An introduction to Ecosystem Accounting

Dr Michael Vardon
Director
Centre of Environment Statistics
michael.vardon@abs.gov.au

Workshop for Laguna Lake Basin
Manila, The Philippines
5-6 September 2013

Australian Government
AusAID

Australian Bureau of Statistics

Australian Government
AusAID

Question: Why am I here?
Answer: Environmental accounting is a priority area of work for Australia

WAVES

Australia in the Asian Century 2012

www.asiancentury.dpmc.gov.au

- High level policy document from the Department of Prime Minister and Cabinet
- "Support the ongoing development and use of environmental accounting in Australia"
- "Support the ongoing development and use of environmental accounting in the region"

ABS has been:

- Producing environmental accounts since 1996
- Supporting the World Bank WAVES programme since 2011
- Recently provided with funding from AusAid to significantly boost assistance to the WAVES countries in the region

Australian Bureau of Statistics

Australian Government
AusAID

ABS history of environmental accounting

Account type	Year First published	Frequency or status	Reference Years for which accounts are available			
			Stock accounts		Flow accounts	
			Physical	Monetary	Physical	Monetary
NATIONAL BALANCE SHEET	1995	Annual from 1995	1988-89 to 2011-12	1988-89 to 2011-12		
-land						
-minerals						
-energy						
-timber						
-fish	2012	Experimental		2000-01, 2005-06 to 2009-10		
FISH	1995	Occasional	1996-97		1996-97	
ENERGY	1996*	Annual from 2011	1988-89 to 2011-12	1988-89 to 2011-12	2008-09 to 2010-11; 2006-07; 2004-05; 1993-94 to 1996-97	2009-10; 2004-05
MINERALS	1998	Occasional	1985 to 1996		1992-93, 1993-94	
WATER	2000*	Annual from 2010			2008-09 to 2010-11; 2004-05; 2000-01; 1993-94 to 1996-97	2009-10; 2008-09; 2004-05; 2003-04
LAND COVER AND LAND USE VALUES (BY STATE)*	2011	Annual from 2011	2011; 2012; 2013	2012; 2013	2013	2013
WASTE	2012	Annual from 2012			2009-10	2009-10
GHG EMISSIONS						
- Emissions	2001	Occasional			1992–93 to 1997–98	
- Embedded in final demand	2012	Experimental			2008-09	

* Land cover and use accounts are prepared for each state on a rotating schedule, with each state covered once in three years.

Australian Bureau of Statistics

Australian Government
AusAID

Current environmental accounting at the ABS

WAVES

Water Account, Australia
Physical and monetary SUT
(ABSI)

ABS Energy Account
Physical and monetary SUT
(ABS)

Experimental Waste Account
(ABS)

ABS Experimental Land Accounts
(ABS)

Experimental Ecosystem Accounts
(Victorian government)

Victoria Water Account
(Victorian government)

Research for expanding the accounts produced and methodology

Environmental Taxes and subsidies, environmental protection expenditure, as well as valuation methods

Australian Environmental - Economic Accounts
(Annual)

http://www.abs.gov.au/ausstats/abs@.nsf/mf/4628.0.55.002

Researching ecosystem accounts

Biodiversity, Carbon, Ecosystem condition
ABS, SEWPAC, BOM, DCCEE, DAFF
Murray-Darling Basin Authority,
Victorian government
South East Queensland CMA
Wentworth group and universities

National Accounts Data

Natural resources on National Balance Sheet
(Annual)

National Water Account
Physical asset account
(Bureau of Meteorology)

Input-output analysis of energy and greenhouse gas emissions
(ABS)

National Carbon Account
(Dept. of Climate Change)

Australian Bureau of Statistics

Australian Government
AusAID

The objective of this presentation is to answer the questions:

WAVES

- What is environmental and ecosystem accounting?
- What are the key concepts of ecosystem accounting?
- What do environmental and ecosystem accounts look like and how are they used?
- What are the key lessons from others that have begun environmental and ecosystem accounting?

Australian Bureau of Statistics

Australian Government
AusAID

What is environmental accounting?

WAVES

- A way of arranging information showing the interactions and dependencies between the environment and the economy
- Environmental accounting has been developing for many years, with many academic studies by academics and government agencies
- A “niche” field until relatively recently

Australian Bureau of Statistics

Australian Government
AusAID

The standardisation of environmental accounting

WAVES

http://unstats.un.org/unsd/envaccounting/pubs.asp

Standardised internationally in the System of Environmental-Economic Accounting (SEEA)

- SEEA Central Framework
- SEEA Experimental Ecosystem Accounting (a rapidly evolving area)
- SEEA Applications and Extensions
- SEEA Water, SEEA Energy, SEEA Fisheries

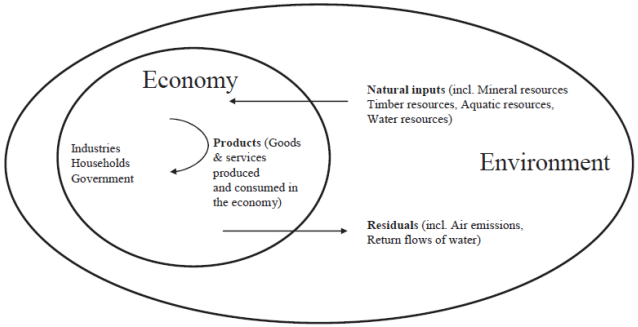
Australian Bureau of Statistics

Australian Government
AusAID

SEEA Central Framework

WAVES

- An extension of the System of National Accounts (SNA)
- Covers the physical environment as well as the economy
- Key aspect is accounting for individual natural resources (water, forests, minerals, fossil fuels, timber, fish, water, land and soil)
- Codifies the treatments developed and tested over the past 20 years



Australian Bureau of Statistics

Australian Government
AusAID

Environmental accounting is built from established concepts in several disciplines

WAVES

- Ecology
- Environmental science
- Ecological economics
- National accounts
- Statistical measurement

Australian Bureau of Statistics

Australian Government
AusAID

Key concepts in environment accounting

WAVES

- Stocks and flows
- Physical (e.g. tonnes, litres, parts per million) and monetary (pesos, $, €, etc.) measures
- Benefits (when and where?) and beneficiaries (who?)
- Classification

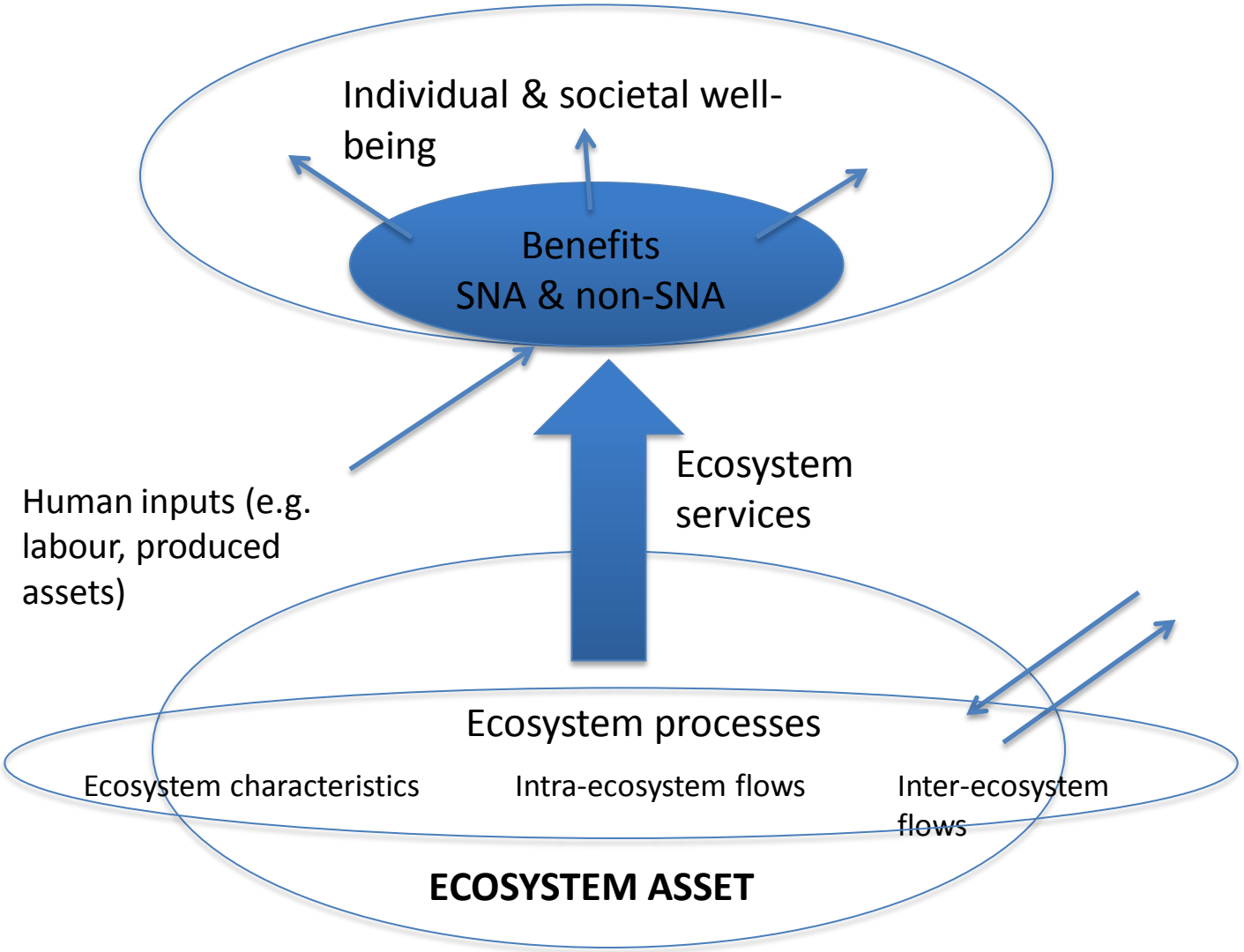
	Volume (e.g. m3)	Value (e.g. peso, $)
Stocks		
Flows		

Australian Bureau of Statistics

Australian Government
AusAID

Ecosystem Accounting Model

WAVES



Australian Bureau of Statistics

Australian Government
AusAID

Characteristics of Ecosystem Assets

WAVES

- Extent (area of ecosystem)
- Composition (biotic and abiotic components)
- Configuration (organisation of components)
- Landscape form (e.g. mountains, coastal areas)
- Biodiversity
  - Ecosystems, species, genes
- Structure (e.g. understory, succession stage)
- Processes (e.g. photosynthesis)
- Functions (e.g. resilience)

Australian Bureau of Statistics

Australian Government
AusAID

Classifications

WAVES

Environmental assets

- SEEA Central Framework

Ecosystem Services

- Common International Classification of Ecosystem Services (CICES)

Industries

- International Standard Industry Classification (ISIC)

Products (Goods and services)

- Central Product Classification (CPC)

Sectors - from SNA

Species status – IUCN Red List catagories

Spatial units

Australian Bureau of Statistics

Australian Government
AusAID

Common International Classification of Ecosystem Services (CICES)

WAVES

Provisioning
- Water
- Food, etc.

Regulating
- Flood protection
- Erosion control, etc.

Cultural
- Recreation
- Existence

CICES for the SEEA Experimental Ecosystem Accounts				
Section (1-digit)	*Division(2-digit)*	*Group (3-digit)*	**Examples of ecosystem services**	**Examples of benefits**
Provisioning	*Water*	*Water*	Water taken up for the growing of crops and animals, agricultural, mining, manufacturing and household use, etc	Drinking water, water for crop production, livestock feed, thermoelectric power production, etc.
		Uncultivated terrestrial plants and animals for food	Uncultivated terrestrial plants and animals (e.g. game animal, berries and fungi in the forest) taken up for food	Food for human consumption
		Uncultivated freshwater plants and animals for food	Uncultivated freshwater plants and animals (e.g. plaice, sea bass, salmon, trout) taken up for food.	Food for human consumption
		Uncultivated marine plants, algae and animals for food	Uncultivated marine plants, algae and animals (e.g. Seaweed, crustaceans such as crabs, lobsters, crayfish) taken up for food.	Food for human consumption
		Nutrients and natural feed for cultivated biological resources	Nutrient resources for the uptake by crops; fodder for livestock; feed for aquaculture product;	Crops and vegetable products; cultivated timber and cotton; cattle for meat and diary product; aquaculture product;
		Plant and animal fibres and structures	Plant and animal fibres and structure (e.g. natural timber, straw, flax , skin, bone algae) to be harvested for manufacturing or domestic use	Logged timber, straw, flax, algae, natural guano, corals, shells, skin and bone for further processing in the manufacturing industry (e.g. fertiliser and chemicals) or final consumption
		Chemicals from plants and animals	Substances and biochemicals (e.g. rubber, enzymes, gums, oils, wax, herbal substances) from living organisms taken up for medicine use, manufacturing or domestic production	Substances and biochemicals, such as rubber, enzymes, gums, oils, wax, herbs to cosmetic and medicinal use or for further processing in the manufacturing industry
	Materials	*Genetic materials*	Genetic materials taken up for breeding programmes (e.g. for crop plants, farm animals, fisheries and aquaculture)	Genetic materials used for breeding programmes (e.g. for crop plants, farm animals, fisheries and aquaculture)
	Energy	*Biomass based energy*	Wood taken up for fuel; uncultivated energy plants, algae to be harvested for biofuel; dung, fat, oils from natural animal to be extracted for energy.	Heating, light, fuel etc.
	Other provisioning services	*Other provisioning services, n.e.c.*	Other provisioning services that are not classified elsewhere in this section, such as provisioning of exotic animals, tamed animal trained to harness	Work and pet animals
Regulating	*Remediation and regulation of biophysical environment*	*Bioremediation*	Chemical detoxification/breakdown of pollutants by plants, algae, micro -organisms and animal.	Reduced level of pollutant/contaminants in soil and ground water
		Dilution, filtration and sequestration of pollutants	Dilution of municipal wastewater in rivers, removal of organic materials and nutrients from wastewater by biogeochemical process; filtration of particulates and aerosols; sequestration of nutrients and pollutants in organic sediments, removal of odours.	Cleaner air, water and soil
	Flow regulation	*Air flow regulation*	Natural or planted vegetation that serves as shelter belts, air ventilation services.	Dust storm mitigation, shelter from the wind, improvement of ventilation and heat mitigation in the urban area.
		Water flow regulation	Regulation of timing and magnitude of water runoff, flooding and aquifer recharge	Prevention of flood damage; recharge of water into surface water and ground water; reduced damage from high water.
		Mass flow regulation	Soil and mudflows stabilization	Prevention of soil erosion, avalanche and mudflows.
	Regulation of physico-chemical environment	*Atmospheric regulation*	Capture of carbon dioxide; Climate regulation; Maintenance of urban climate (such as temperature and humidity) and regional precipitation patterns.	Reduced amount of greenhouse gas in the atmosphere; Reduced impact of climate change; Improvement of the climate condition.
		Water cycle regulation	Oxygenation of water, Retention and translocation of nutrients in water	Improvement of water quality
		Pedogenesis and soil cycle regulation	Maintenance of soil fertility and structure in the cultivated system	Improvement of soil fertility and productivity in the cultivated system
		Noise regulation	Natural buffering and screening	Reduction of noise level
	Regulation of biotic environment	*Lifecycle maintenance, habitat and gene pool protection*	Pollination, seed dispersal, maintenance of habit nursery population and habitats	Improvement of productivity of crops, habitats conservation
		Pest and disease control (incl. invasive alien species)	Control of pathogens	Reduced hazard level to crops, human health and the environment
Cultural	*Physical or experiential use of ecosystems [environmental setting]*	*Non-extractive recreation*	Landscape and seascape character and biodiversity species for hiking, bird recreation	Enjoyment for hiking, bird watching, whale watching, etc.; Increase health level; increased number of visitor in the tourism industry
		Information and knowledge	Landscape character and biodiversity species for scientific research and education	Scientific progress (e.g. such as pollen record, tree ring record, genetic patterns); Increase knowledge (e.g. subject matter for wildlife programmes and books) etc.
	Intellectual representations of ecosystems [of environmental settings]	*Spiritual & symbolic*	Landscape character and biodiversity species for cultural heritage values, sense of personal and group identity (sense of place), spiritual and religious function, etc.	Increase sense of personal and group identity, national symbol, performance of spiritual and religious functions.
		Non-use	Ecosystem capital for future generation of ecosystem services.	Availability of biodiversity and ecosystem services to future generation.

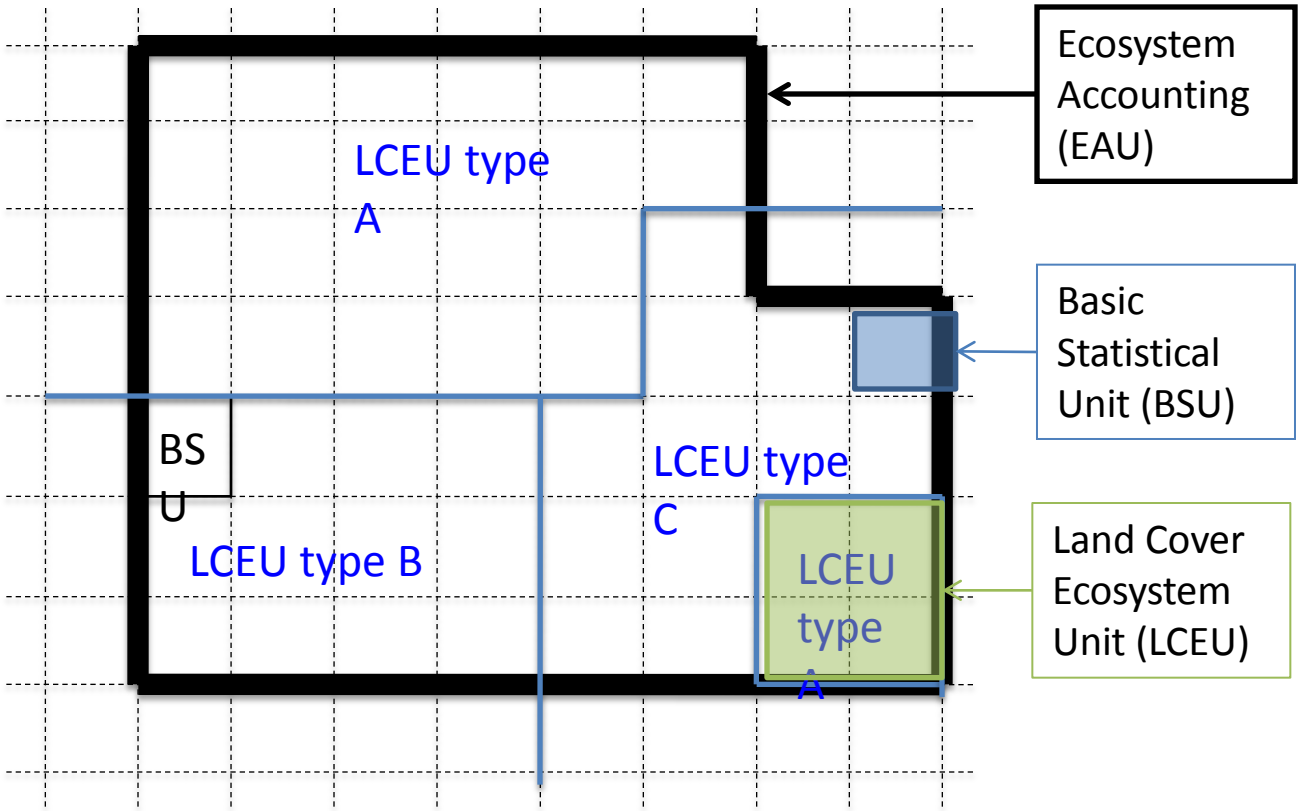
Australian Bureau of Statistics

Australian Government
AusAID

Spatial units for ecosystem accounts

WAVES

Clearly defined areas grouped according to common characteristics. E.g. land use, land cover or ownership/tenure



The land parcel as a basic spatial unit

Australian Bureau of Statistics

Australian Government
AusAID

Australian Bureau of Statistics

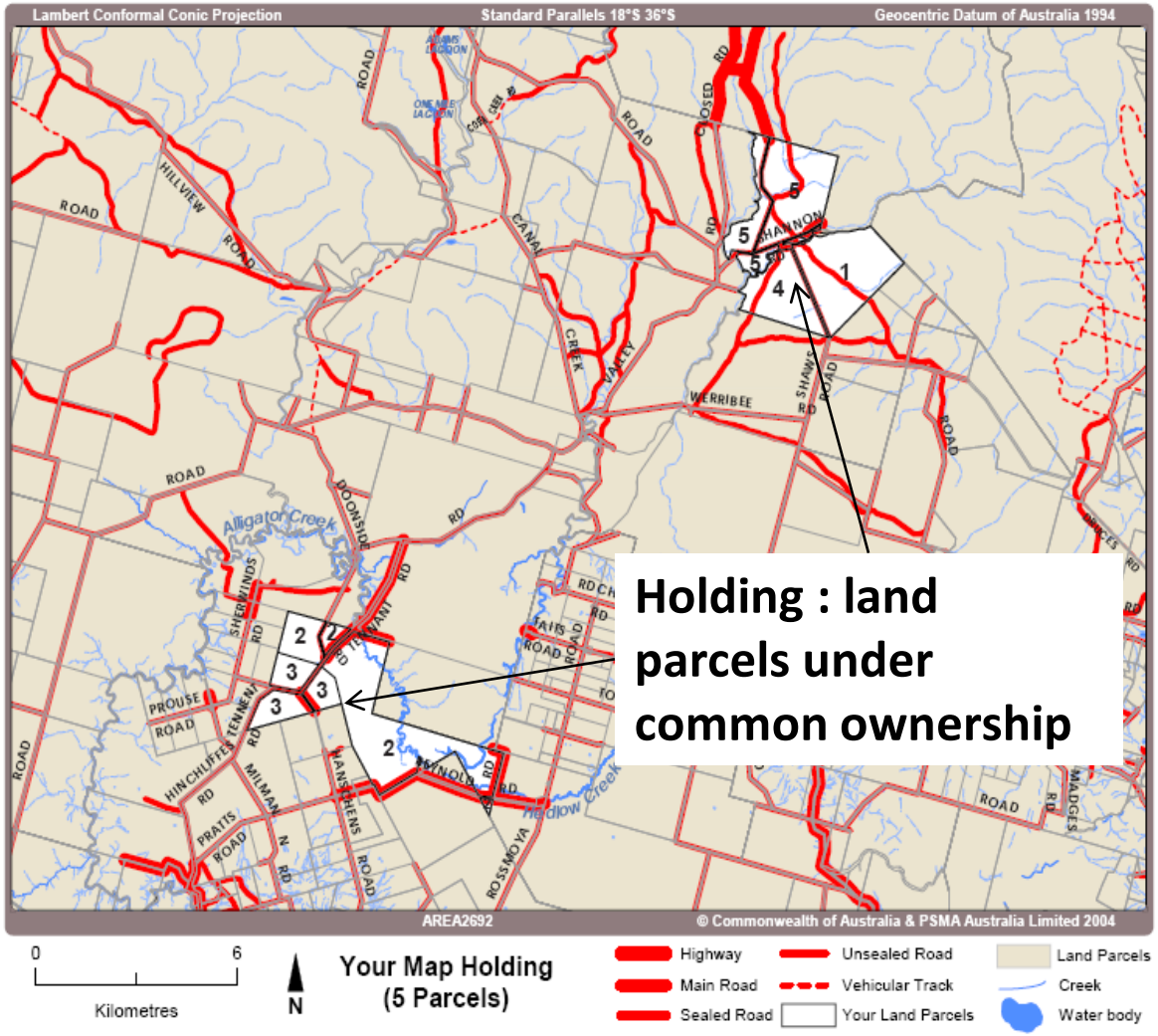
PSMA Australia

For the purpose of the accompanying survey, ONLY the land parcels coloured white on this map constitute 'your holding'. The ID in the list below corresponds to the parcels on the map. The total area of your holding is also listed below.

Total Holding Area (Hectares)

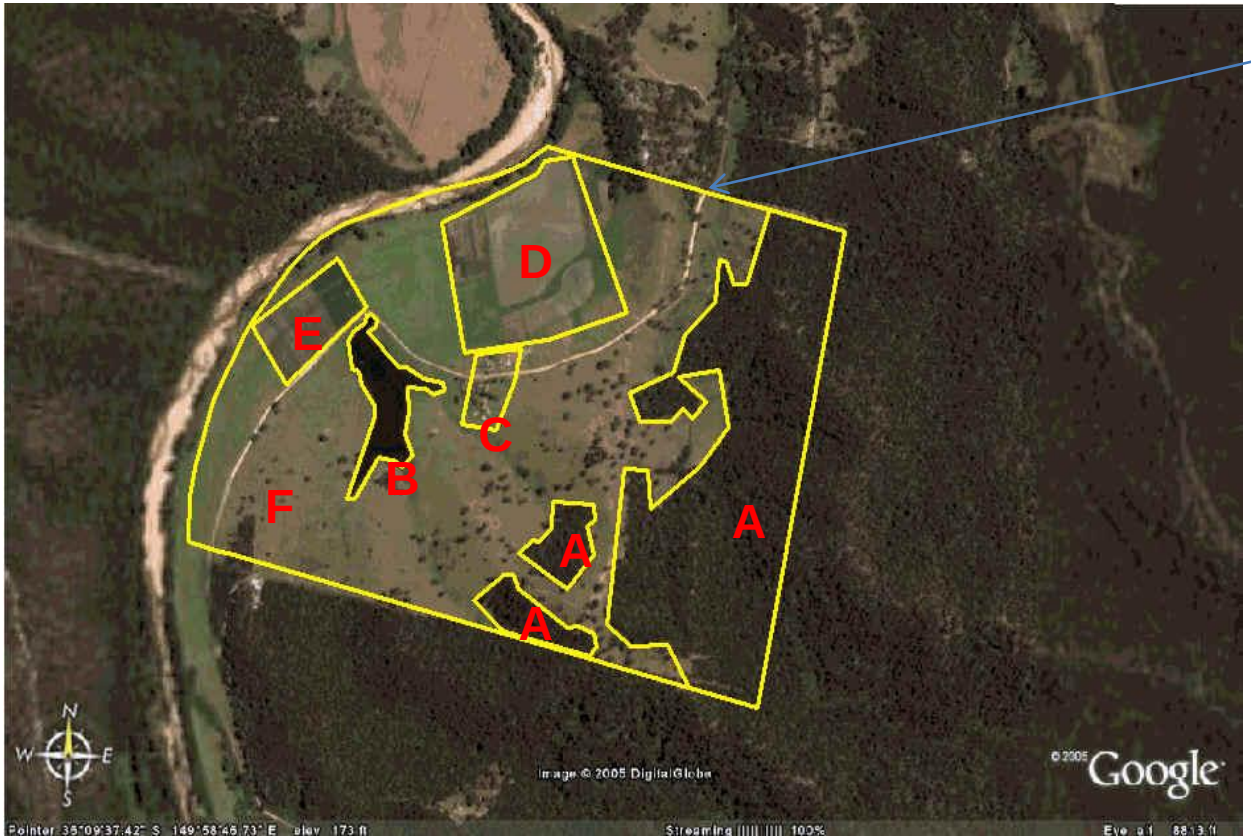
2952

ID	Lot	Plan	Area in hectares
1	7	LN59	558.3
2	76	LN535	1,047.6
3	77	LN535	307.4
4	8	LN249	335.3
5	6	LN60	703.5



WAVES

A farm as a basic spatial unit: Accounting for land cover and land use



Total area 129.5 ha

Accounting for land cover (by vegetation type)

A: Forest	39.0 ha
B: Water	3.5 ha
C: Residence	1.8 ha
D: Irrigated crop	13.5 ha
E: Other crop	3.8 ha
F: Grassland	68.0 ha

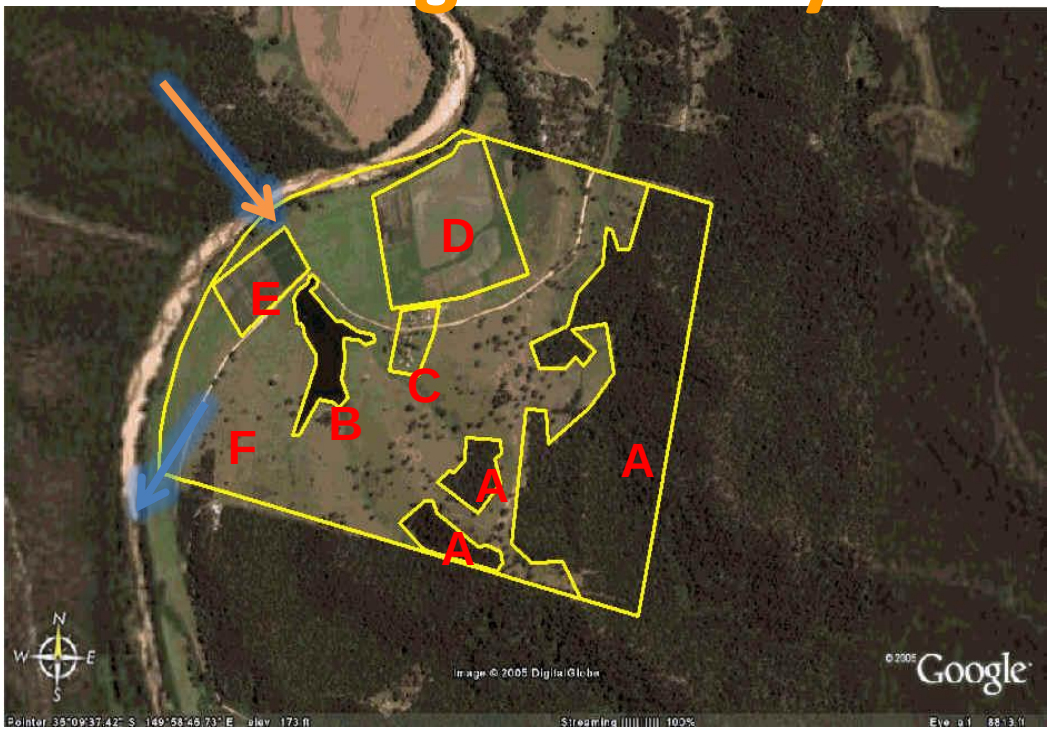
Accounting for land use (by industry/sector)

A: Forestry ?	39.0 ha
B: Water storage	3.5 ha
C: Household	1.8 ha
D: Agriculture	13.5 ha
E: Agriculture	3.8 ha
F: Agriculture	68.0 ha

Accounting for ecosystem condition

1. Simple extent of native vegetation relative to “natural” = 21%
2. Other possible physical measures of assets – soil, native species, structure of remaining native vegetation, water quality, etc.
3. Flow of services – production of food, wood and water

A farm as a basic spatial unit: Accounting for ecosystem services



Accounting for ecosystem services
(by CICES)
Provisioning
- Timber
- Water
- Food

Regulating
Cultural /recreational

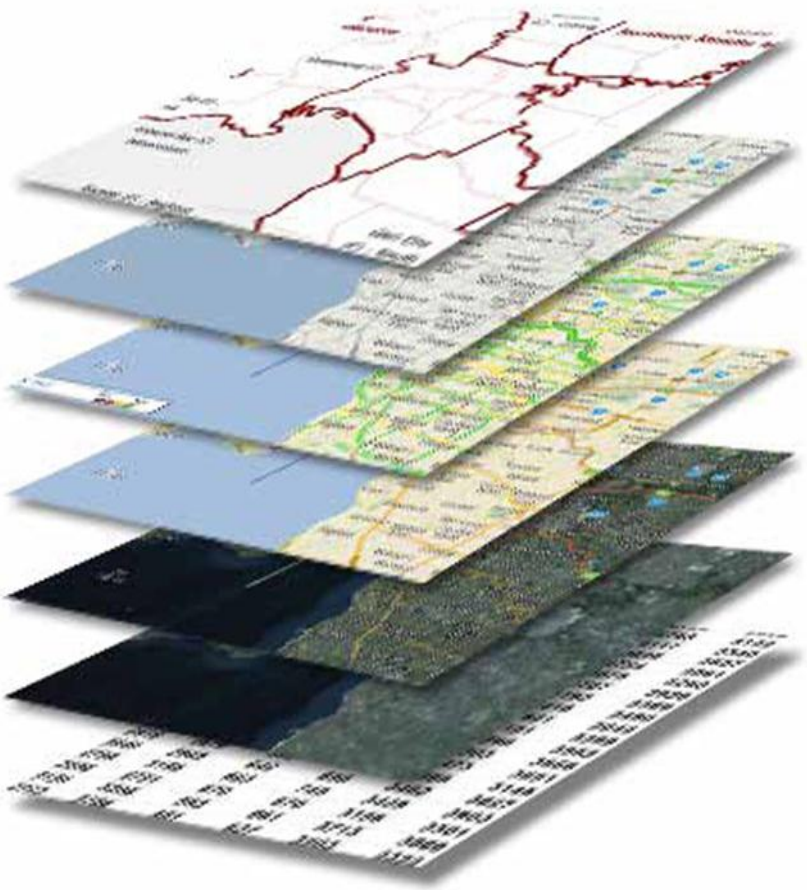
Inter-ecosystem flows, e.g.
- Water from farm to river (outflow, i.e. run-off)
- Water filtration service (outflow)
- Crop pollination service from insects resident in adjacent forest (inflow)

Intra-ecosystem flows, e.g.
- Nutrient cycling within forest
- Transpiration of water by forest plants

Ecosystem services
Imports, e.g.
- Water from river to farm dam and crops

Exports, e.g.
- Crops and livestock
- Timber

Data sources for ecosystem and environmental accounting



Remote censing (e.g. satellites)

- Land cover
- Rainfall
- Temperature
- Geography (mountains, plains, coasts, etc.)

Scientific studies/research

- E.g. Species distribution and abundance

Administrative sources

- Land title offices
- Business registers, Tax data
- Development applications
- Environmental Impact assessments

Annual reports from business

Statistical surveys/census

  - Population census, Agricultural surveys, etc

Australian Bureau of Statistics

Australian Government
AusAID

Valuation of Ecosystem Services and Ecosystem Assets

WAVES

- Not all prices not directly observable
- Some prices and values embedded in market prices of marketed products (fish, timber, agricultural outputs) and marketed assets (land)
- Generally the prices are “missing”, reflecting externalities and that many ecosystem services are public goods
- Non-market valuation techniques commonly used to place a value on the welfare impact of losing or gaining ecosystem services
- For accounting purposes want a measure of exchange value excluding consumer surplus
- Complexity of determining future supply profile – should not assume sustainable use
- Defining and valuing degradation very challenging

Australian Bureau of Statistics

Australian Government
AusAID

What do accounts look like?

WAVES

General form of

- Ecosystem asset accounts
- Ecosystem service accounts

Examples from Australia

- What issues do the accounts address?
- Water accounts (water supply as an ecosystem service)
- Land accounts
- Ecosystem accounts

General form of ecosystem service accounts

	Type of LCEU								
	Ag	Urban	Forest	Wetlands	…				
Type of ecosystem services (by CICES)									
Provisioning services									
Regulating services									
Cultural services									

General form of ecosystem asset account

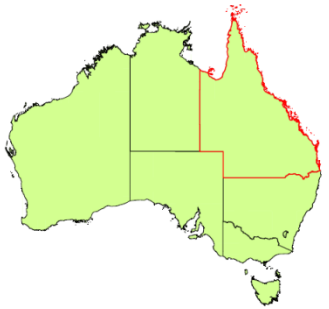
	Ecosystem extent	Characteristics of ecosystem condition				
		Vegetation	Biodiversity	Soil	Water	Carbon
	Area (proportion of EAU)	Indicators (e.g. Leaf area index, biomass index)	Indicators (e.g. species richness, relative abundance)	Indicators (e.g. soil fertility, soil carbon, soil moisture)	Indicators (e.g. river flow, water quality, fish species)	Indicators (e.g. net carbon balance, primary productivity)
Type of LCEU						
Forests						
Agricultural land						
Urban areas						
Inland water bodies						

Australian Bureau of Statistics

Australian Government
AusAID

What do accounts look like in Australia?

WAVES



Water Account, Australia

http://www.abs.gov.au/ausstats/abs@.nsf/mf/4610.0

Land Accounts:

- **Great Barrier Reef Catchments**
  http://www.abs.gov.au/ausstats/abs@.nsf/mf/4609.0.55.001
- **Victoria**
  http://www.abs.gov.au/ausstats/abs@.nsf/mf/4609.0.55.002
- **Queensland**
  http://www.abs.gov.au/ausstats/abs@.nsf/mf/4609.0.55.003

Victoria Experimental Ecosystem Accounts

http://www.dse.vic.gov.au/conservation-and-environment/ecomarkets/ecomarkets-science

Australian Bureau of Statistics

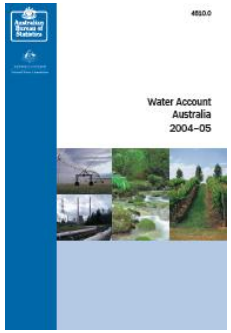
Australian Government
AusAID

Water Account, Australia

WAVES

Why a water account?

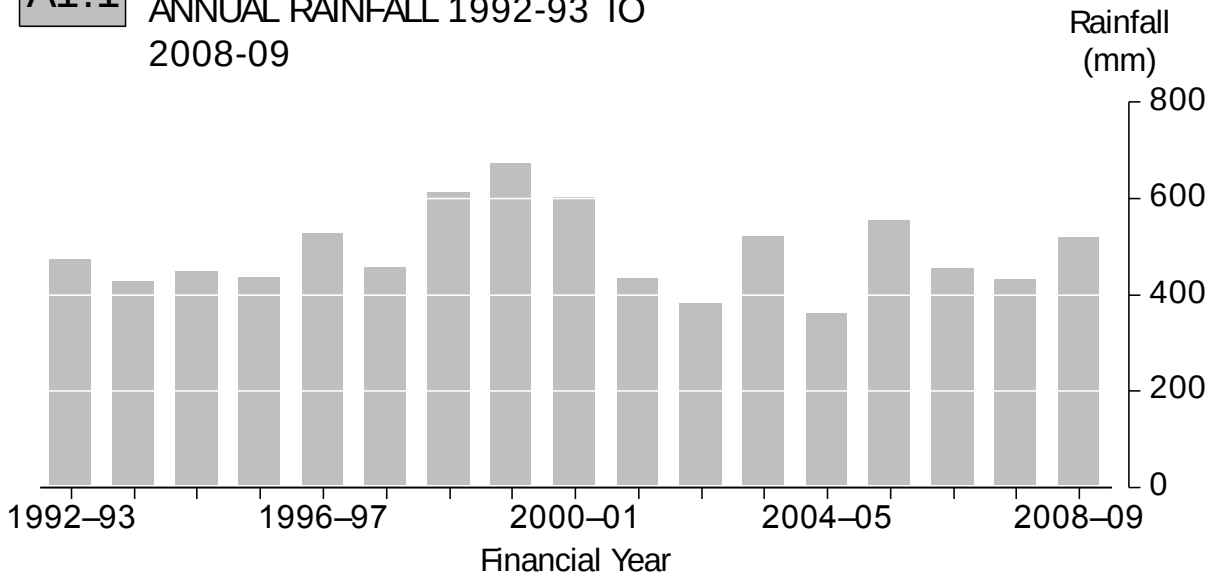
- Australia is dry country and most people live in the south-east
- Pressure on water resources has increased with the expansion of agriculture and growing population
- Droughts are a feature of the climate
- Extended drought in mid-2000s
- How best to manage water?



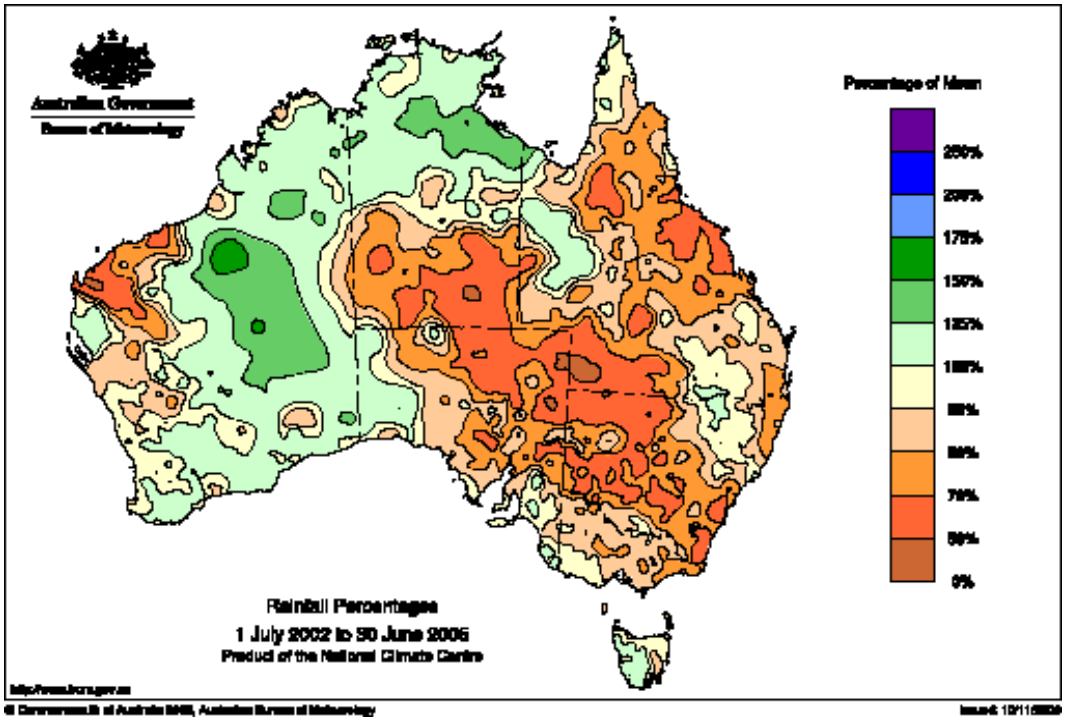
Australian Bureau of Statistics

Australian Government
AusAID

A1.1 ANNUAL RAINFALL 1992-93 TO 2008-09



Source: Bureau of Meteorology



2004-05

WAVES

Tables from the Water Account, Australia

Australian Bureau of Statistics

Australian Government

AusAID

WAVES

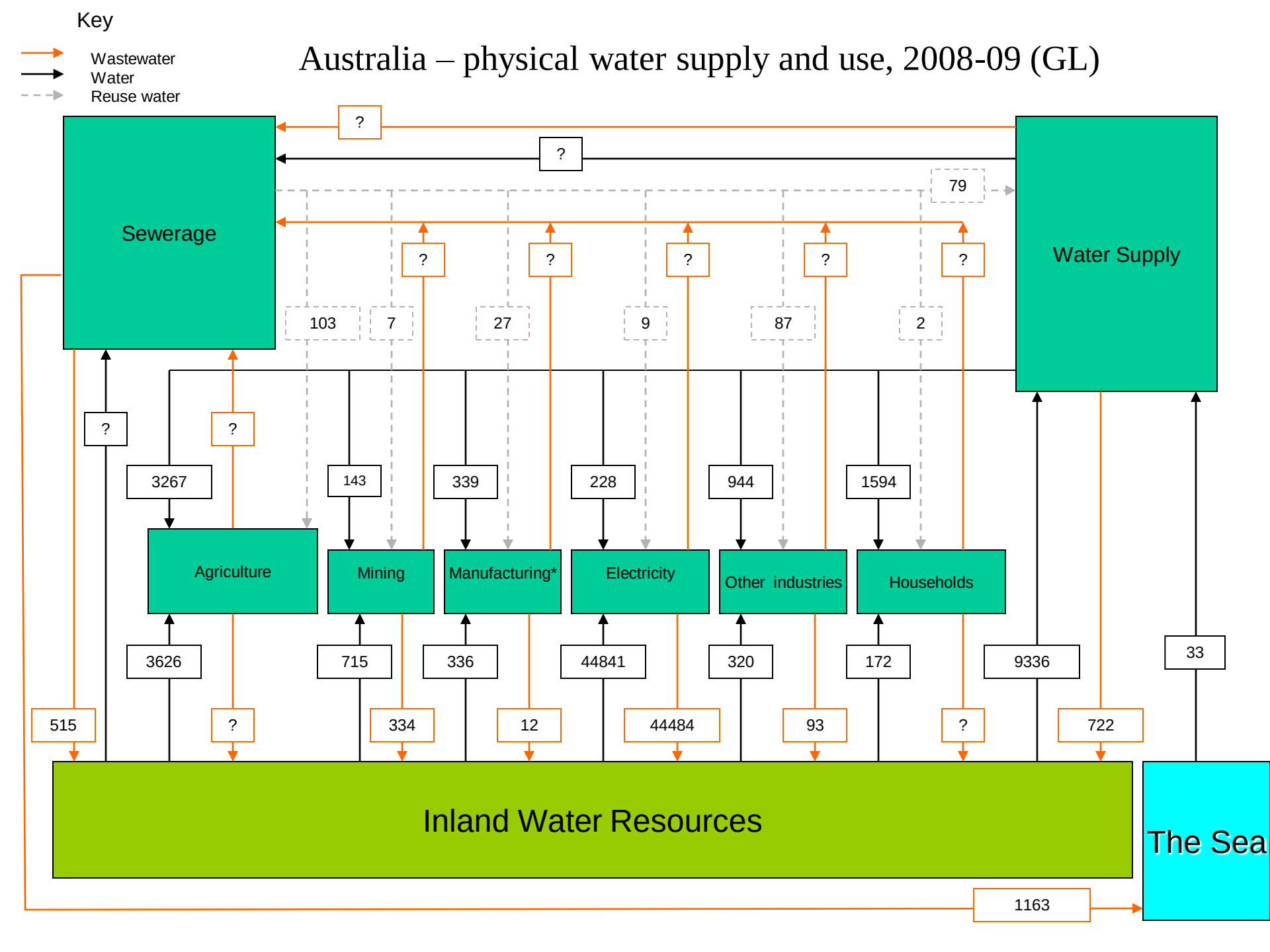
Australian Bureau of Statistics

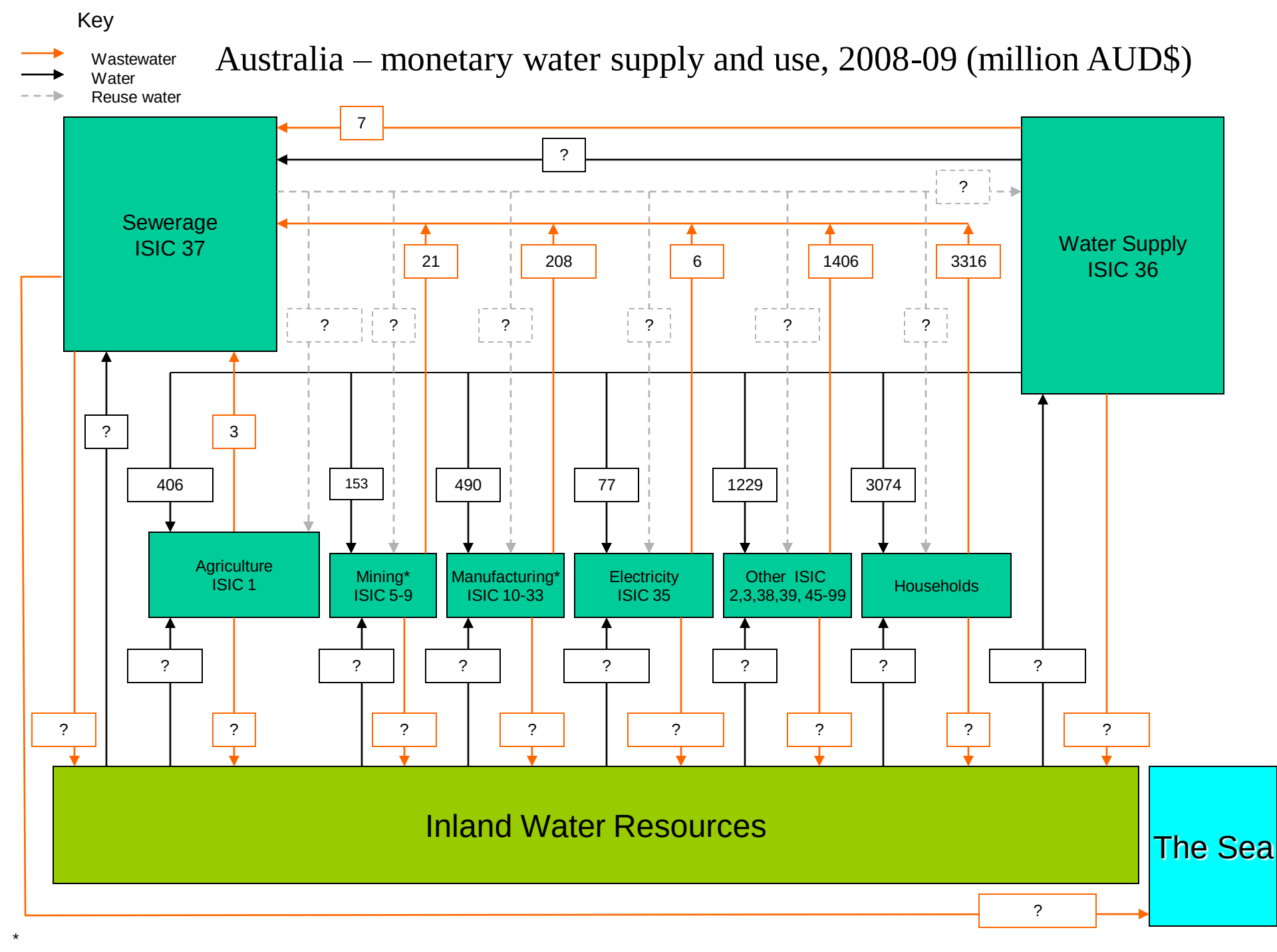
TopOfTable_Table_1

Released at 11:30 am (Canberra time) Thurs 31 Mar 2011

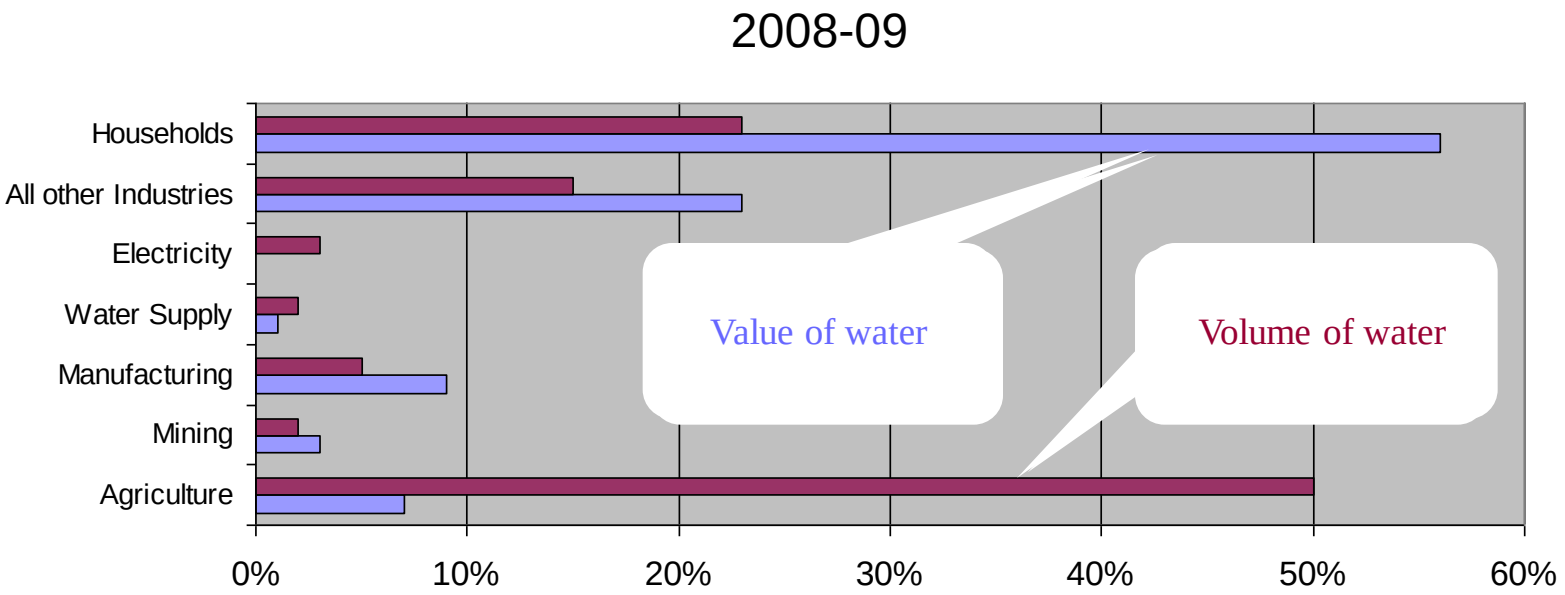
Table 1 Water supply and use 2010-11 - Australia

	Water supplied within the economy				Water use				Exchanges with the environment
	Non-scheduled	Scheduled	Reuse	Scheduled exchanges	Non-scheduled	Scheduled	Reuse	Evaporation	
	ML	ML	ML	ML	ML	ML	ML	ML	ML
Agriculture, forestry and fishing									
Agriculture									
Services to agriculture, gardening					29,000	18,000	1,000		48,000
Nurseries and floriculture growing					360,000	80,000	3,000		443,000
Cut and turf growing					490,000	380,000	9,000		883,000
Sheep, beef cattle and grain farming					1,900,000	1,000,000	80,000		3,000,000
Dairy cattle farming					1,200,000	800,000	30,000		2,000,000
Poultry farming					400,000	400,000	10,000		800,000
Deer farming						3,000			3,000
Pig farming						800			1,000
Other animal farming					31,000	30,000	1,000		70,000
n.e.c.					5,000,000	5,000,000	200,000		10,000,000
Aquaculture				300,000	300,000	1,000	30	300,000	3,000
Foresting and logging					4,000	30,000	1,000		80,000
Fishing, hunting and trapping					8,000	3,000			8,000
Agriculture, forestry and fishing support services					80,000	30,000	600		70,000
Mining									
Coal Mining		8,000		81,000	110,000	10,000	1,000	30,000	80,000
Metal Ore Mining		400		20,000	90,000	1,000		80,000	40,000
Non-Metallic Mineral Mining and Quarrying				160,000	430,000		8,000	100,000	330,000
Exploration and Other Mining Support Services		30		2,000	30,000	4,000	30	3,000	40,000
n.e.c.		40,000		300,000	700,000	60,000	40,000	700,000	800,000
Manufacturing									
Food, Beverage and Tobacco Product		4,000		60,000	160,000	130,000	2,000	40	300,000
Textile, Leather, Clothing and Footwear				1,000	1,000	9,000	900	1	11,000
Wood, Pulp, Paper and Converted Paper Product				60,000		30,000			90,000
Printing (and the Reproduction of Recorded Media)				100	6	4,000	4		4,000
Petroleum, Coal, Basic Chemical and Chemical Product				30,000	30,000	40,000		4,000	60,000
Polymer, Rubber and Non-Metallic Mineral Product				8,000		10,000	600		30,000
Primary Metal, Metal Product and Machinery				80,000	80,000	40,000	10,000		130,000
Transport Equipment, Machinery and Equipment		1		30	300	2,000	300		8,000
Furniture and Other		0		0	30	900	0		900
n.e.c.		40,000		300,000	300,000	300,000	30,000	40,000	400,000
Electricity, gas, water and waste services									
Electricity generation		60,000		80,000,000	80,000,000	100,000	30,000	80,000,000	300,000
Water supply, sewerage and drainage services		2,000,000	300,000	8,000,000	2,000,000	1,000,000	60,000		1,000,000
Waste collection, treatment and disposal services					1,000	3,000	1		1,000
Other industries				60,000	300,000	800,000	60,000	60,000	1,000,000
Household					100,000	1,000,000	3,000		1,000,000
Environment	21,000,000								
Total			300,000				300,000		


Key
Wastewater
Water
Reuse water
Australia – physical water supply and use, 2008-09 (GL)
Sewerage
Water Supply
Agriculture
Mining
Manufacturing*
Electricity
Other industries
Households
Inland Water Resources
The Sea
?
?
79
?
?
?
?
?
103
7
27
9
87
2
?
?
3267
143
339
228
944
1594
3626
715
336
44841
320
172
9336
33
515
?
334
12
44484
93
?
722
1163


Key
Wastewater
Water
Reuse water
Australia – monetary water supply and use, 2008-09 (million AUD$)
Sewerage ISIC 37
Water Supply ISIC 36
7
?
?
21
208
6
1406
3316
?
?
?
?
?
?
?
3
406
153
490
77
1229
3074
Agriculture ISIC 1
Mining* ISIC 5-9
Manufacturing* ISIC 10-33
Electricity ISIC 35
Other ISIC 2,3,38,39, 45-99
Households
Inland Water Resources
The Sea
*

Monetary vs. physical use of distributed water (% of total use)



Australian Bureau of Statistics

Australian Government
AusAID

Great Barrier Reef region, experimental accounts

WAVES

Why accounts?

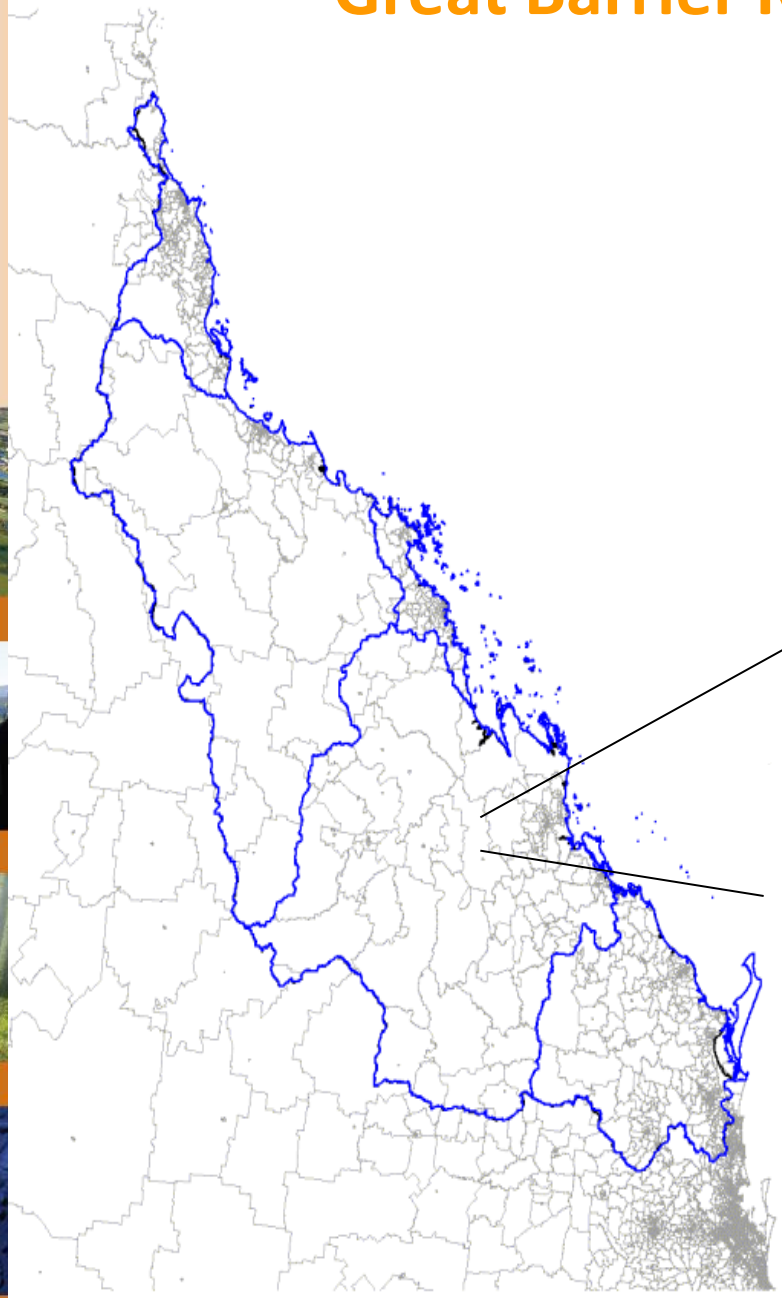
- The Great Barrier is a world famous area for biodiversity and tourism
- The condition of the reef is declining
- Agricultural practices mean that sediment, nutrients and chemicals enter the water and impact on the reef
- Managing the reef requires managing the basins which drain on the reef

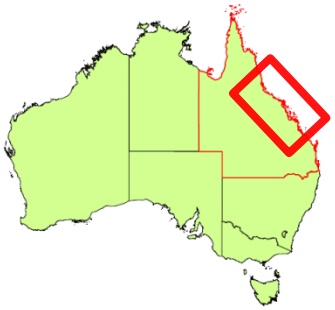
Great Barrier Reef region

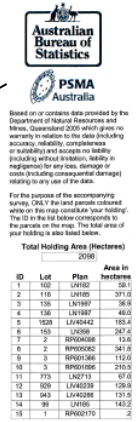
Australian Bureau of Statistics

Australian Government

AusAID







Australian Bureau of Statistics

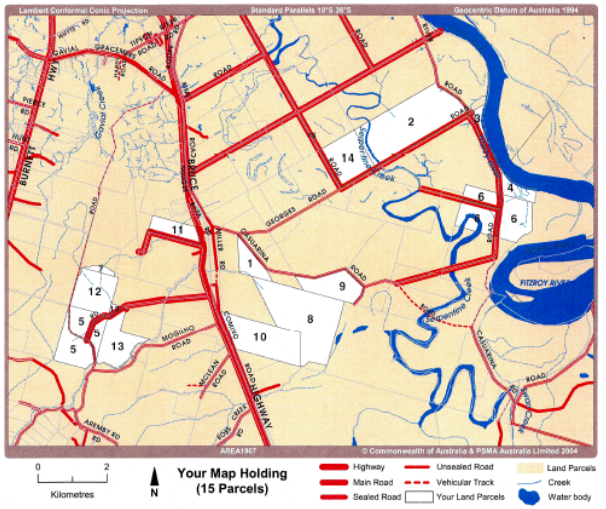
PSMA Australia

Based on or contains data provided by the Department of Natural Resources and Mines, Queensland 2005 which gives no warranty in relation to the data (including accuracy, reliability, completeness or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data.

For the purpose of this accompanying survey, ONLY the land parcels coloured white on this map constitute 'your holding'. The ID in the list below corresponds to the parcels on the map. The total area of your holding is also listed below.

Total Holding Area (Hectares)
2096

ID	Lot	Plan	Area in hectares
1	102	LN162	58.1
2	116	LN165	371.0
3	135	LN1997	36.9
4	136	LN1997	49.0
5	1535	LV/40442	183.4
6	153	LN356	347.4
7	2	RP004066	13.6
8	2	RP005082	341.8
9	3	RP001366	112.0
10	3	RP001806	210.5
11	773	LN2713	67.0
12	929	LV/40239	126.9
13	943	LV/40286	131.5
14	99	LN165	143.2
15	1	RP002170	2



	Data item	Value	Unit
	ABN count	27	No
	Estimated Population, 2006	251 to 310	No
	Employment Range	20 to 199	No
	GVIAP, 2005-06	-	$`000
	GVAP, 2005-06	9,419.8	$`000
	Water Use, 2005-06	421	ML

Source:ABS

2. Rateable value and Land use

2.1 Land use and rateable land value

	Data item	Value	Unit
	Area of this SA1 region	3,123.6	Ha
	Rateable Value	15.4	$m
	Agriculture	52.8	%
	Retail/Wholesale	2.1	%
	Transport Storage	-	%
	Industrial	0.9	%
	Sport, Recreation, Accommodation	-	%
	Community Services	3.3	%
	Residential	14.6	%
	Vacant Land - Urban	4.5	%
	Vacant Land - Rural	0.2	%

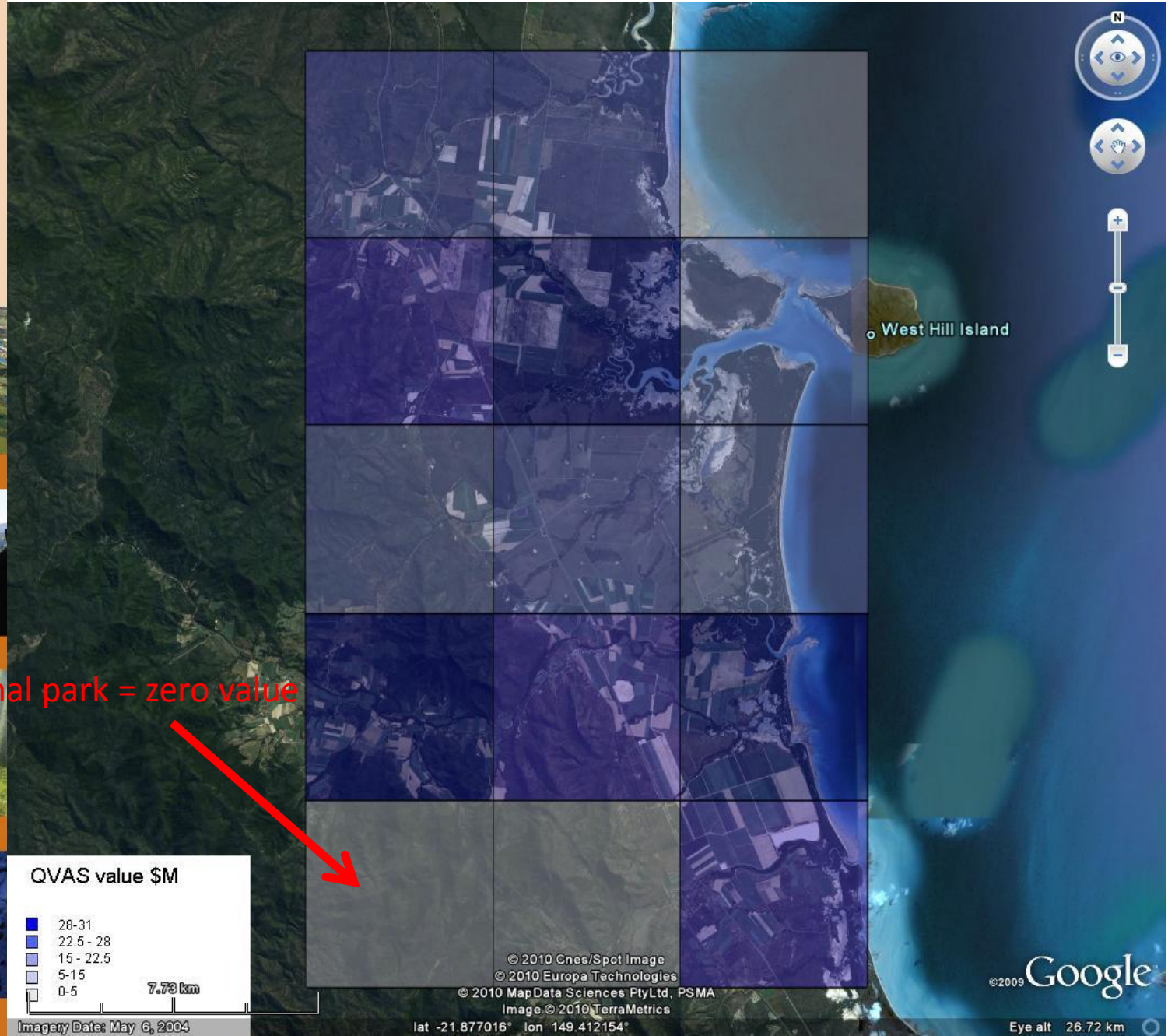
Land Value as recorded in government information system

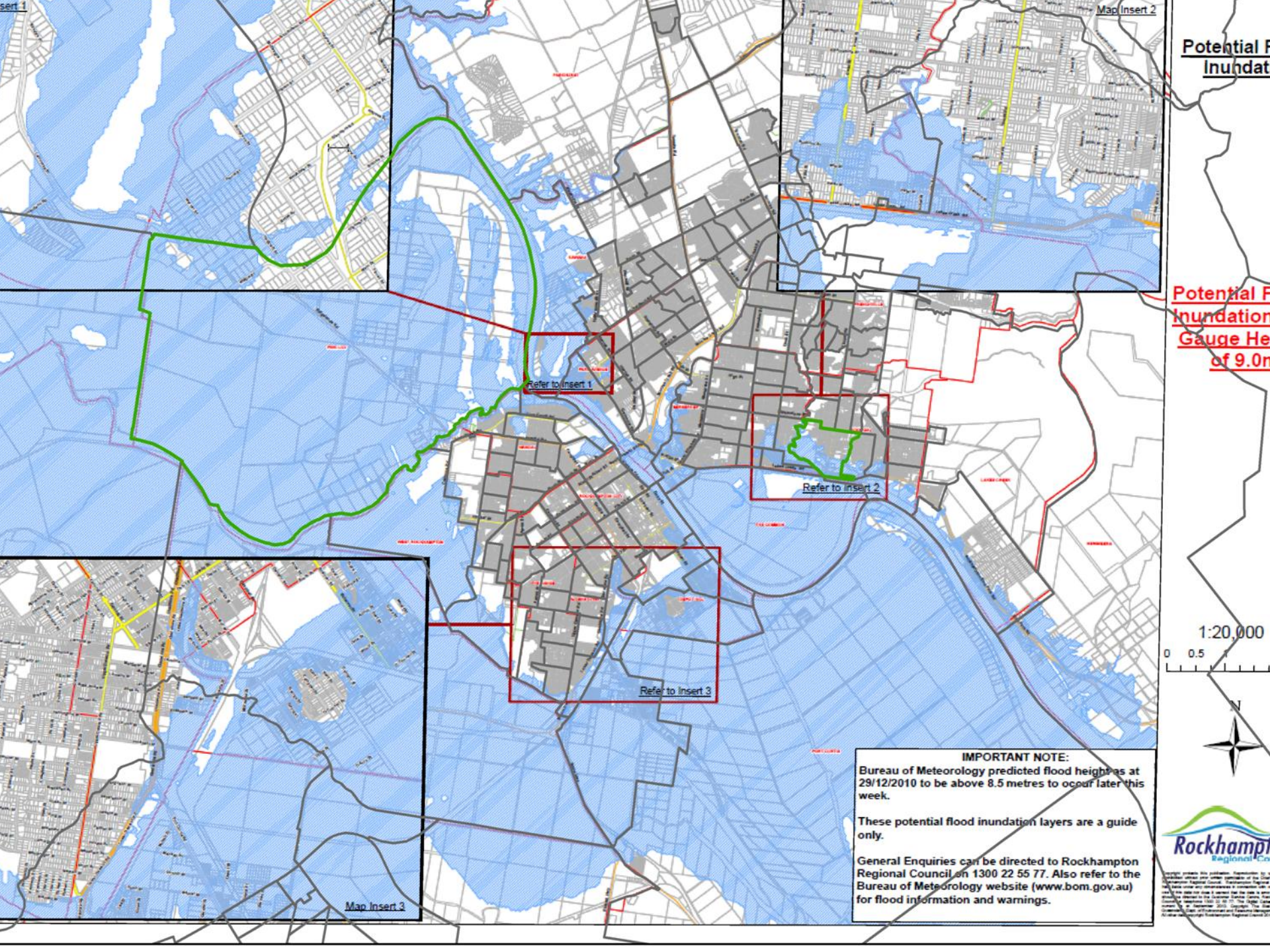
Australian Bureau of Statistics

Australian Government

AusAID

National park = zero value




Map Insert 2
Refer to Insert 1
Refer to Insert 2
Refer to Insert 3
Map Insert 3
1:20,000
0 0.5
N
IMPORTANT NOTE:
Bureau of Meteorology predicted flood height as at 29/12/2010 to be above 8.5 metres to occur later this week.
These potential flood inundation layers are a guide only.
General Enquiries can be directed to Rockhampton Regional Council on 1300 22 55 77. Also refer to the Bureau of Meteorology website (www.bom.gov.au) for flood information and warnings.

Australian Bureau of Statistics

Australian Government
AusAID

Victorian land and ecosystem accounts: ABS and Victorian Government Collaboration

WAVES

Australian Bureau of Statistics

Australian Government
AusAID

Victorian experiments land and ecosystem accounts

WAVES

Why accounts for Victoria?

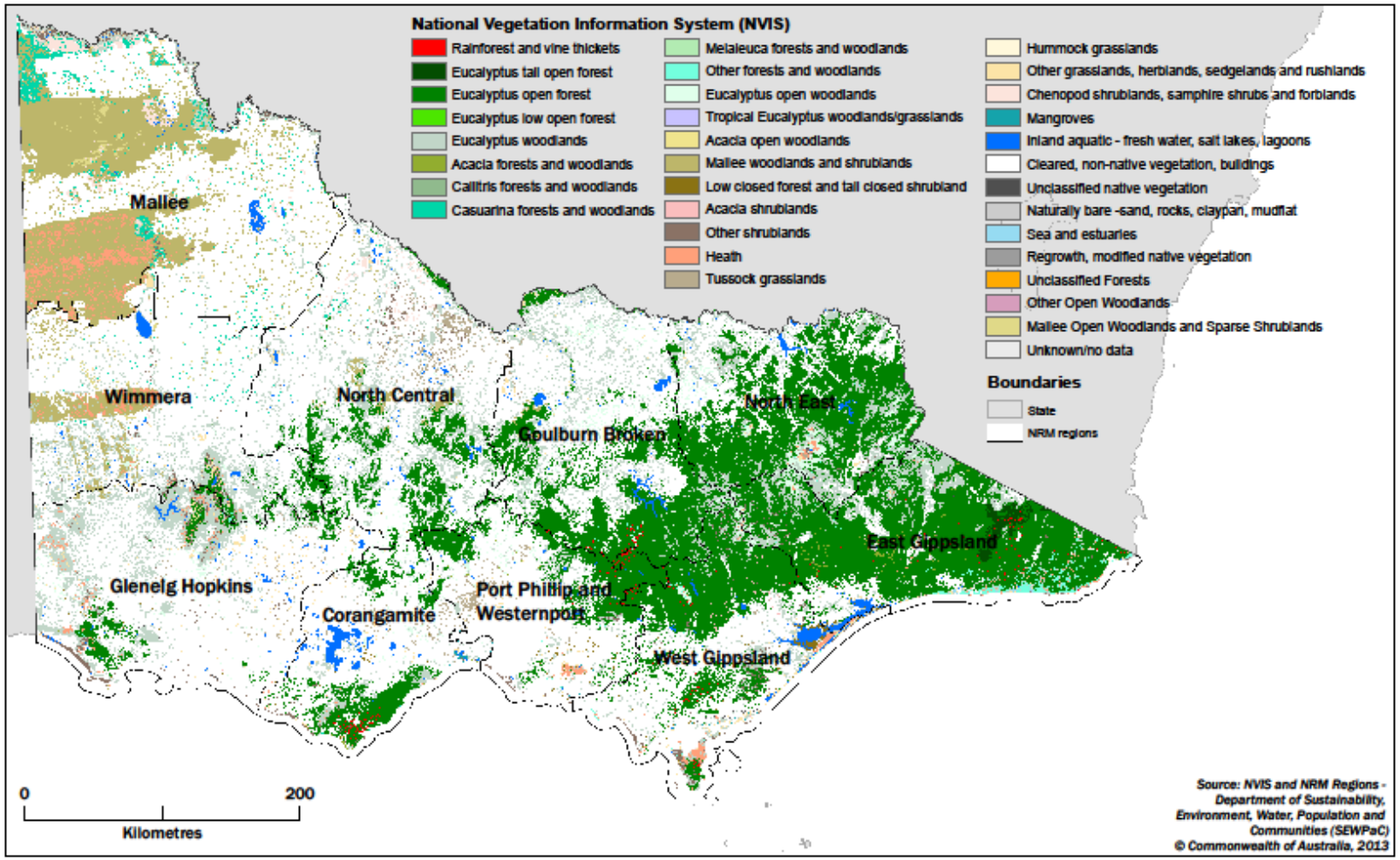
- Much native vegetation occurs on private land
- Preserving this vegetation protects biodiversity and provides other benefit like carbon sequestration, water filtration and erosion control
- What to create incentives for private landowners to keep and restore native vegetation

Victorian land and ecosystem accounts: Native vegetation 1750 and 2006

Australian Bureau of Statistics

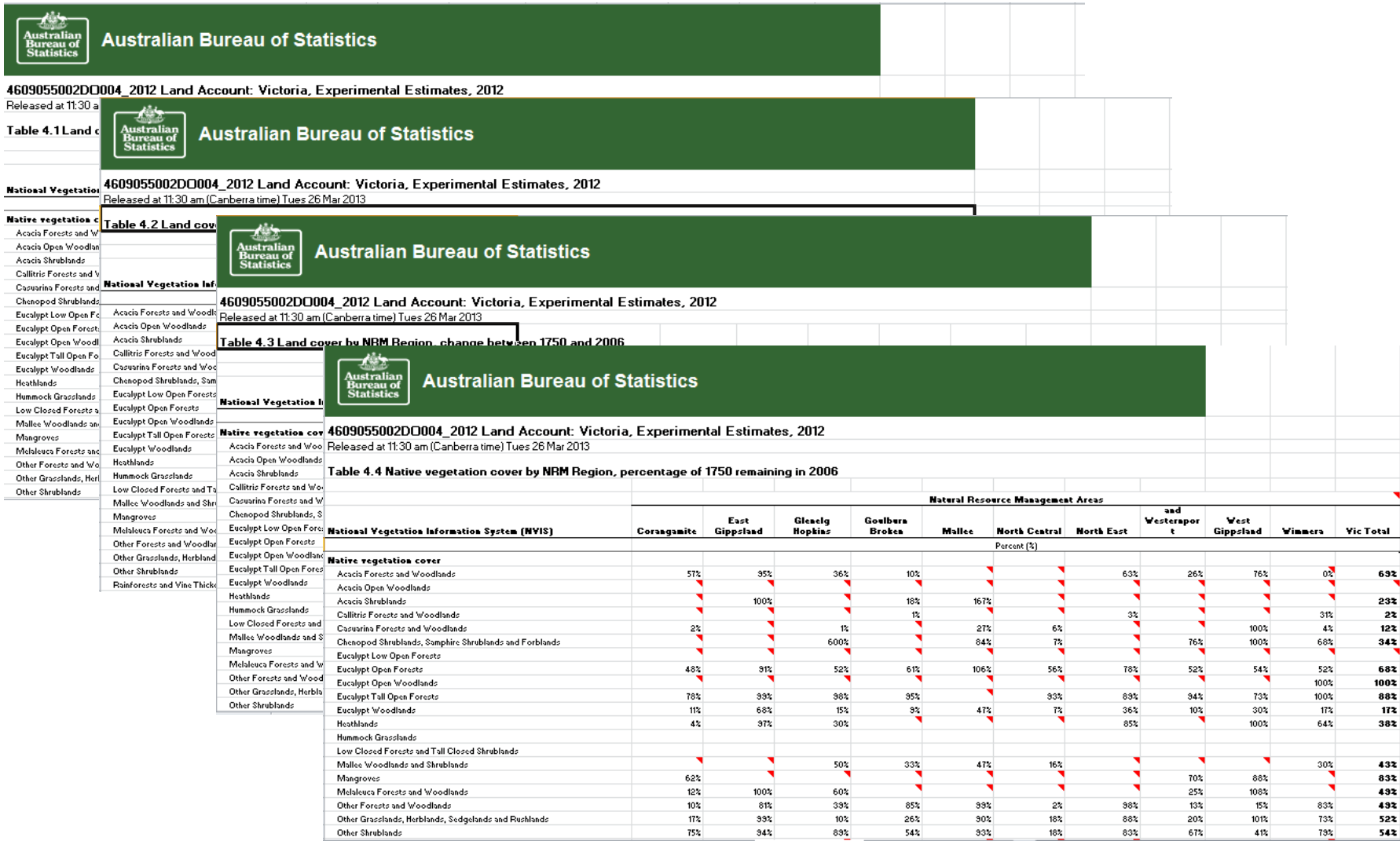
LAND ACCOUNT, VICTORIA, 2012

Map 10 - 2006 NVIS grid overlaid with NRM regions for Victoria



Source: NVIS and NRM Regions - Department of Sustainability, Environment, Water, Population and Communities (SEWPaC)

Victorian land and ecosystem accounts: Native vegetation 1750, 2006, change and percentage remaining by Natural Resource Management regions (NRM)



Australian Bureau of Statistics

4609055002DO004_2012 Land Account: Victoria, Experimental Estimates, 2012

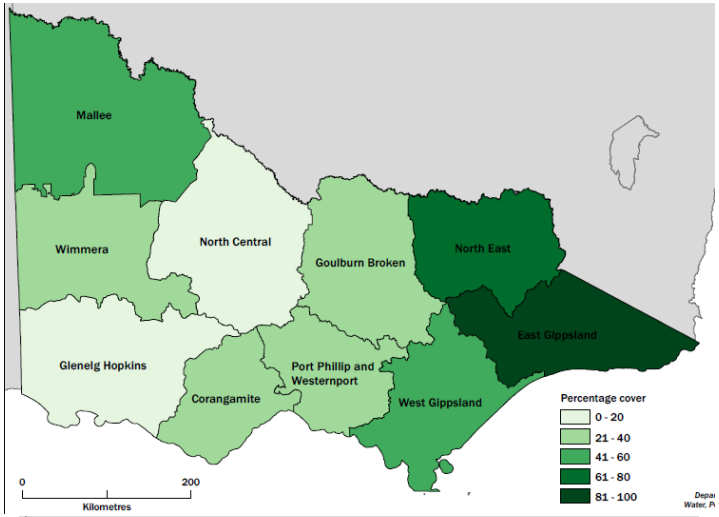
Released at 11:30 am (Canberra time) Tues 26 Mar 2013

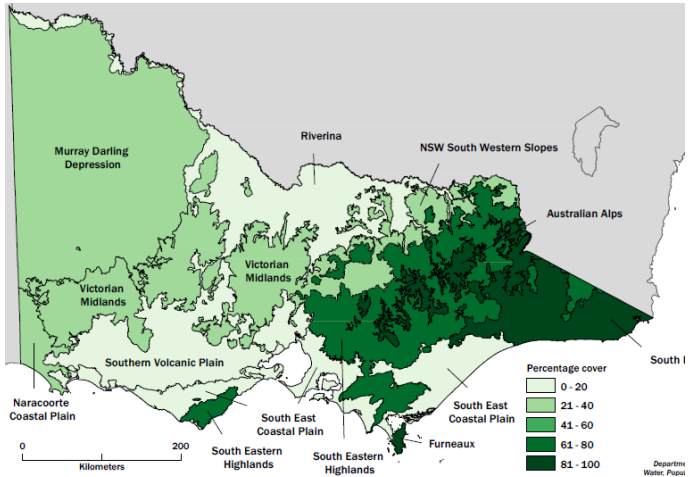
Table 4.4 Native vegetation cover by NRM Region, percentage of 1750 remaining in 2006

National Vegetation Information System (NVIS)	Natural Resource Management Areas										
	Corangamite	East Gippsland	Glenelg Hopkins	Goulburn Broken	Mallee	North Central	North East	and Westernport	West Gippsland	Wimmera	Vic Total
	Percent (%)										
Native vegetation cover											
Acacia Forests and Woodlands	57%	95%	36%	10%			63%	26%	76%	0%	**63%**
Acacia Open Woodlands											
Acacia Shrublands		100%		18%	167%						**23%**
Callitris Forests and Woodlands				1%			3%			31%	**2%**
Casuarina Forests and Woodlands	2%		1%		27%	6%			100%	4%	**12%**
Chenopod Shrublands, Samphire Shrublands and Forblands			600%		84%	7%		76%	100%	68%	**34%**
Eucalypt Low Open Forests											
Eucalypt Open Forests	48%	91%	52%	61%	106%	56%	78%	52%	54%	52%	**68%**
Eucalypt Open Woodlands										100%	**100%**
Eucalypt Tall Open Forests	78%	99%	98%	95%		93%	89%	94%	73%	100%	**88%**
Eucalypt Woodlands	11%	68%	15%	9%	47%	7%	36%	10%	30%	17%	**17%**
Heathlands	4%	97%	30%				85%		100%	64%	**38%**
Hummock Grasslands											
Low Closed Forests and Tall Closed Shrublands											
Mallee Woodlands and Shrublands			50%	33%	47%	16%				30%	**43%**
Mangroves	62%							70%	88%		**83%**
Melaleuca Forests and Woodlands	12%	100%	60%					25%	108%		**43%**
Other Forests and Woodlands	10%	81%	39%	85%	99%	2%	98%	13%	15%	83%	**43%**
Other Grasslands, Herblands, Sedgelands and Rushlands	17%	99%	10%	26%	90%	18%	88%	20%	101%	73%	**52%**
Other Shrublands	75%	94%	89%	54%	93%	18%	83%	67%	41%	78%	**54%**

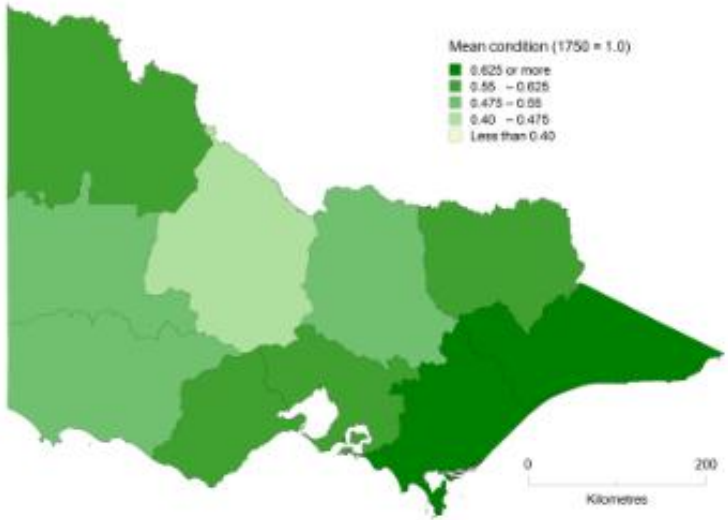
Victorian land and ecosystem accounts:
Native vegetation remaining compared to condition by NRM

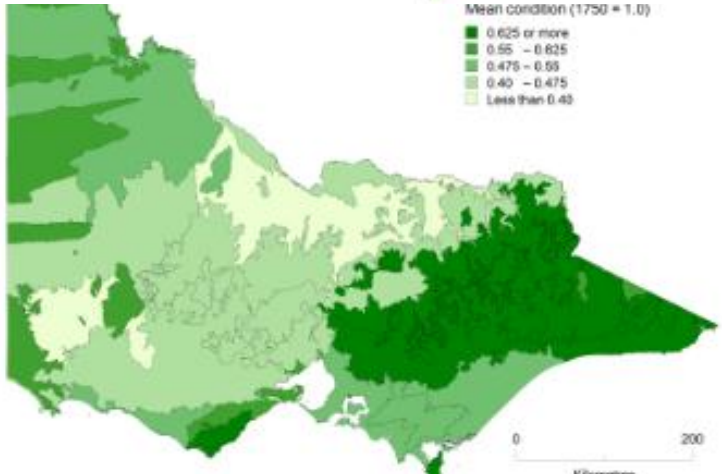
Per cent (%) of 1750 native vegetation remaining in 2006





Condition of 1750 native vegetation remaining in 2006





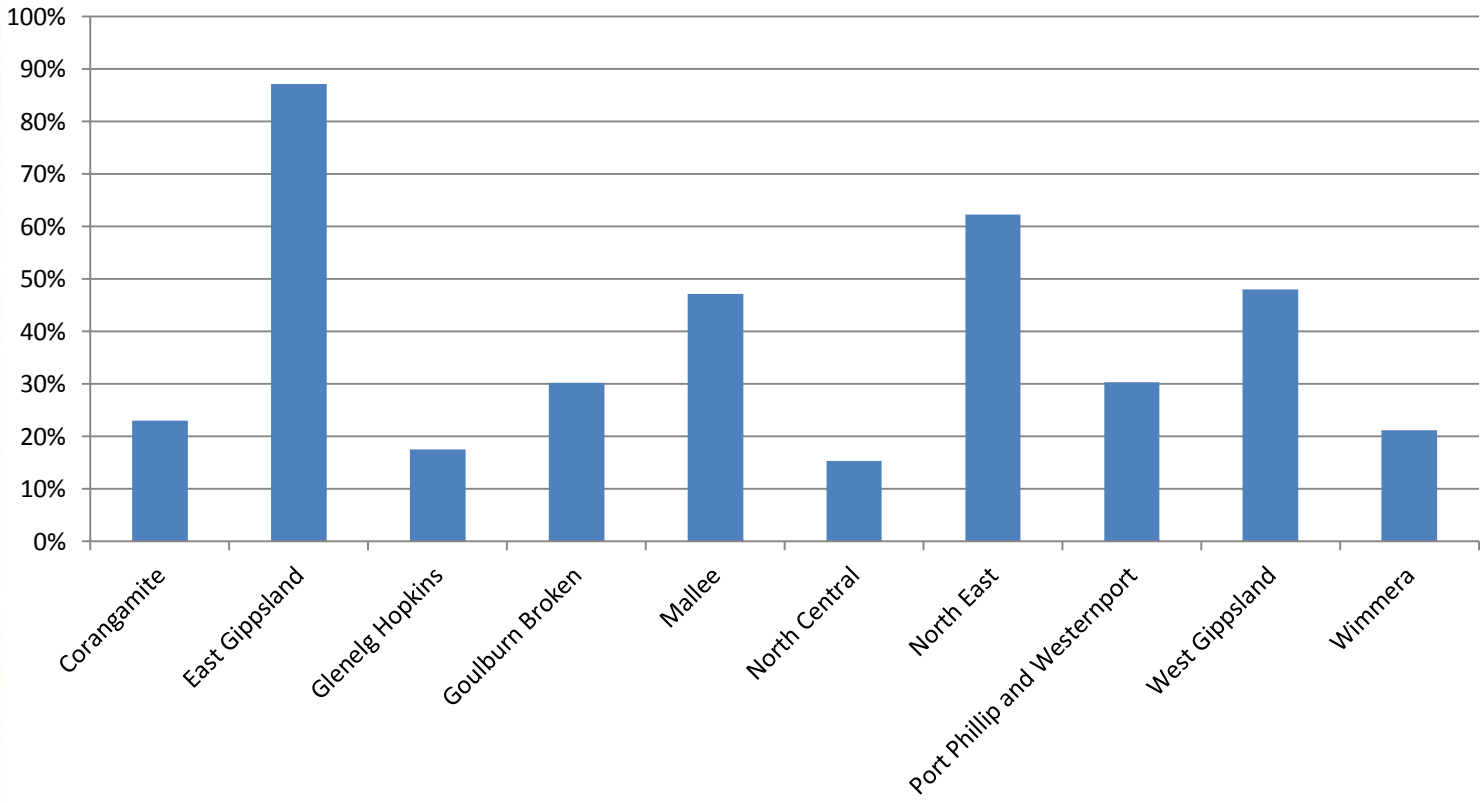
Australian Bureau of Statistics

Australian Government

AusAID

Victorian land and ecosystem accounts: Percentage of 1750 native vegetation remaining in 2006 by Natural Resource Management regions (NRM)

WAVES



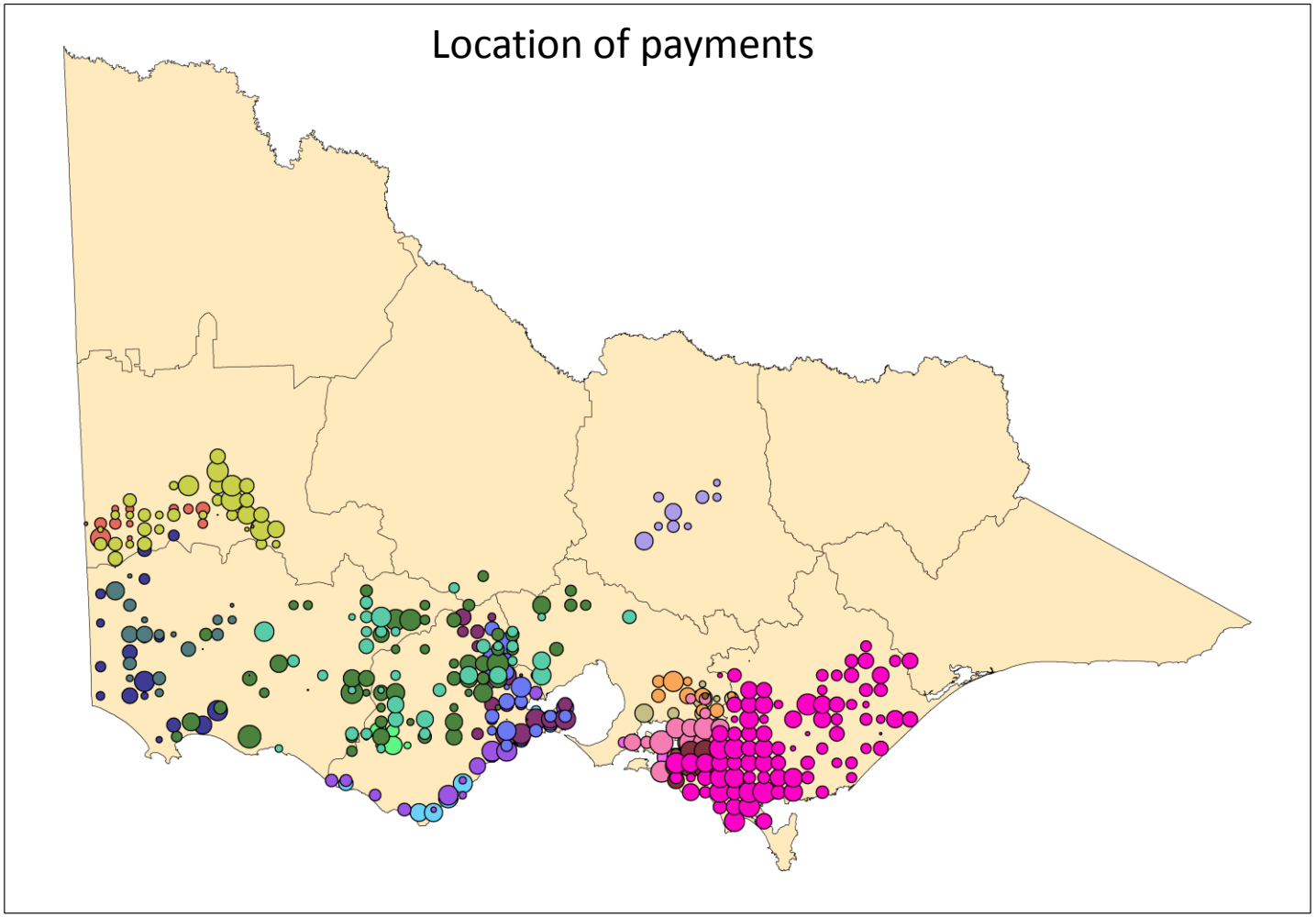
Australian Bureau of Statistics

Australian Government

AusAID

Victoria – ecoTender
Payments for ecosystem services

WAVES



Australian Bureau of Statistics

Australian Government

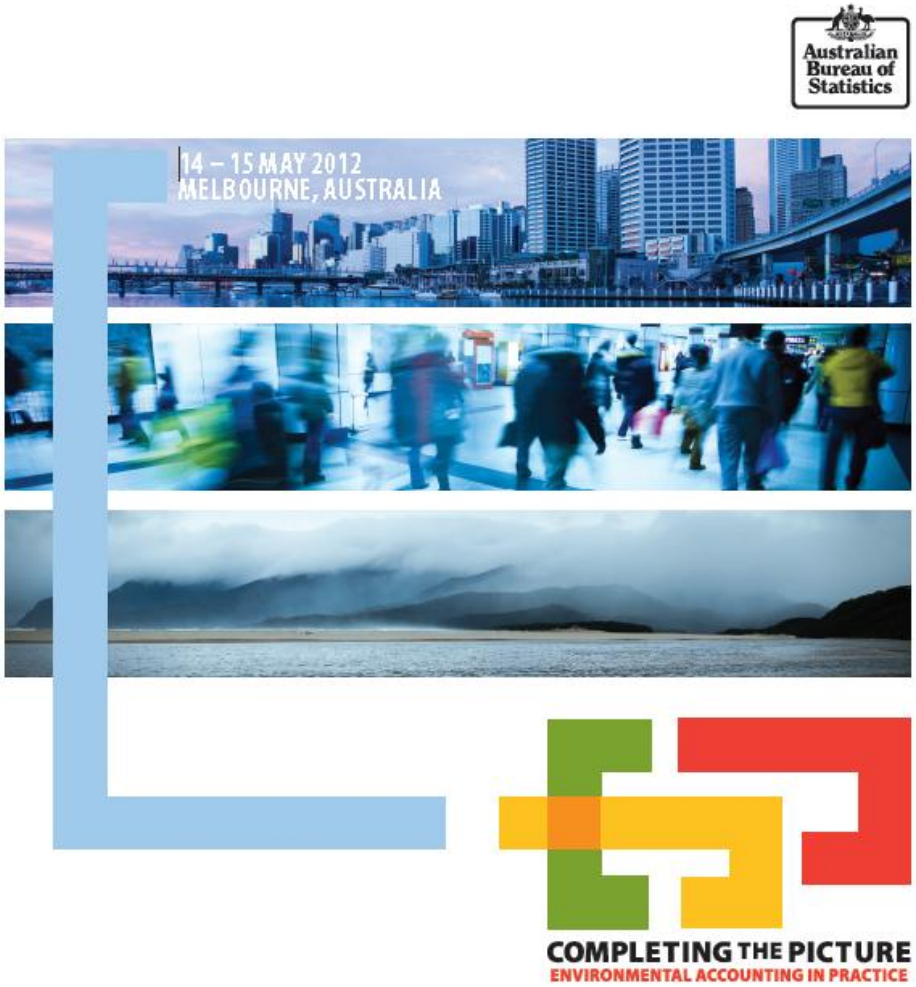
AusAID

Lessons learnt

WAVES

- Need sustained high level support
  - Accounts take time to mature and there will be criticisms and misunderstandings, especially during the initial stages
- Producing accounts requires strong partnerships
  - Cooperation is essential – between agencies and between professions (e.g. accountants, economists and ecologists)
  - Spatial data and spatial manipulation of data are needed and Geographic Information Systems (GIS) are essential
  - Data availability and access to data are key issues
  - Learning from international experience
- Experimental accounts are very useful
  - Helps in developing methods, building capability, focus for work and cooperation between agencies and demonstrating how accounts can be used
  - The work necessarily requires trade-offs between accuracy and frequency (the perfect is the enemy of the good)
- Accounts get better over time and usefulness increases when repeated
  - Time series increases usefulness
- Communication is essential

Example of explaining accounts to users



- Issues linked to accounts, including climate change, green growth and sustainability

http://www.abs.gov.au/ausstats/abs@.nsf/mf/4628.0.55.001

Contact for more information

michael.vardon@abs.gov.au

Australian Bureau of Statistics

Australian Government
AusAID

Communication

WAVES

A better way of linking the economy and environment

December 22, 2012

Read later

Ross Gittins

The Sydney Morning Herald's Economics Editor

View more articles from Ross Gittins

Follow Ross on Twitter Email Ross

Over the eight years to 2010-11, gross domestic product increased by 28 per cent, whereas Australia's net energy use increased by 18 per cent. So our "energy intensity" - energy used per $1 of GDP - is falling at the rate of 1 per cent a year.

In 2010-11 we produced 89 per cent of our total energy supply domestically, with the remaining 11 per cent being mainly imported oil. This took our total annual supply of energy to almost 19,000 petajoules. Of this we exported 71 per cent - mainly coal, uranium and natural gas.

Turning from energy to water, the price charged to households rose by 17 per cent in 2010-11, while the amount of water consumed by households fell by 8 per cent. On average, households were paying $2.44 a kilolitre. Of total water consumption of more than 13,000 gigalitres, 54 per cent went to agriculture and 33 per cent to the rest of industry, leaving just 13 per cent going to households.

Turning from water to land, Victoria's 23 million hectares of rateable land are valued at more than $1 trillion. Residential land accounts for 83 per cent of this total value, even though it accounts for only 5 per cent of the state's total area.

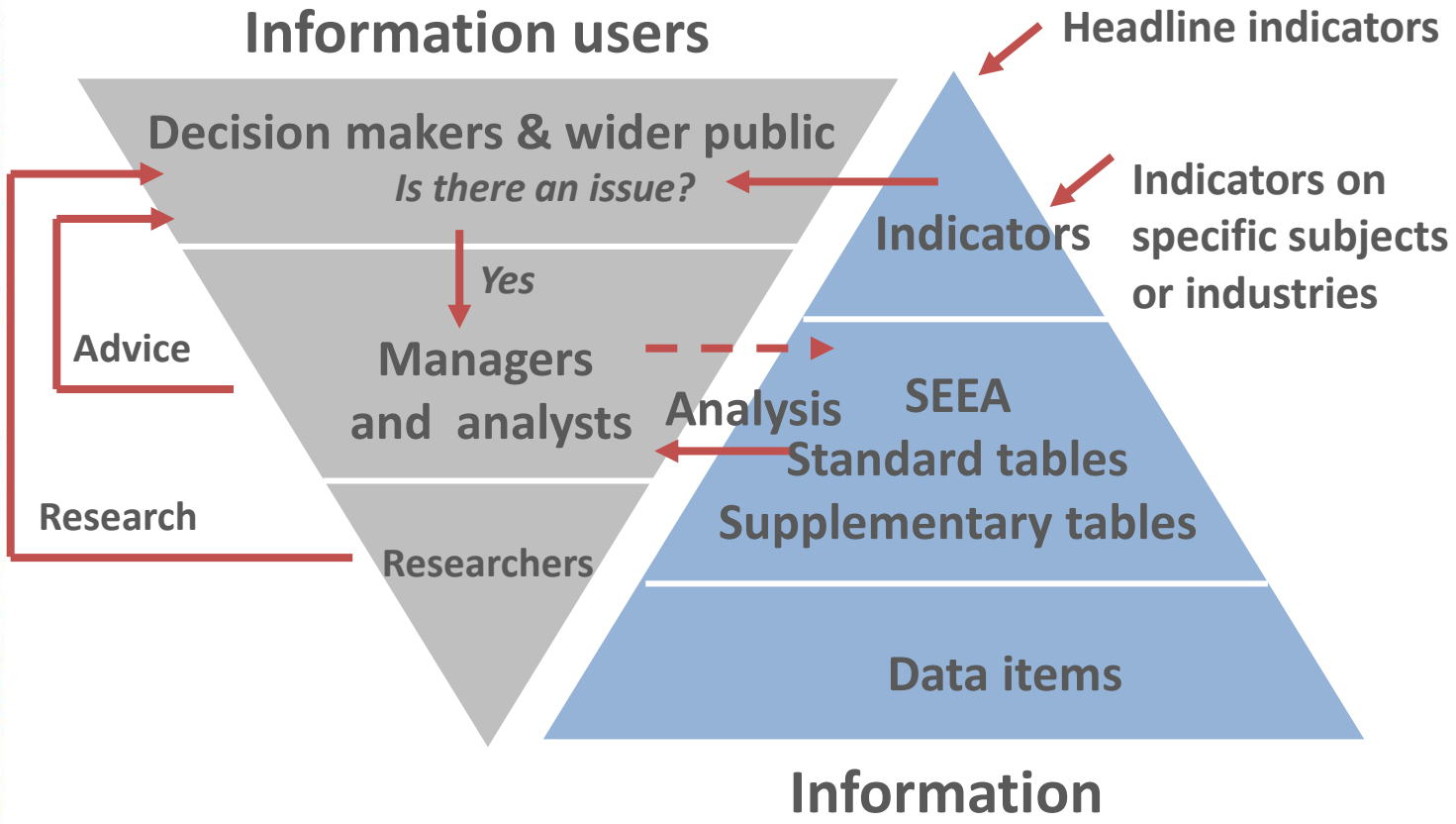
How do I know all this? Because I've been reading the "energy account", the "water account" and the "land account (Victoria, experimental estimates)", each published by the Bureau of Statistics in the past few weeks.

Australian Bureau of Statistics

Australian Government
AusAID

Audiences and information

WAVES



Australian Bureau of Statistics

Australian Government
AusAID

Ecosystem accounting initiatives in Australia

WAVES

Victorian Department of Environment and Primary Industries

- 2013 Experimental ecosystem accounts
  http://www.dse.vic.gov.au/conservation-and-environment/ecomarkets/ecomarkets-science

Bureau of Meteorology

- 2013 The environment accounts landscape
  http://www.bom.gov.au/environment/doc/environmental_accounts_landscape.pdf

Department of Agriculture Forestry and Fisheries

- 2012 Discussion paper on Ecosystem services
  http://www.daff.gov.au/natural-resources/ecosystem-services/ecosystem-services-report

Department of Sustainability, Environment, Water, Population and Communities

- – 2010 Ecosystem services: Key concepts and applications
  http://www.environment.gov.au/biodiversity/publications/ecosystem-services.html

South East Queensland Catchments

- 2012 Ecosystem Services Framework SEQ
  http://www.ecosystemservicesseq.com.au/

Wentworth Group

- 2008 Accounting for Nature (trials to be published soon)
  http://www.wentworthgroup.org/

ABS work – water and experimental land accounts

Australian Bureau of Statistics

Australian Government
AusAID

Key messages for ecosystem accounting

WAVES

- Conceptual model for ecosystem accounting brings together existing knowledge from many disciplines
- The SEEA ecosystem accounting model straightforward
- Distinction between stocks and flows central
  - measurement of both ecosystem condition & extent, and ecosystem service flows is required
- Ecosystem accounting is possible
  - Requires commitment and cooperation
  - Need to prioritise and stage work, so carefully planning
  - Accounts are never perfect
  - Learn best by doing

Australian Bureau of Statistics

Australian Government
AusAID

Acknowledgements

WAVES

- This contribution from the Australian Bureau of Statistics is made possible by funding from AusAID in support of the World Bank's WAVES programme.
- Carl Obst (SEEA Editor), Mark Eigenraam (Department of Environment and Primary Industries), Mark Lound, Tom Walter and John Power (all ABS), contributed to the material presented.