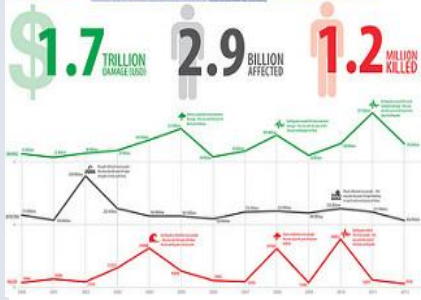


Natural Hazards



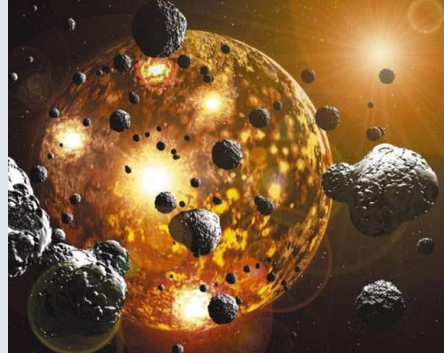
UNISDR DISASTER IMPACTS / 2000-2012



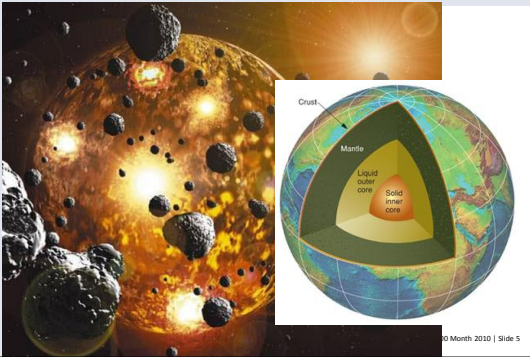
Title | 00 Month 2010 | Slide 2



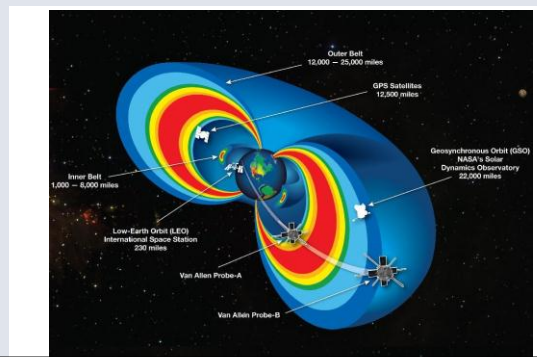
Presentation Title | 00 Month 2010 | Slide 3

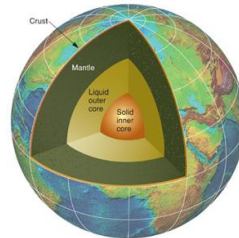
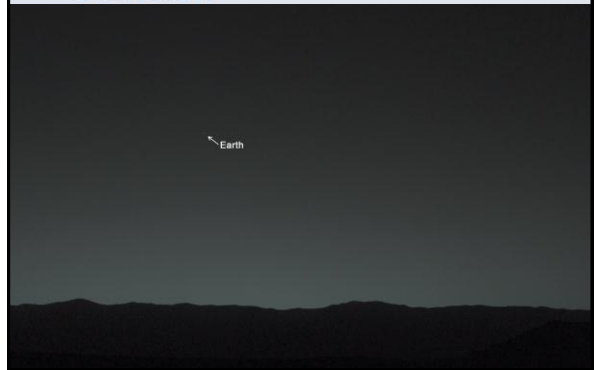
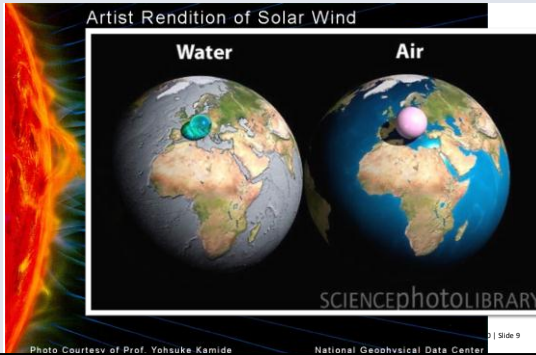
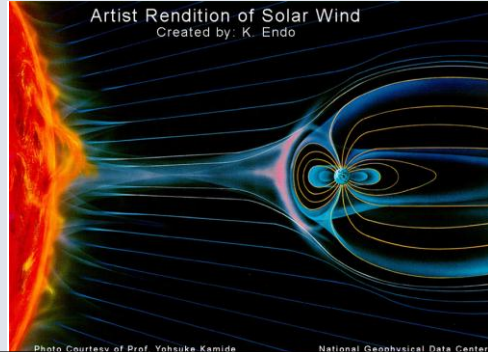
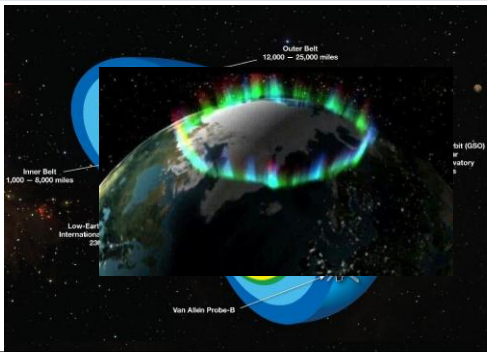


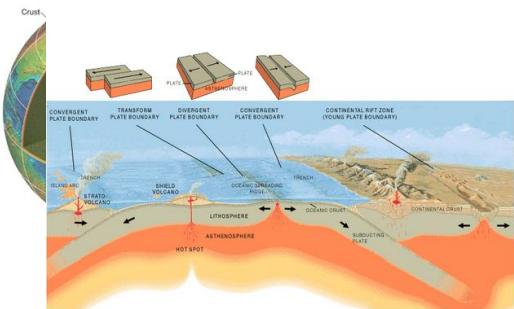
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Active Volcanoes, Plate Tectonics, and the "Ring of Fire"



USGS. <https://www.usgs.gov/media/images/active-volcanoes-plate-tectonics-and-the-ring-of-fire>. Modified from *Tectonic Plates and Volcanoes*, 1997.

Earthquake



Presentation Title | 00 Month 2010 | Slide 15

Earthquake



Earthquake



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earthquakecheck.com

Today's Biggest Earthquakes All recent earthquakes >

Earthquakes over 3.0 M within the last 24 hours.

- about 5 hours ago 3.5 magnitude, 112 km depth Central Mexico
- about 7 hours ago 3.4 magnitude, 16 km depth Guadalupe Victoria, Baja California, Mexico
- about 8 hours ago 4.2 magnitude, 10 km depth Irapue, Coahuila, Chile
- about 13 hours ago 4.7 magnitude, 7 km depth Copacabana, Copacabana, Chile
- about 14 hours ago 4.2 magnitude, 68 km depth Pineda Nacional, Oaxaca, Mexico
- about 16 hours ago 4.9 magnitude, 123 km depth Tarma, Tarma, Peru
- about 17 hours ago 5.0 magnitude, 22 km depth Horowhenua Islands, New Zealand
- about 17 hours ago 3.3 magnitude, 16 km depth Central Mexico
- about 18 hours ago 4.8 magnitude, 10 km depth Central East Pacific Rise
- about 18 hours ago 4.3 magnitude, 12 km depth Copacabana, Copacabana, Chile

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Earthquake Track: Today's Earthquakes - Places - Quakes Near - Go - Like - On - Tweet - 0/1

There have been: (M1.0 or greater)

- 79 earthquakes today
- 634 earthquakes in the past 7 days
- 3,411 earthquakes in the past month
- 38,977 earthquakes in the past year

The biggest earthquake:

- Today: 5.4 in Karambuc, Antalya, Turkey
- This week: 5.9 in Copiapo, Copiapo, Chile
- This month: 4.3 in Illapel, Copiapo, Chile
- This year: 8.3 in Illapel, Copiapo, Chile

Earthquake Alerts via Twitter: [Follow @QuakesToday](#)

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Predicted vs Observed Horizontal GPS Displacements

- Predicted horizontal displacement from teleseismic finite fault model
- Red arrows indicate predicted horizontal displacement from finite fault model
- Black arrows indicate horizontal displacements observed at GPS stations

Data Source:
University of Chile
<http://www.csn.uchile.cl/deplazamientos-del-terremoto-de-illapel-2010/>

Observed Predicted 32 cm

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Earthquakes in Australia

2011 ADELAIDE EARTHQUAKE

WE WILL REBUILD

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Earthquakes in Australia

Location	Year	Magnitude
Meeberrie WA	1941	7.2
Adelaide	1954	5.5
Newcastle	1989	5.6

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Earthquakes in Australia

Magnitude
7.2
5.5
5.6

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Earthquakes in Australia

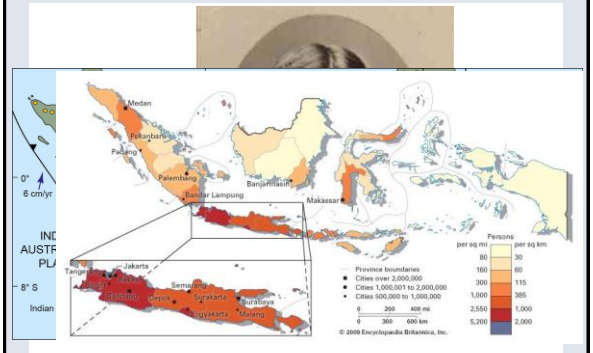
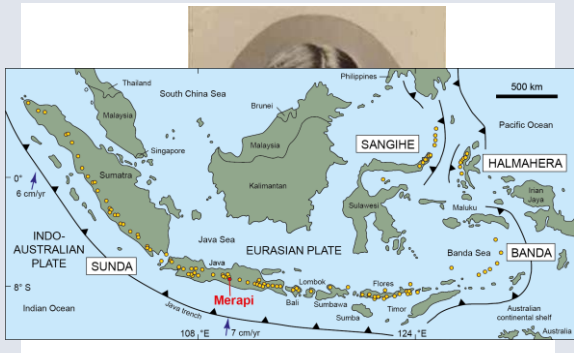
Presentation Title | 00 Month 2010 | Slide 24



| 00 Month 2010 | Slide 31



| 00 Month 2010 | Slide 32

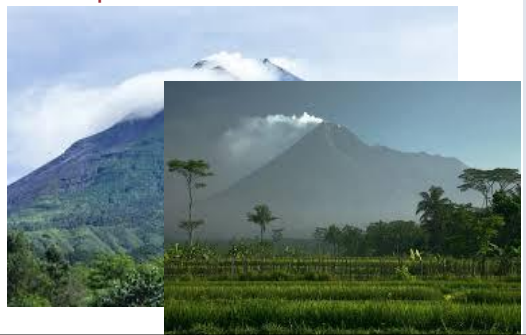


Volcanic Eruption

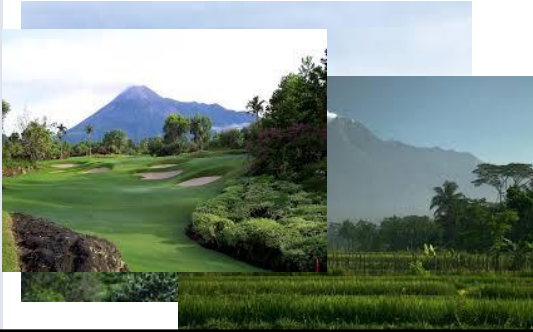


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Volcanic Eruption



Volcanic Eruption



Volcanic Eruption



Volcanic Eruption



Volcanic Eruption



Volcanic Eruption



Volcanic Eruption

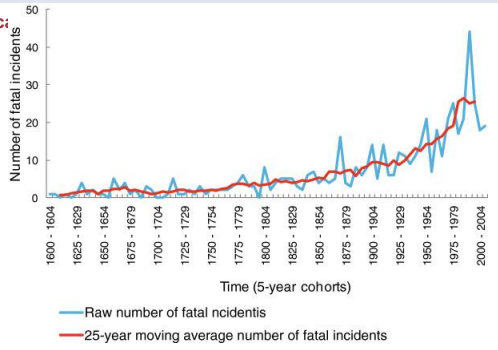


Volcanic Eruption

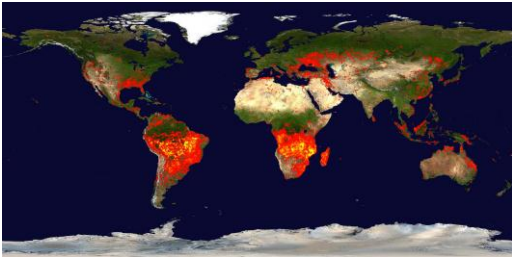


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Volc:



Natural Context of Fire

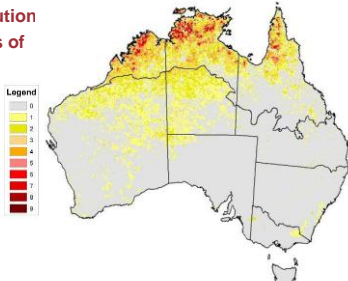


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Natural Context of Fire



**Actual fire distribution
Based on 10 years of
satellite
data**



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Cultural Context of Fire



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Cultural Context of Fire



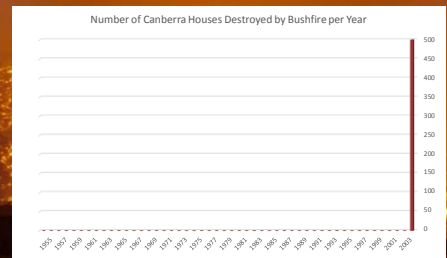
Cultural Context of Fire

Prior to 1788 fire was not a hazard:

The secret of fire in our traditional knowledge is that it is a thing that brings the land alive again. So we do not necessarily see fire as bad and destructive...But it is not a thing to play with unless people understand the nature of fire.



Dean Yeatuk and Peter Cooke, Savanna Burning—Understanding and Using Fire in Northern Australia. Tropical Savannas CRC, 2001



Fire management by RESPONSE



| Slide 53

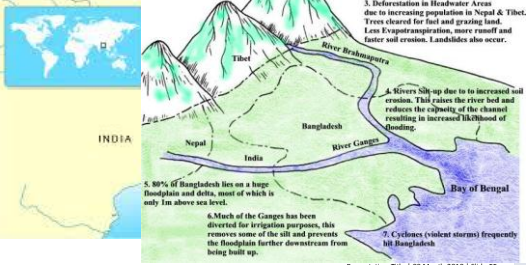
Floods



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Some Causes of Flooding in Bangladesh

Floods



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Some Causes of Flooding in Bangladesh

Floods



Presentation Title | 00 Month 2010 | Slide 56

Cost of disasters in Australia

Table 1.1 Deadliest natural disasters in Australia, 1970–2013

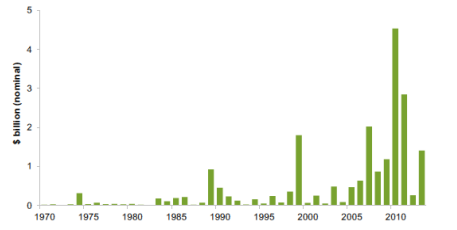
Rank	Event	Fatalities
1	2009 Black Saturday bushfires	173
2	1983 Ash Wednesday bushfires	75
3	1974 Cyclone Tracy	71
4	2010–11 Queensland floods	33
5	1997 Thredbo landslide	18

Source: AEMU (2014).

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Cost of disasters in Australia

Figure 1.2 The insurance losses of natural disasters, 1970–2013



Data source: ICA (2014e).

Cost of disasters in Australia

Table 1.2 Insurance losses by natural hazard, 1970–2013^a
\$ million (2011 dollars)

Event type	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Total
Bushfire	527	1 650	–	189	96	100	–	440	3 002
Cyclone	36	–	3 329	–	486	–	1 529	–	5 379
Flood	965	400	3 630	–	24	51	123	–	5 192
Storm	2 747	2 439	1 376	47	1 232	34	–	–	7 874
Hail	4 856	294	949	92	0	86	–	–	6 277
Earthquake	1 657	–	–	–	15	–	–	–	1 671
Total	10 788	4 783	9 283	327	1 852	271	1 652	440	29 395
Per cent	36.7	16.3	31.6	1.1	6.3	0.9	5.6	1.5	100.0

^a Where events were recorded as impacting multiple states, costs have been divided evenly across those states. – Nil or rounded to zero.

Data sources: ICA (2014e); Productivity Commission estimates.

Cost of disasters in Australia

Table 1.3 The five costliest natural disasters in Australia, 1970–2013
Various forms of insurance losses

Rank	Nominal cost		Deflated cost		Normalised cost	
	Event	\$b	Event	2011\$b	Event	2011\$b
1	2010–11 Queensland floods	2.4	2010–11 Queensland floods	2.5	1999 Sydney hailstorm	4.3
2	1999 Sydney hailstorm	1.7	1999 Sydney hailstorm	2.5	1974 Cyclone Tracy	4.1
3	2007 Newcastle and Hunter Valley storm	1.5	2007 Newcastle and Hunter Valley storm	1.7	1989 Newcastle earthquake	3.2
4	2011 Cyclone Yasi	1.4	1989 Newcastle earthquake	1.6	1974 Cyclone Wanda and Brisbane flood	2.6
5	2009 Black Saturday bushfires	1.1	1974 Cyclone Tracy	1.4	2010–11 Queensland floods	2.4

Sources: ICA (2014e); Productivity Commission estimates.

Cost of disasters in Australia

Estimated economic costs of the 2009 Black Saturday bushfires

Item	Cost (\$m)
Direct costs	
General insurance payouts	1 200
Loss and damage to public infrastructure	77
Value of destroyed timber, replanting and salvage costs	658
Asset damage and other costs incurred by Telstra and Melbourne Water	25
Indirect costs	
Costs associated with the Victorian Bushfire Reconstruction and Recovery Authority	1 081
Cost of 2009 Victorian Bushfires Royal Commission	90
Intangible costs	
Loss of life	645
Other costs	
Supplementary funding from the Victorian Government	593
Total	4 369

Source: VBRC (2010b).

Expenditure on disasters in Australia

- Anti-terror expenditure from 2001 to 2011 >\$21 Billion (ASPI)

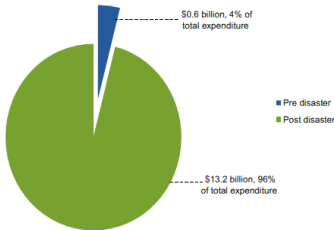
Table 1.4 Estimated Australian Government pre-disaster expenditure 2002-03 to 2014-15

Financial year	NPANDR/SPPF ^a	NEMP	Other ^b	Total
	\$m	\$m	\$m	\$m
2002-03	18.4	-	8.0	26.4
2003-04	10.2	-	10.2	20.4
2004-05	15.5	-	12.4	27.9
2005-06	30.9	-	20.0	50.9
2006-07	24.0	-	17.7	41.7
2007-08	30.2	-	17.4	47.6
2008-09	36.9	-	15.6	52.5
2009-10	34.1	3.6	15.0	52.7
2010-11	26.4	3.6	13.0	43.0
2011-12	30.0	3.6	13.0	46.6
2012-13	24.0	3.8	16.0	43.8
2013-14	17.6	3.6	16.0	37.2
2014-15	39.2	3.7	22.0	64.9
Total	337.4	21.9	196.3	555.6

Source: Productivity Commission (2010) | Slide 62

Expenditure on disasters in Australia

Figure 1.7 Estimated Australian Government expenditure pre and post disaster, 2002-03 to 2014-15



Data source: Productivity Commission estimates.

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Disaster Decision Making

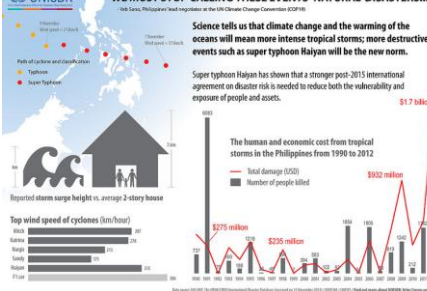
Cognitive bias

- Research in the last 15 – 20 years indicates that there is almost universal failure to make good decisions in the face of infrequent natural hazards. This is largely due to hard-wired elements of human cognition...
- Kahneman, D 2011 "Thinking, fast and Slow"
- Framing
- Availability heuristic
- Unreasonable Optimism
- Outcome expectancy
- Shifting blame / responsibility
- Persistent failure to grasp probability

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Conclusions:

WE MUST STOP CALLING THESE EVENTS 'NATURAL' DISASTERS...



Slide 65

Conclusions:



Earth to scale