Coastal Futures 18 : London, 18-19 January 2018

Communicating ocean acidification & climate change

Phil Williamson

Natural Environment Research Council & University of East Anglia

NERC SCIENCE OF THE ENVIRONMENT

UK Ocean Acidification Research Programme

UEA University of East Anglia

Communicating ocean acidification & climate change

"Research that isn't communicated is research that hasn't happened"

David Ellar *quoted by Anne Glover*

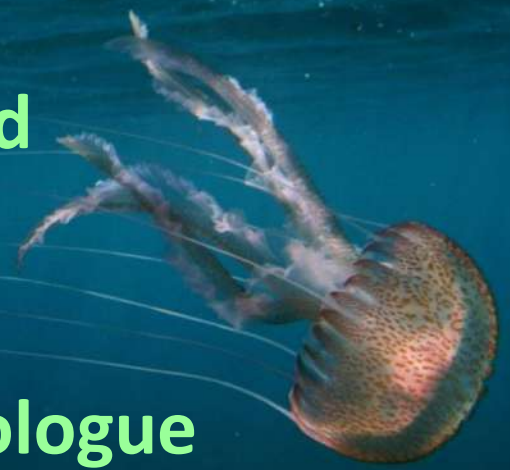
Communicating ocean acidification & climate change

"Research that isn't communicated to policy-makers and managers won't change anything"

Communicating ocean acidification & climate change

Importance of:

- **Interesting, understandable and relevant information**
- **Trust and credibility**
- **Interactive dialogue - not monologue**



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Importance of:

- Interesting, understandable and relevant information
- Trust and credibility
- Interactive dialogue - not monologue
- Sir David Attenborough (and ~£8m budget)
- Framing: context and values

Don't exaggerate – there's no need to!

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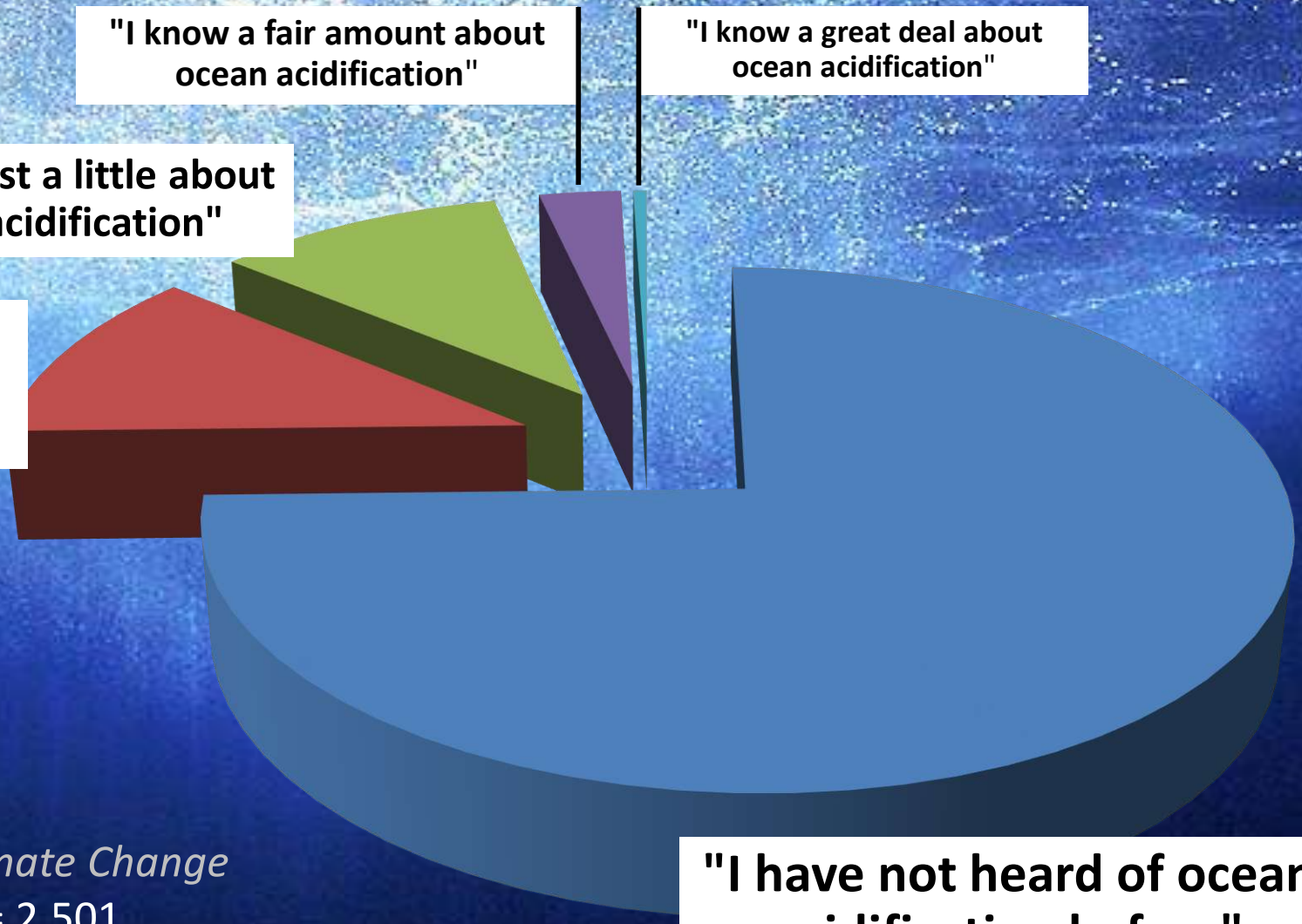
Importance of:

- **Interesting, understandable and relevant information**
- **Trust and credibility**
- **Interactive dialogue - not monologue**
- **Sir David Attenborough (and ~£8m budget)**
- **Framing: context and values**

Before Blue Planet 2

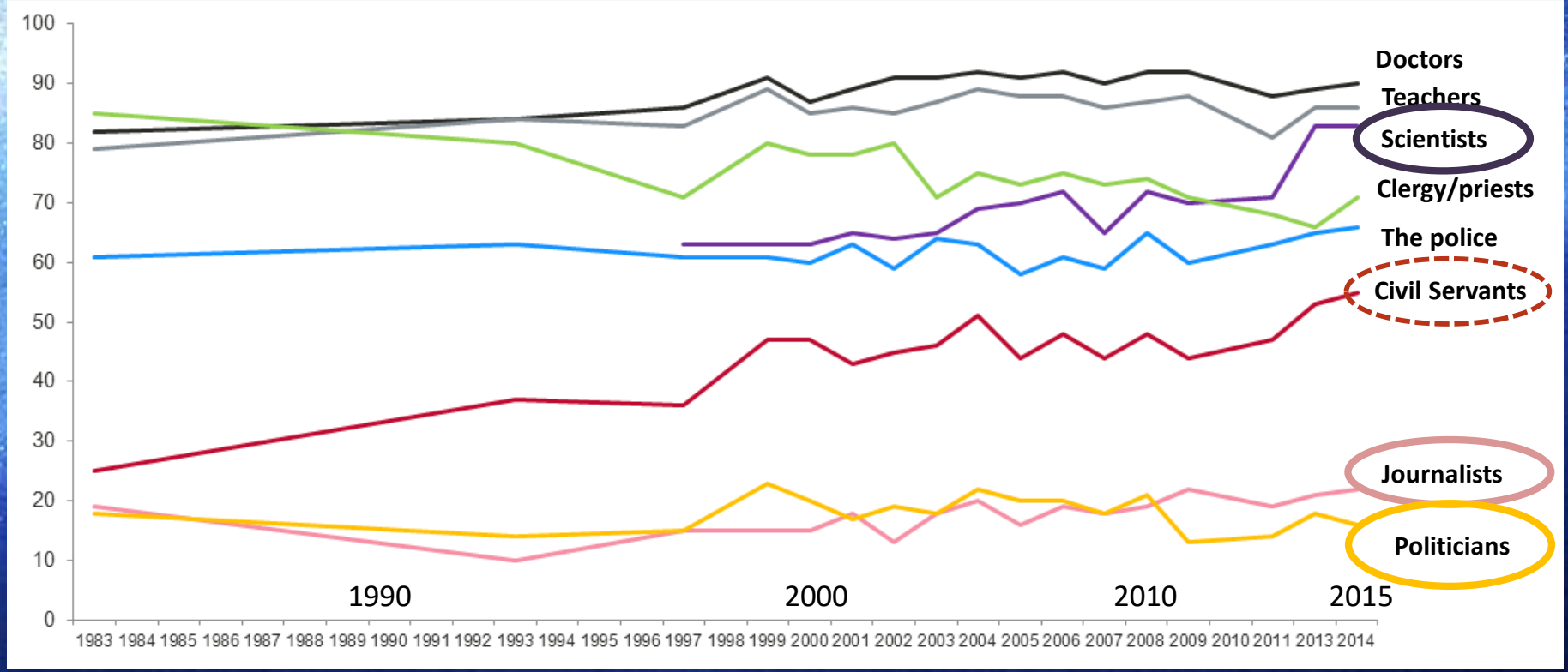


Capstick et al (2016) *Nature Climate Change*
UK survey in 2013 and 2014; n = 2,501

Trust and credibility

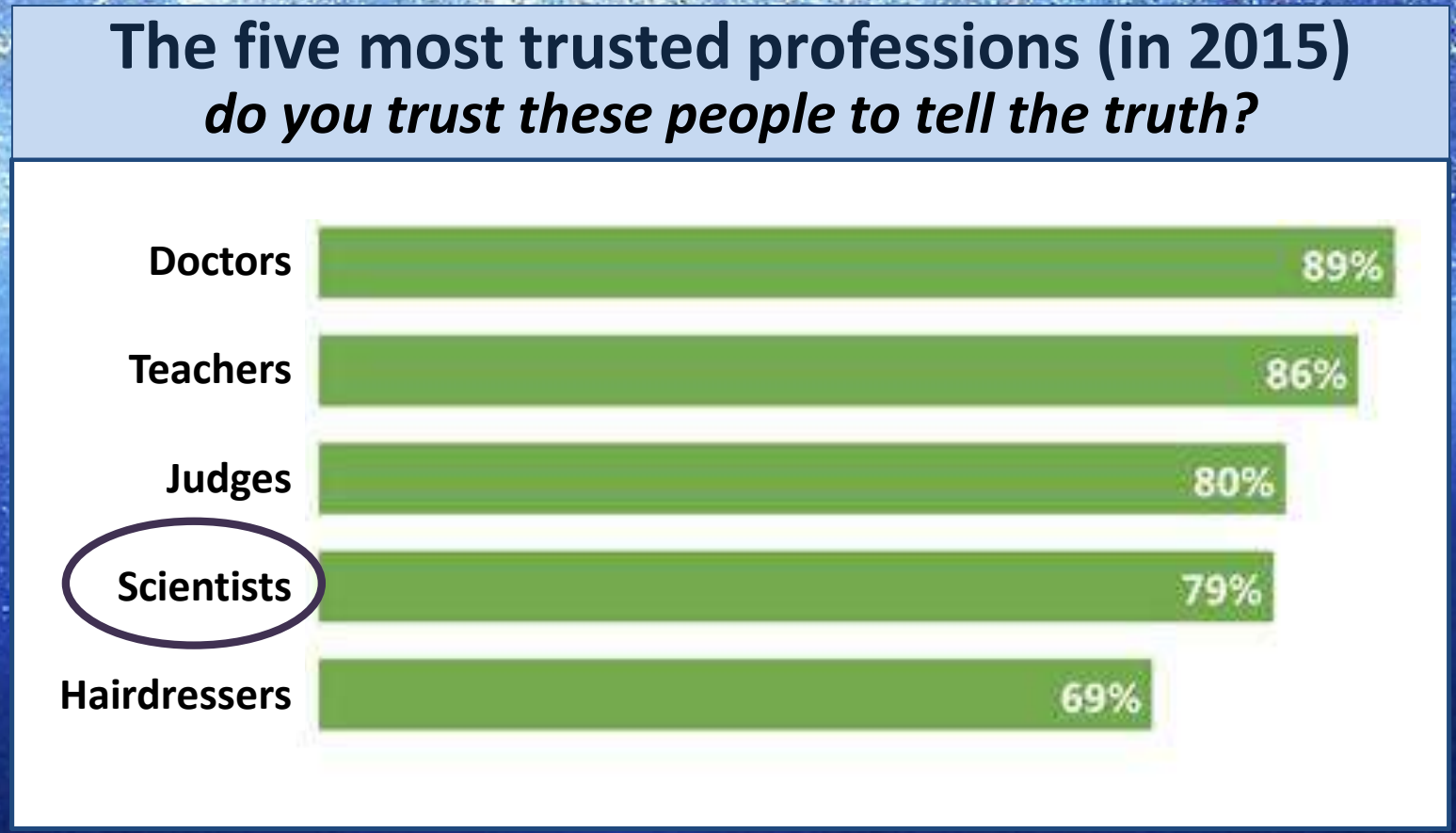
UK public surveys

do you trust these people to tell the truth?



Ipsos MORI (2016)

Trust and credibility



Ipsos MORI (2016)

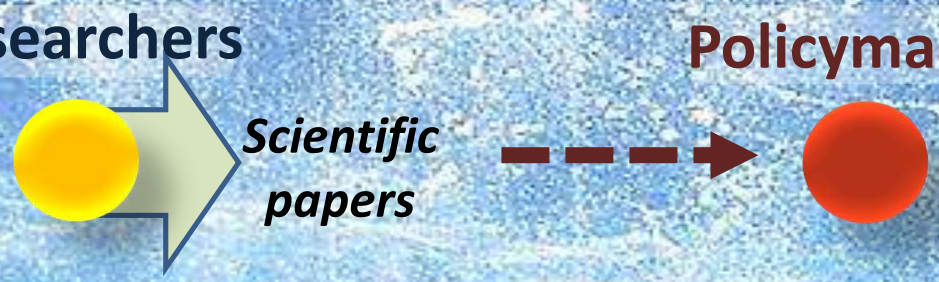
Trust and credibility

The five most trusted
do you trust these peop

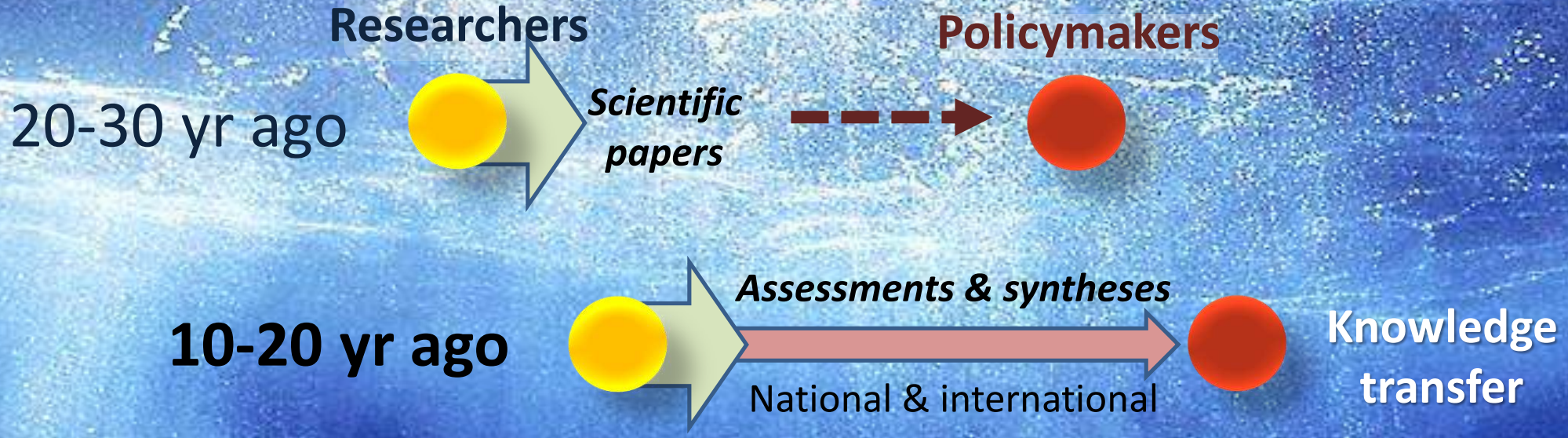
New opportunities for high impact publications!

Evolution of science-policy communications #1

20-30 yr ago

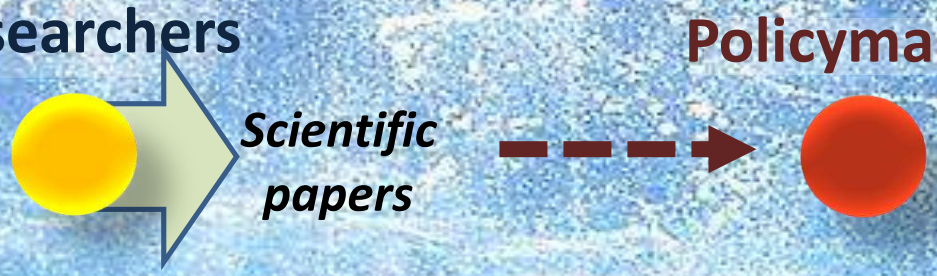


Evolution of science-policy communications #2



Evolution of science-policy communications #3

20-30 yr ago



10-20 yr ago

Knowledge transfer

Past decade

Science to society

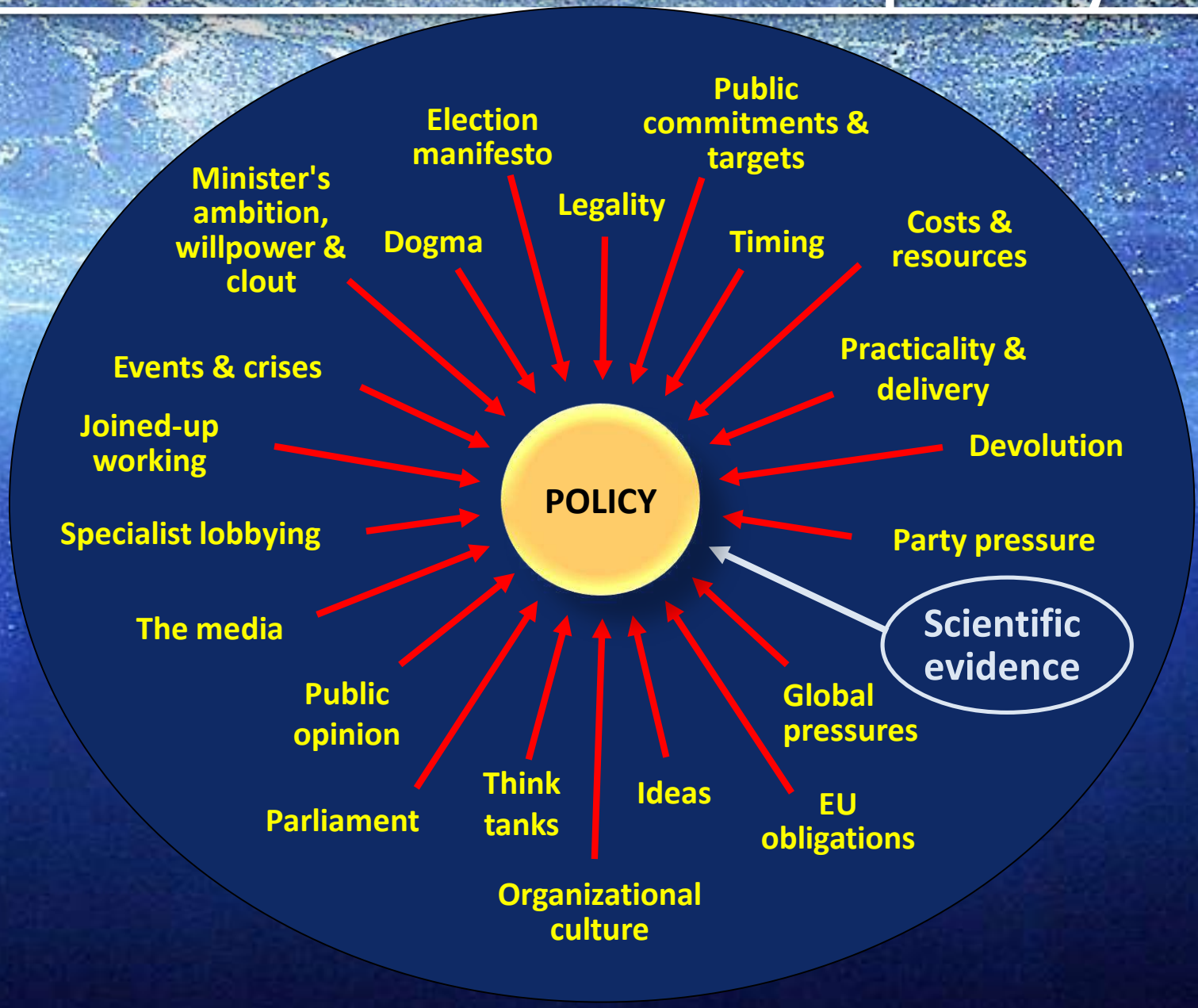
Knowledge exchange

Role of public, NGOs & other stakeholders

22 factors that influence UK policy decisions

After Larcombe 2006
(via Bob Earll)

22 factors that influence UK policy decisions



22 factors that influence UK policy decisions

Direct:
Science to policy

Marine evidence providers include:

- Defra staff & CSA (Ian Boyd)
- Cefas , MMO, JNCC , EA, EN, MS & SNH
- UKMMAS & its evidence groups
- MCCIP
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Only ~4% of current MPs have science degrees, and only 0.2% (= 1) has a science PhD. But that PhD holder happens to be a Defra Minister…

22 factors that influence UK policy decisions

Broadcast
- Television
- Radio

Print

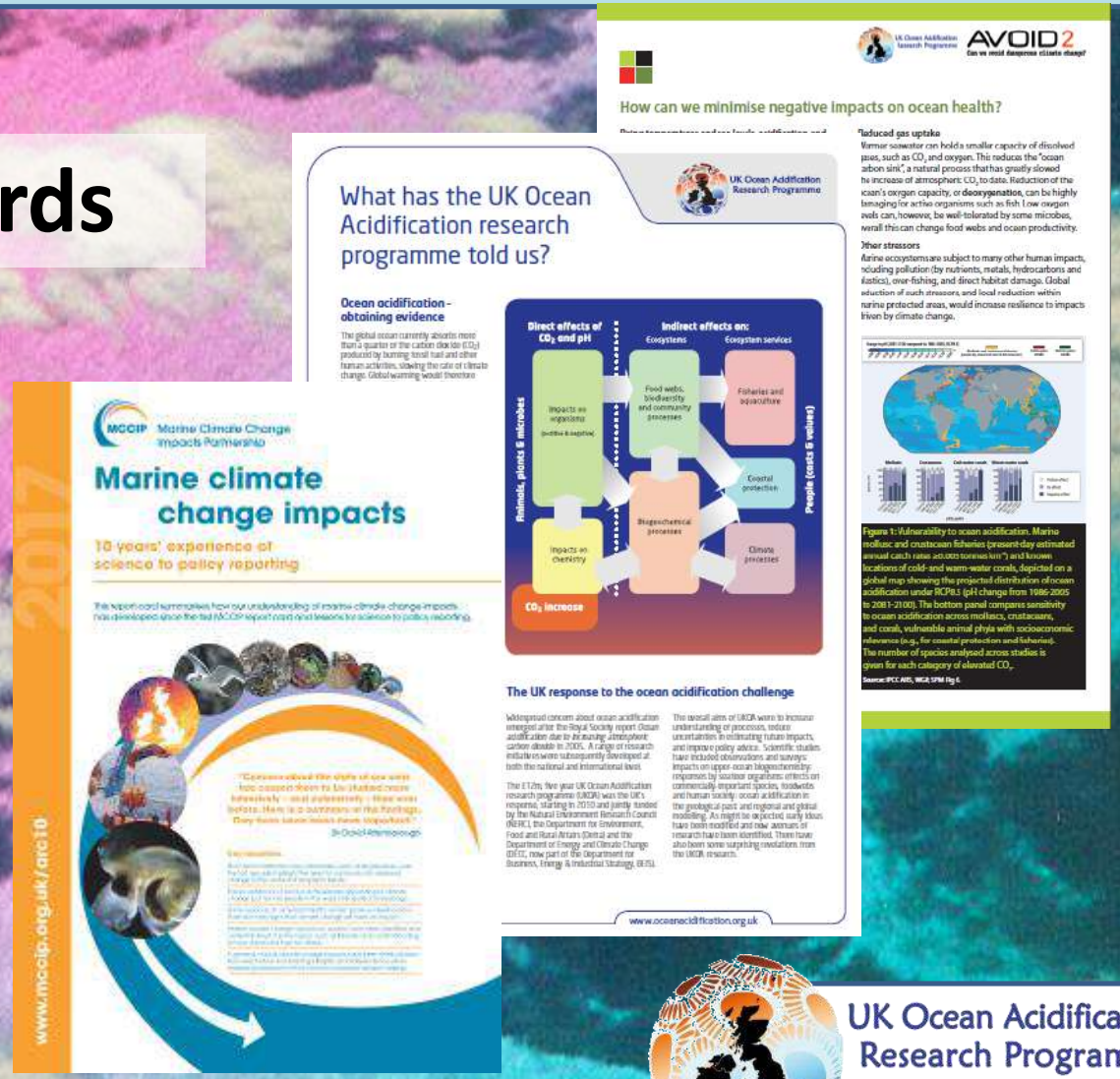
Online
- Websites
- Facebook
- Twitter

Indirect:

Science to society

The ocean acidification research community has actively engaged in communication, facilitated by national, regional and global programmes and coordination initiatives

- **UK briefings and policy cards**



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- **Inputs to wider assessments**

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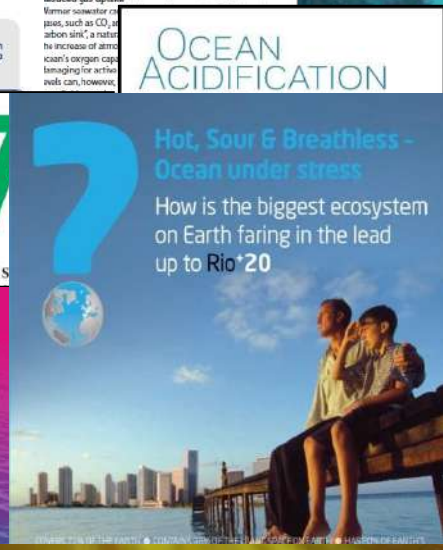
- **UN engagement**



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sometimes helped, and sometimes hindered, by the UK press

Daily Mail

The Oceans are DYING 2 July 2015

Are climate scientists doom-mongering? Bulk of research on impacts of ocean acidification is FLAWED, new study finds 6 August 2015

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"Ocean acidification is a terrifying threat… that will cause an almighty mass extinction, and turn our oceans into a barren zone of death"

"A pH reduction of up to 0.3 is beneficial, not damaging. Marine life has nothing to fear from ocean acidification"

James Delingpole

THE SPECTATOR

30 April 2016

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THE TIMES

Who's afraid of acid in the ocean? Not me

We keep being told this is a natural disaster – but scientists must come clean. It isn't

Matt Ridley

James Delingpole

THE SPECTATOR

30 April 2016

Misconceptions promoted by ocean acidification sceptics (deniers)

1. 'Acidification' is an alarmist misnomer: ocean pH will never fall below 7.0.

Scientific response:

- Acidification is like warming – a direction of travel (= fall in pH; increase in acidity)
- Many marine micro-habitats are < pH 7.0

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4. Many species will benefit, with no overall damage to ecosystems

Scientific response:

- Enhanced metabolic rate is a stress response, not a benefit
- 'Nuisance' species are more tolerant
- Ecosystem disruption inevitable

Biological responses are complicated …

Taxa	Response	Mean Effect
 Calcifying algae	Survival	
	Calcification	
	Growth	
	Photosynthesis	-28%
	Abundance	-80%
 Corals	Survival	
	Calcification	-32%
	Growth	
	Photosynthesis	
	Abundance	-47%
 Coccolithophores	Survival	
	Calcification	-23%
	Growth	
	Photosynthesis	
	Abundance	
 Molluscs	Survival	-34%
	Calcification	-40%
	Growth	-17%
	Development	-25%
	Abundance	
 Echinoderms	Survival	
	Calcification	
	Growth	-10%
	Development	-11%
	Abundance	

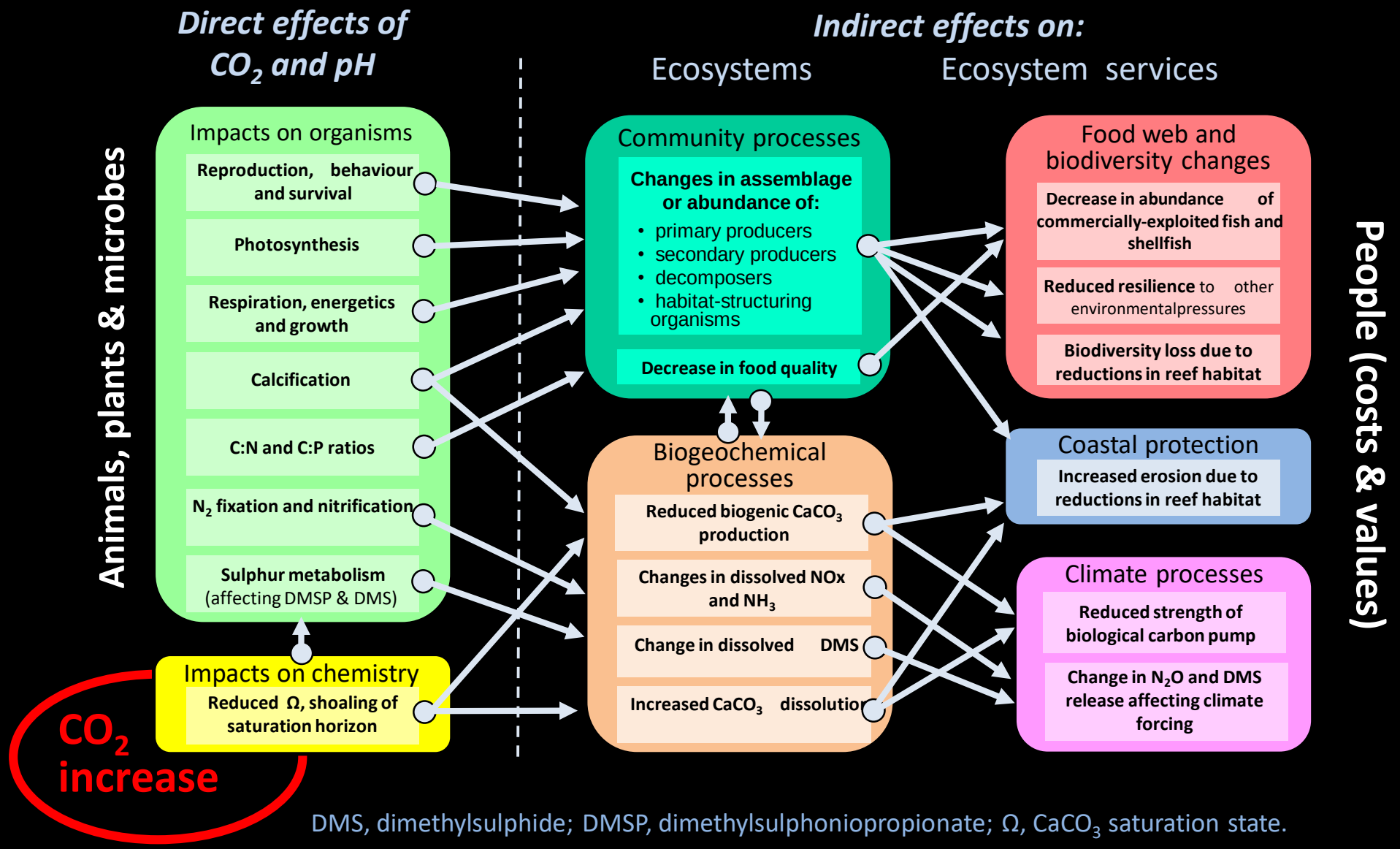
 Crustaceans	Survival	
	Calcification	
	Growth	
	Development	
	Abundance	
 Fish	Survival	
	Calcification	
	Growth	
	Development	
	Abundance	
 Fleshy algae	Survival	
	Calcification	
	Growth	+22%
	Photosynthesis	
	Abundance	
 Seagrasses	Survival	
	Calcification	
	Growth	
	Photosynthesis	
	Abundance	
 Diatoms	Survival	
	Calcification	
	Growth	+17%
	Photosynthesis	+12%
	Abundance	

- Not tested or too few studies
- Enhanced <25%
- 95% CI overlaps 0
- Reduced <25%
- Reduced >25%

Meta-analysis based on single-species studies

Kroeker et al. 2013

Biological responses are complicated …



DMS, dimethylsulphide; DMSP, dimethylsulphoniopropionate; Ω, $CaCO_3$ saturation state.

Williamson & Turley (2011), after Tyrrell

Responses to ocean acidification: **What can be done?**

Action		Specific activity
Address causes	***Mitigation***	• Reduce (to zero) global CO_2 emissions
	Remediation	• Remove CO_2 from the atmosphere: negative emissions
Address consequences	***Amelioration***	• Reduce other causes of low pH (e.g. eutrophication) • Reduce other stressors • Raise local pH by chemical means
	Adaptation	• Change fisheries to target less-affected species • Strengthen sea defences to allow for coral reef loss
Improve decision-making	***Monitoring***	• Determine global pH changes – and local/regional factors
	Risk assessment	• Improve scientific understanding and scenario projections
	Governance	• Integrate OA with other climate policies over range of scales

Williamson & Widdicombe(2018)

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Obvious linkage to climate change!

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Responses to climate change
What needs to be done?

To meet commitments of Paris Agreement and 'avoid dangerous climate change' (UNFCCC goals)

1. Stabilise CO_2 emissions
2. Reduce CO_2 emissions
3. Stop all CO_2 emissions
4. Remove CO_2 from the atmosphere

Quiz time!

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"keeping tap full on when bath overflowing…"

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Almost certainly needed to limit global warming to 1.5-2.0°C

Quiz time!

Thank you for your attention!

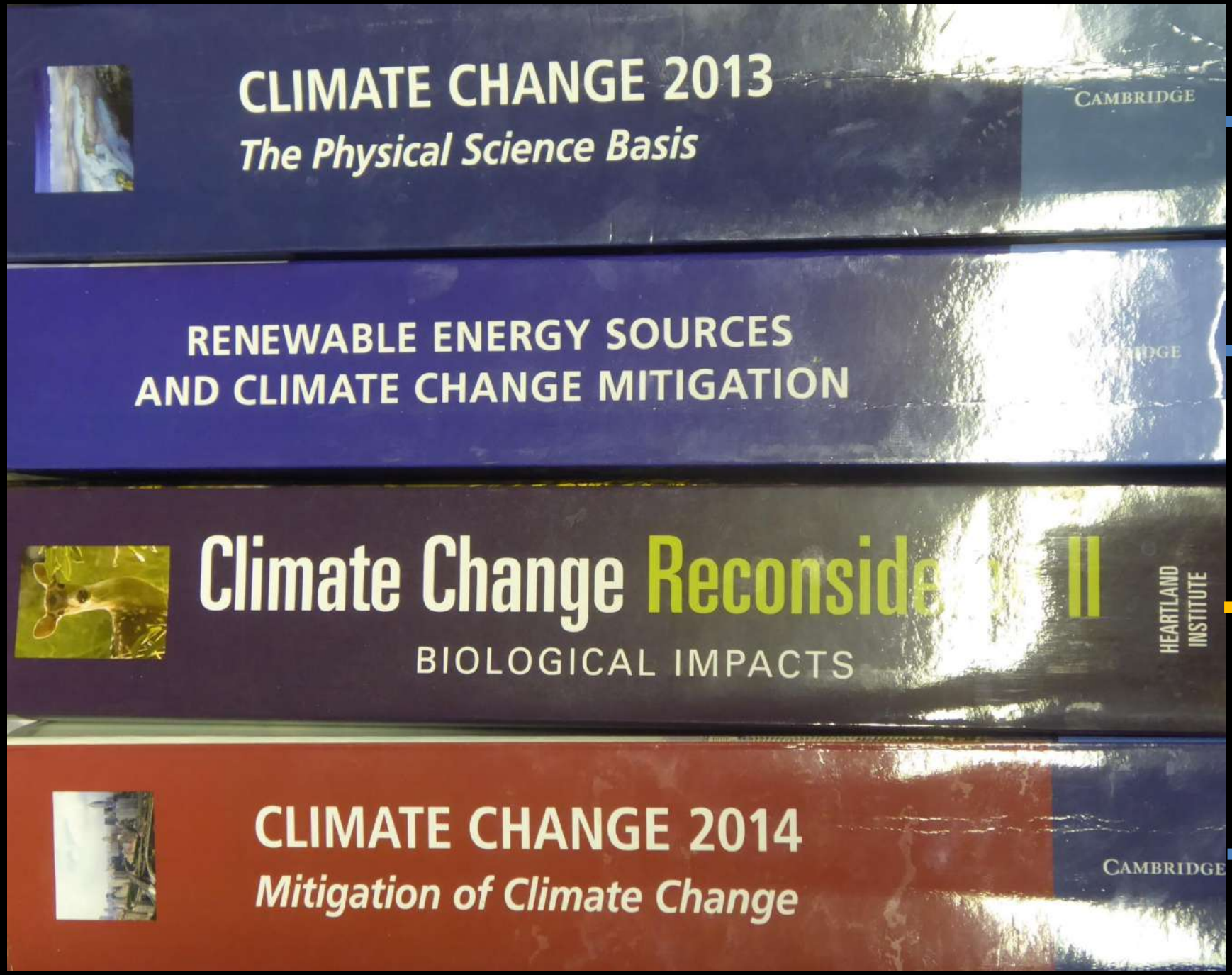
p.williamson @uea.ac.uk

NERC SCIENCE OF THE ENVIRONMENT

UK Ocean Acidification Research Programme

University of East Anglia

The UK Ocean Acidification research programme (2010-15) was co-funded by NERC, Defra and DECC



IPCC:
Intergovernmental Panel on Climate Change

NIPCC:
Nongovernmental International Panel on Climate Change

Fake science!