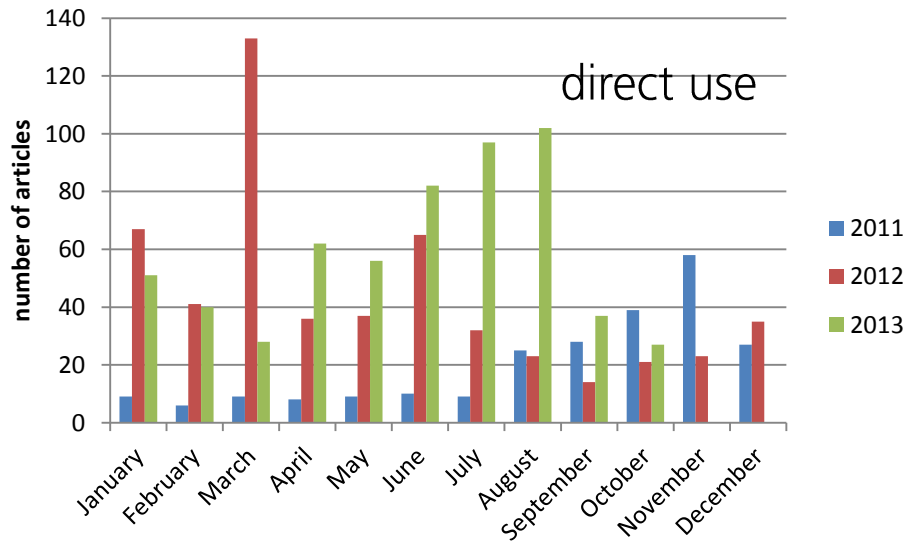
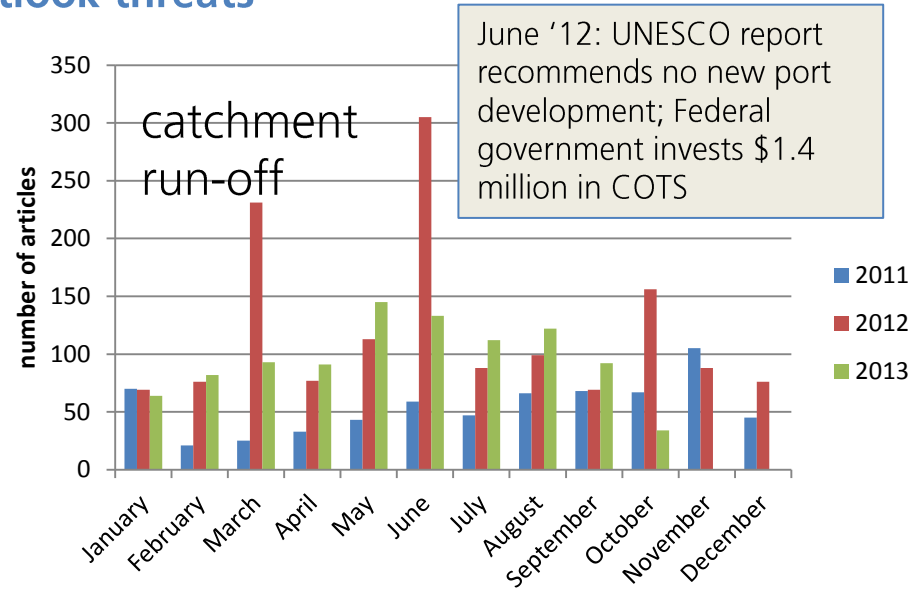
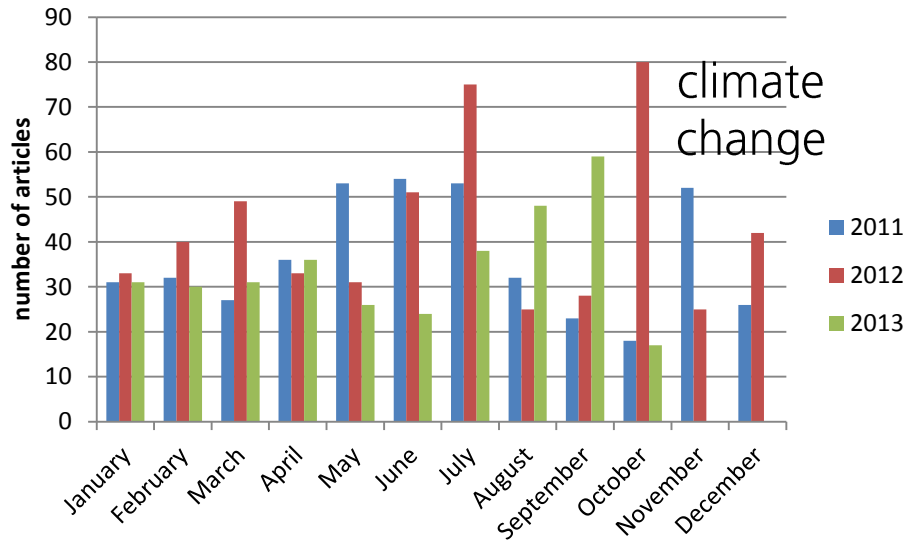
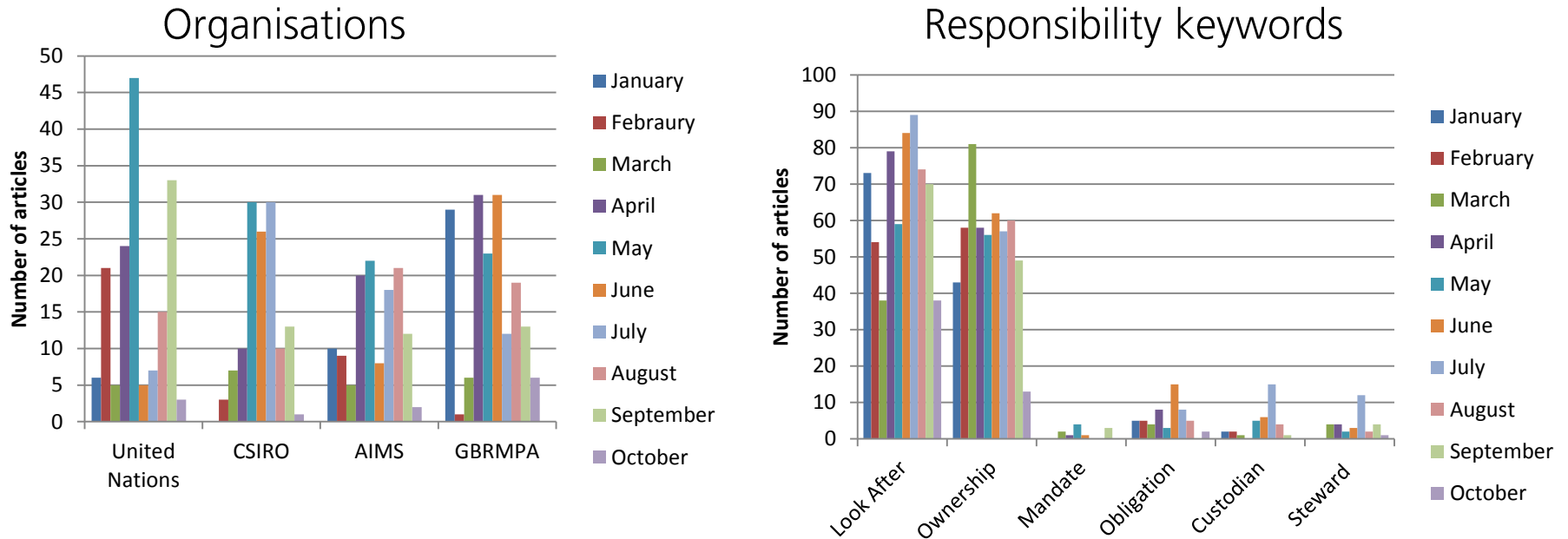


Figure 23. Proquest Australia & New Zealand Newsstand Search of 2011-2013 news articles; threats from GBRMPA Outlook Report (2009).

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5. Information, Communication & Media: Survey themes



Herbert MP Ewen Jones said the low number of infringement notices showed most fishers were abiding by the law while out on the Great Barrier Reef.... "I think GBRMPA's probably doing a very good job there." (Townsville Bulletin [Townsville, Qld] 10 Apr 2013: p14.)

Cairns and Far North Environment Centre spokeswoman Anna McGuire said being left off the list should serve as a wake-up call, as the iconic Reef faced a growing number of proposed port developments along the Queensland coast. "We are very privileged to have such a beautiful and diverse reef system along our coastline, and we need to look after it," she said. (The Cairns Post [Cairns, Qld] 19 Apr 2013: p6.)

Figure 24. Proquest Australia & New Zealand Newsstand Search of 2013 news articles; search terms were "Great Barrier Reef" and words/themes related to "responsibility" (SELTMP in prep)

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5. Information, Communication & Media: Trust in information

Low reported **trust** in media and social media, yet media regulate visibility of issues and provide **highly accessed** information sources

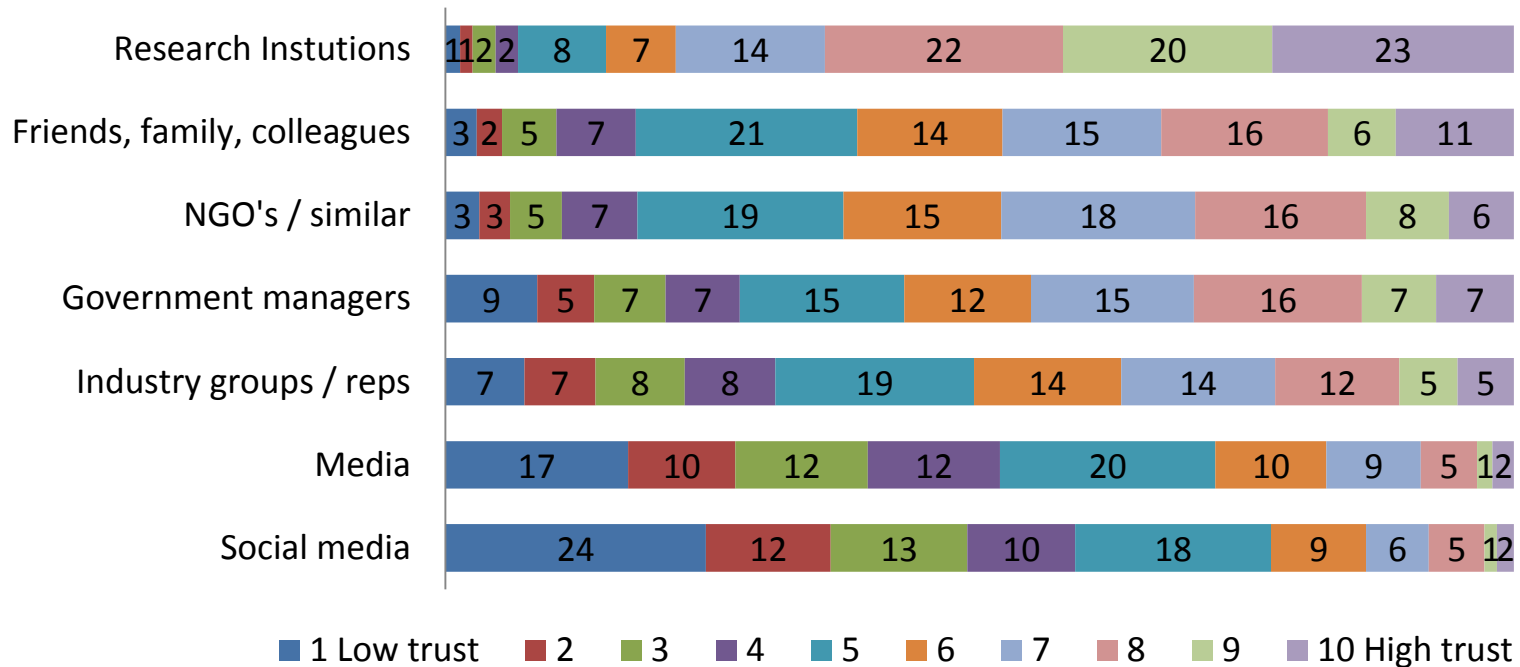


Figure 25. SELTMP Survey Q: On a scale of 1 to 5, where 1 means you have no trust, and 5 means you have complete trust, how much trust would you have in each of the following when reporting environmental issues

6. Science and Technology

*The development and diffusion of **scientific knowledge** and **technologies** can have significant implications for ecological systems and human well-being. Rates of investment in research and development, rates of adoption of new technologies, changes in the productivity and extractive capabilities of new technologies, and the access to and dissemination of information through new technologies all have profound implications.*

“Wishlist” Indicators

- Scientific research published
- Scientific research projects/programs funded
- Government and private research investment
- Scientific advances
- Rates of adoption of new technologies
- Changes in the productivity and extractive capabilities of new technologies
- Access to and dissemination of information through new technologies

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6. Science and Technology: GBR research

1. Number of 2013 Web of Knowledge publications with "Great Barrier Reef" in title: 61 (375 in all text)

2. Most cited GBR-related 2013 paper on Google Scholar (13 citations)

Intra-annual variation in turbidity in response to terrestrial runoff on near-shore coral reefs of the Great Barrier Reef - KE Fabricius, G De'ath, C Humphrey, I Zagorskis... - Estuarine, Coastal and ..., 2013 – Elsevier

3. New research funded in 2013

- Reef Rescue program (\$200 million, \$5 million of which is for research) extended to 2018

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6. Science and Technology: Scientific achievements

ABC Science's top science stories for 2012:

1. Discovery of particle consistent with Higgs boson
2. NASA Mars landing
3. Quantum computing leap by Australian-US-South African researchers
4. Continued loss of Arctic sea ice *most directly relevant to GBR?*
5. Discovery of ancient genome of third hominin, Denisova
6. Director James Cameron's dive to Mariana Trench and first human to break sound barrier unaided
7. Resurrection of Jurassic-era species deemed not viable due to rapid DNA decay rate
8. Feeding 'passwords' discovered in superb fairy wrens
9. Embargo lifted on publications showing risks of H5N1 flu virus
10. Transit of Venus across sun

Source: ABC Science <http://www.abc.net.au/science/articles/2012/12/19/3657116.htm#.UZZog9I3B8E>

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6. Science and Technology: Telecommuting

The Work (Live?) Anywhere City: In Queensland 58% of employees (1.1 million people) have a flexible work arrangement of some type. This includes 13.3% (253,000 people) working from home.

The Australian Government aims to increase teleworking to 12% of the workforce (DCDBE).

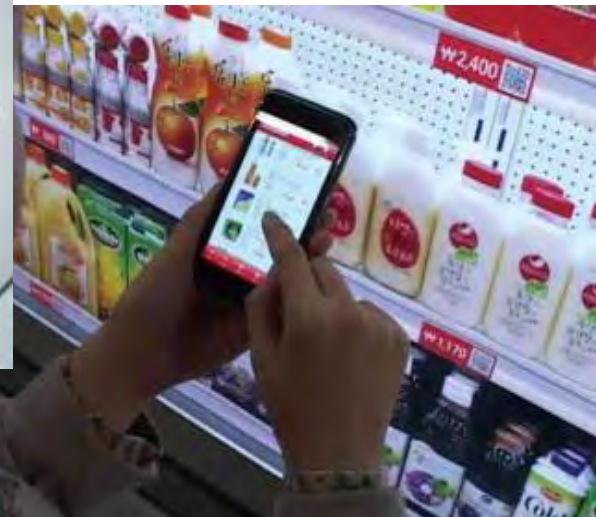
Currently 6% of Australian workers telecommute, 11% in the US and 10% in Europe (Access Economics).

Source: Hajkowicz et al. 2012

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6. Science and Technology: New retail models

Tescos Virtual Grocery Walls

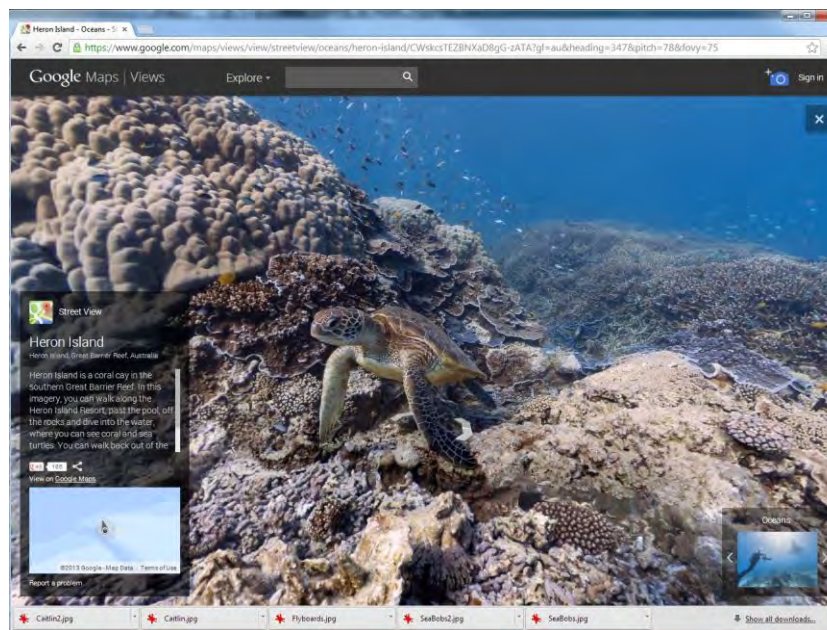


Source: Hajkowicz et al. 2012

Images: www.terminalu.com; www.designboom.com; shoppingcartandshopper.blogspot.com

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6. Science and Technology: Reef exploration and enjoyment



Images (clockwise from top L): © Christian Miller; © Matt Curnock;; <http://www.smh.com.au/technology/sci-tech/googles-360degree-tour-of-the-deep-blue-sea-20120926-26101.html>; © Jayne Jenkins

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References

1. Australian Bureau of Statistics. Animated Population Pyramid.
<http://www.abs.gov.au/websitedbs/d3310114.nsf/4a256353001af3ed4b2562bb00121564/ca0b3137794a766bca256f6c0078cb0b!OpenDocument> (Accessed 24/05/13).
2. Australian Bureau of Statistics, Census of Population and Housing, 2011.
3. Daley, J., McGannon, C., and Savage J., 2013, *Budget pressures on Australian governments*, Grattan Institute
4. Hajkowicz, S., Cook, H., and Littleboy, A. 2012. Our Future World. Canberra, CSIRO.
5. Lindenmayer, D.B. and G.E. Likens. 2009. Adaptive monitoring: a new paradigm for long-term research and monitoring. *Trends in Ecology and Evolution* 24(9), 482-486.
6. Millennium Ecosystem Assessment 2003. *Ecosystems and Well-being: A Framework for Assessment*. Island Press, Washington D.C
7. Quah, D. 2011. The Global Economy's Shifting Centre of Gravity. *Global Policy* 2(1): 3-9.
8. SELTMP *in prep*. Newsflash: Media analysis assists monitoring of the Great Barrier Reef.

Other references used in this report, including websites, are noted with respective figures.



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