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**Sam Dupont**

Researcher, Associate Professor  
University of Gothenburg



SUREAQUA

**Opening Symposium**

**September 25-26**

**Stavanger, Norway**

**We are  
the ocean**





*Growth*





# *Consequences*





# *Innovation*






# *Solutions*



A man with short brown hair, wearing a red polo shirt, is smiling slightly and looking towards the camera. He is standing in front of a large bookshelf filled with books and various items. The lighting is warm and focused on him.

**KEN CALDEIRA**  
on *Inquiring Minds*

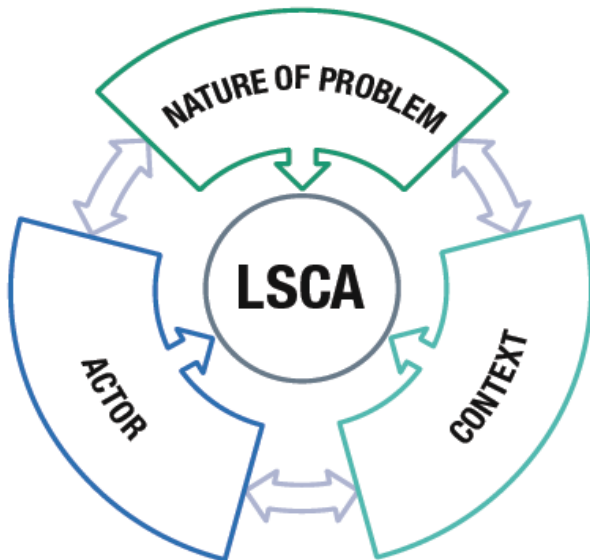
“People have to sacrifice a little bit of their short term self interest to help the world be a better place for the long term. And how you get people to do that, I think, is the most important research that can be done.”

 @inquiringshow



A close-up photograph of several ants, likely red ants, interacting. The ants are shown in various orientations, with some appearing to be in contact or communicating. The background is a solid, muted green color. The text "Collective actions" is overlaid in a white, italicized serif font in the upper right quadrant of the image.

*Collective actions*



## Social dilemma:

Action, acceptance and compliance linked to psychological factors, values, beliefs, norms, policy-specific beliefs, freedom, fairness, effectiveness, personal outcome, trust and reciprocity, etc.





# A failure to communicate



Tim Minchin

*The idea that (...) the science of anthropogenic global warming is controversial is a powerful indicator of the extent of our failure to communicate.*



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# A failure to communicate?

*Scientists can be  
poor  
communicators...*

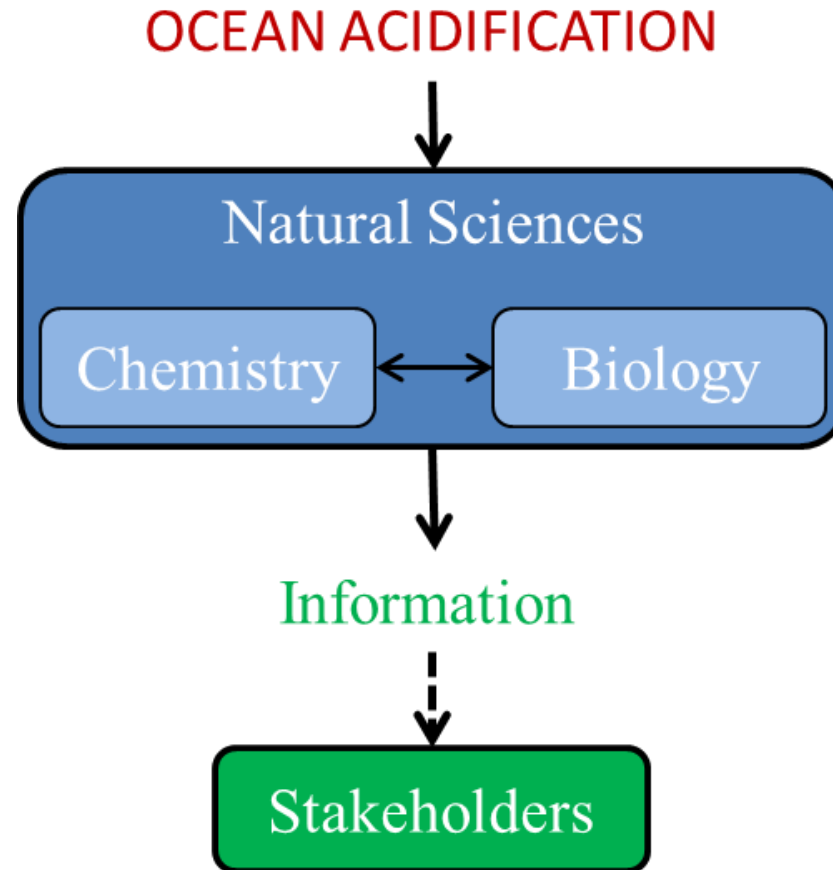


*... and nerds*



# Efficient communication...

## ... a need for a new strategy



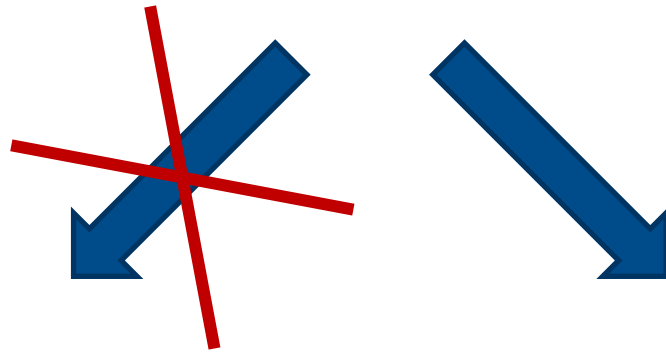
*Science supply paradigm*

# Efficient communication...

... a need for a new strategy

*Information*

[e.g. Global changes]



*Needed Change*

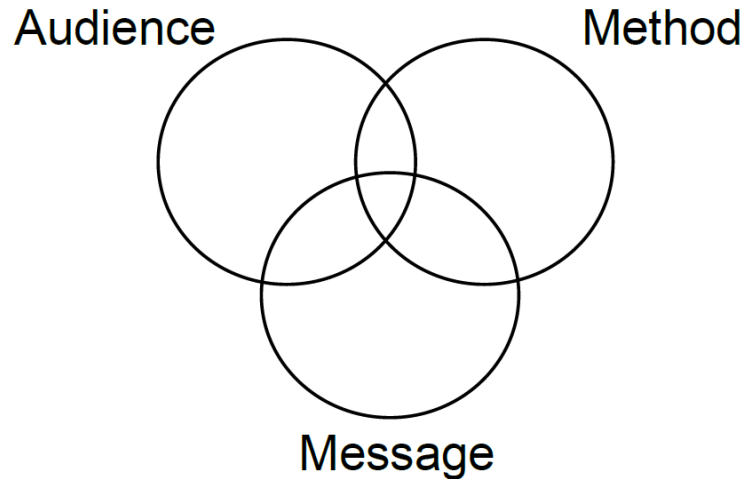
[e.g. cut carbon dioxide emission]

*More polarization*



# Efficient communication $\neq$ more information

- ✓ Information targetting the audience and the goal



# 1. The audience

- ✓ Different cultures / languages
- ✓ Different needs

Need to build some mutual understanding and trust



Kids



Scientists



Economists



Policy makers



Citizens



Journalists





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# What does a journalist want?

THE SACRAMENTO BEE sacbee. **Oysters at Risk From Ocean Acidification, as Are Farmer Livelihoods | Commentary**  
 By Margaret Pilaro Barrette and Bob Rheault  
 Sept. 9, 2013, 4:16 p.m.

**Viewpoints: Ocean acidification threatens California**  
 By Terry S. ...  
 Special to **BOISE STATE PUBLIC RADIO**  
 With Climate Change, No Harm ...

Originally published on Fri June 14, 2013 2:13 ...

**NewScientist** **Environment**  
 difying sea ...

**ROLL CALL**  
 THE SOURCE FOR ...

**Ocean Acidification: Oysters as the New Canary in the W&T SEAFOOD**

**STORIAN**  
 ... acidification alters Pacific ...

**Coal Mine**  
 Posted by **Crystal Cun** on August 10, 2012

**Ocean Acidification Eats Oysters**  
 Hits Home at Bill Dewey's Dabob Bay Farm

Oysters may struggle to build shells as carbon dioxide rises  
 Ocean acidification could hamper larvae's growth

Wednesday, March 13, 2013  
 by **MATT KETTMANN (CONTACT)**



## Stories

# What does a policy maker want?

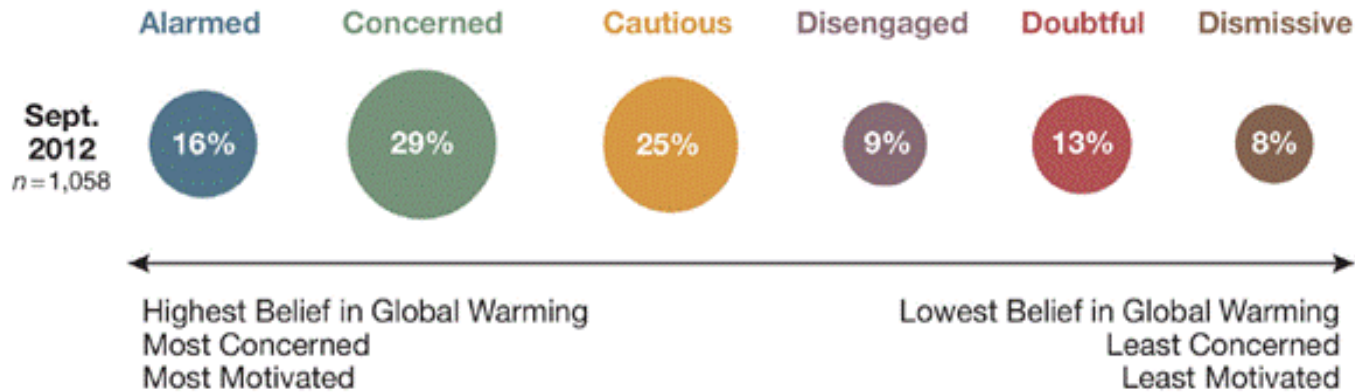


Solutions... to take decisions





# What is a citizen?



(6 Americas)



## 2. The method

- ✓ Formal education
- ✓ Informal education / Outreach / Communication
  - ✓ Scientific literature
  - ✓ Talks
  - ✓ Meetings
  - ✓ Internet / Social Medias
  - ✓ Press
  - ✓ Art
  - ✓ Documents
  - ✓ Ambassadors
  - ✓ etc.

**Need to be  
adaptated to your  
audience !**



# 3. The message

- ✓ Simple
- ✓ Adapted to the audience
- ✓ Accurate (no over-simplification)

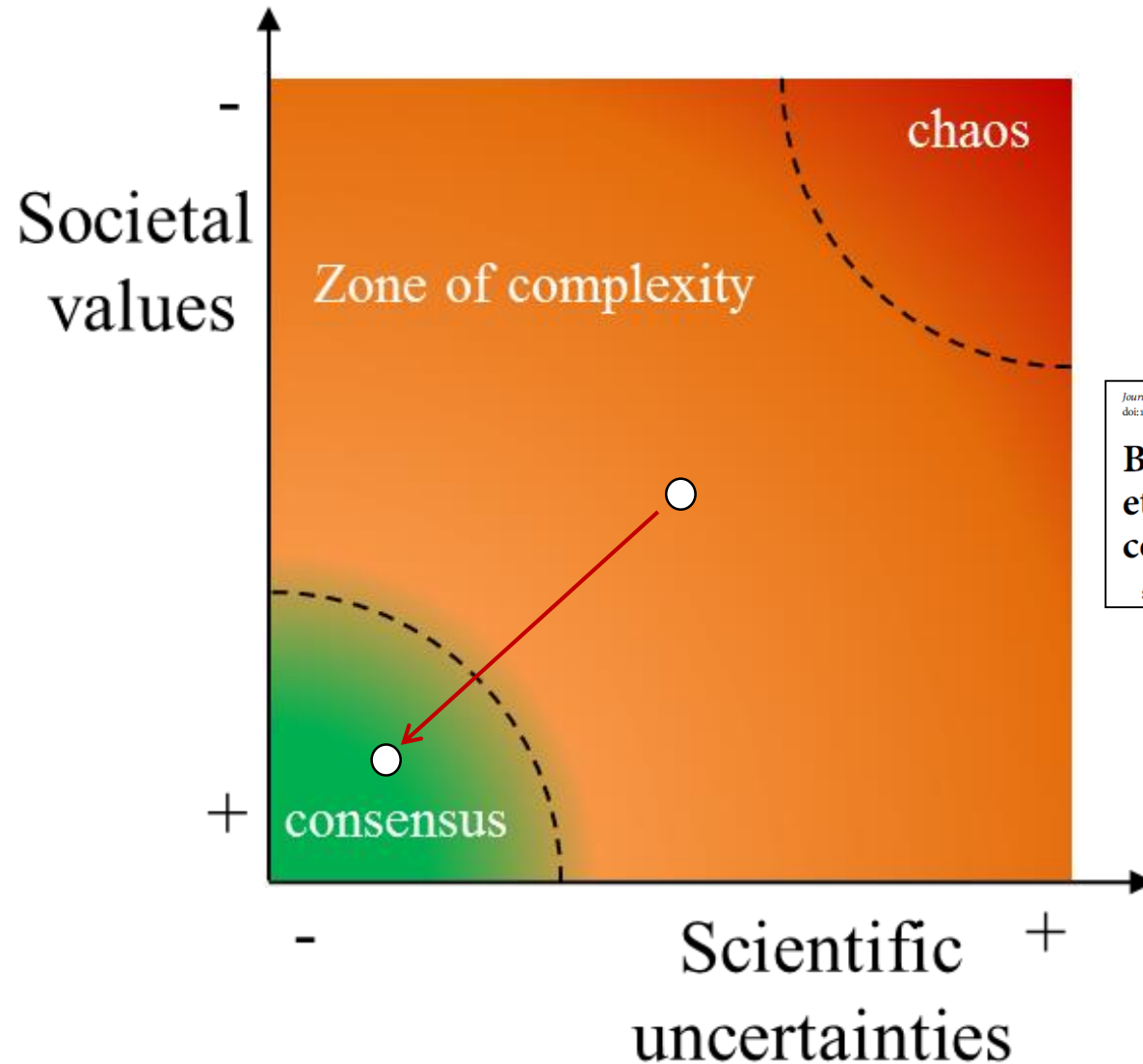


RESEARCH ARTICLE

Simple Messages Help Set the Record  
Straight about Scientific Agreement on  
Human-Caused Climate Change: The Results  
of Two Experiments

Teresa A. Myers<sup>1</sup>, Edward Maibach<sup>1\*</sup>, Ellen Peters<sup>2</sup>, Anthony Leiserowitz<sup>3</sup>

# E.g. citizens - Focus on values



Journal of the Marine Biological Association of the United Kingdom, page 1 of 2. © Marine Biological Association of the United Kingdom, 2015  
doi:10.1017/S0025315415000193

**Bird is the word – on the importance of ethical and effective scientific communication**

SAM DUPONT<sup>1</sup>, GREGORY PUNCHER<sup>2</sup> AND PIERO CALOSI<sup>3</sup>





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# E.g. Citizens - Connect with the issue through physical experience



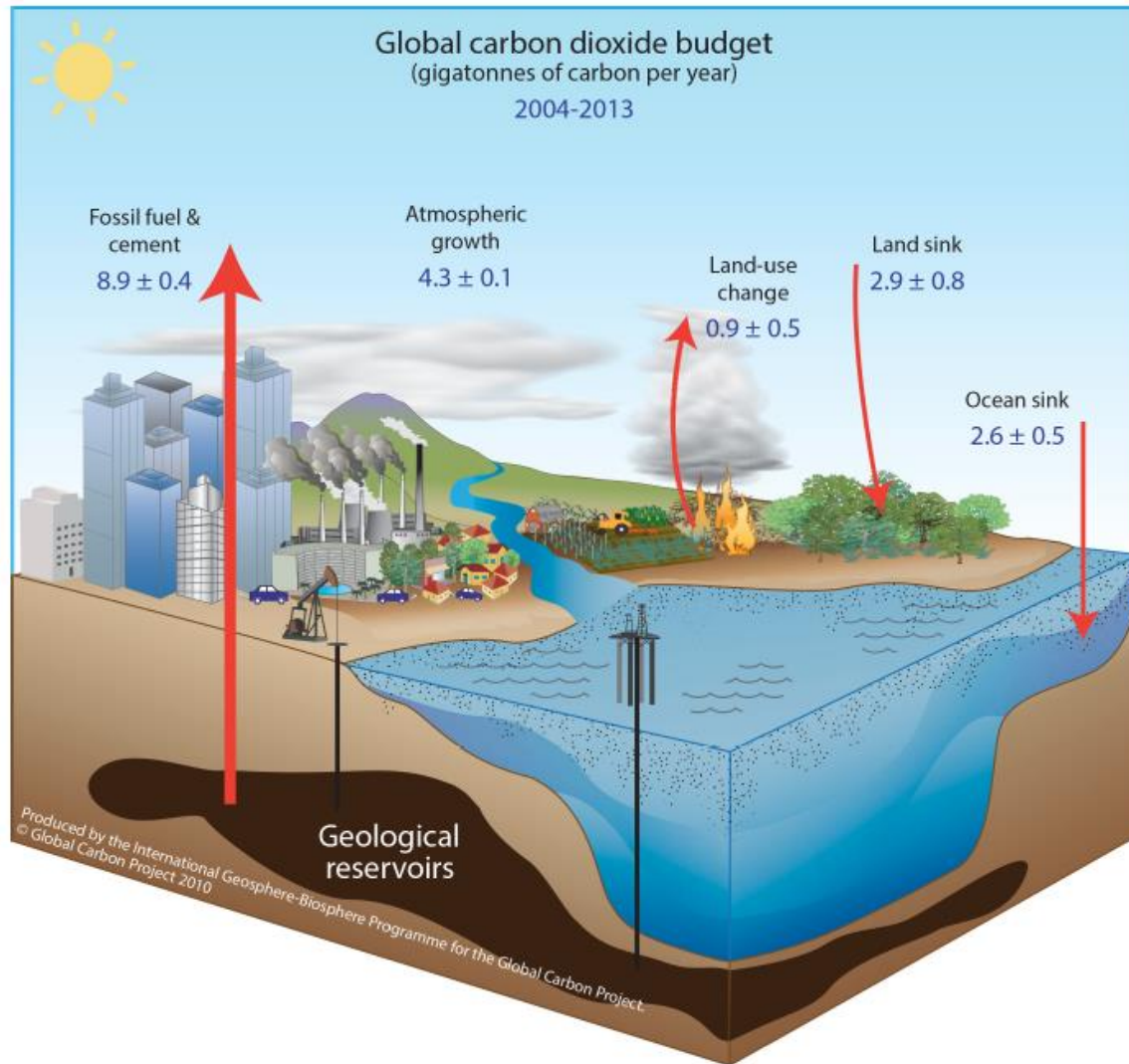
Journal of the Marine Biological Association of the United Kingdom, page 1 of 3. © Marine Biological Association of the United Kingdom, 2017  
doi:10.1017/S0025315417000576

EDITORIAL

***I am the Ocean*** – arts and sciences to move  
from ocean literacy to passion for the ocean



# We are producing CO<sub>2</sub>



Global  
emissions of C:  
10-11 Gt / year





# Not without consequences



Global warming

Catastrophic events

Ice melting

Sea level rise

Hypoxia

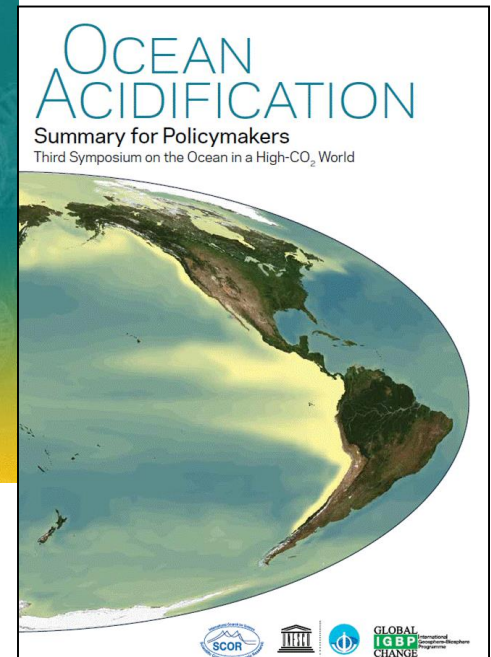
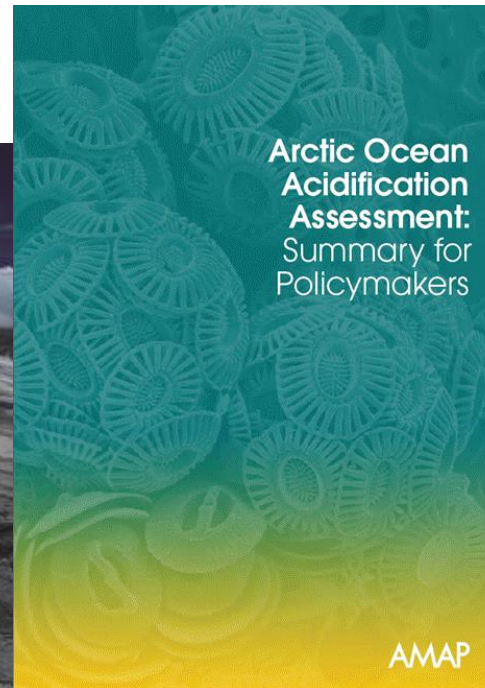
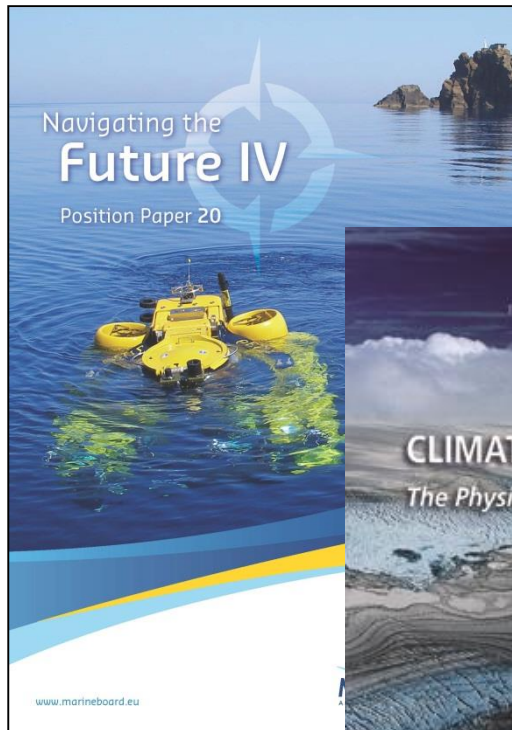
Salinity changes

Ocean acidification



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# Scientists are “virtually certain” that ocean acidification will lead to dramatic consequences







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# We know what to do



CO<sub>2</sub> emissions

Mitigation



Adaptation



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# #1 Bohuslan seafood



Hypothesis: By targetting values, we'll attract more attention





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# Can you taste ocean acidification (make invisible visible)







# Yes, you can

*Journal of Shellfish Research*, Vol. 33, No. 3, 857–861, 2014.

## FIRST EVIDENCE OF ALTERED SENSORY QUALITY IN A SHELLFISH EXPOSED TO DECREASED pH RELEVANT TO OCEAN ACIDIFICATION

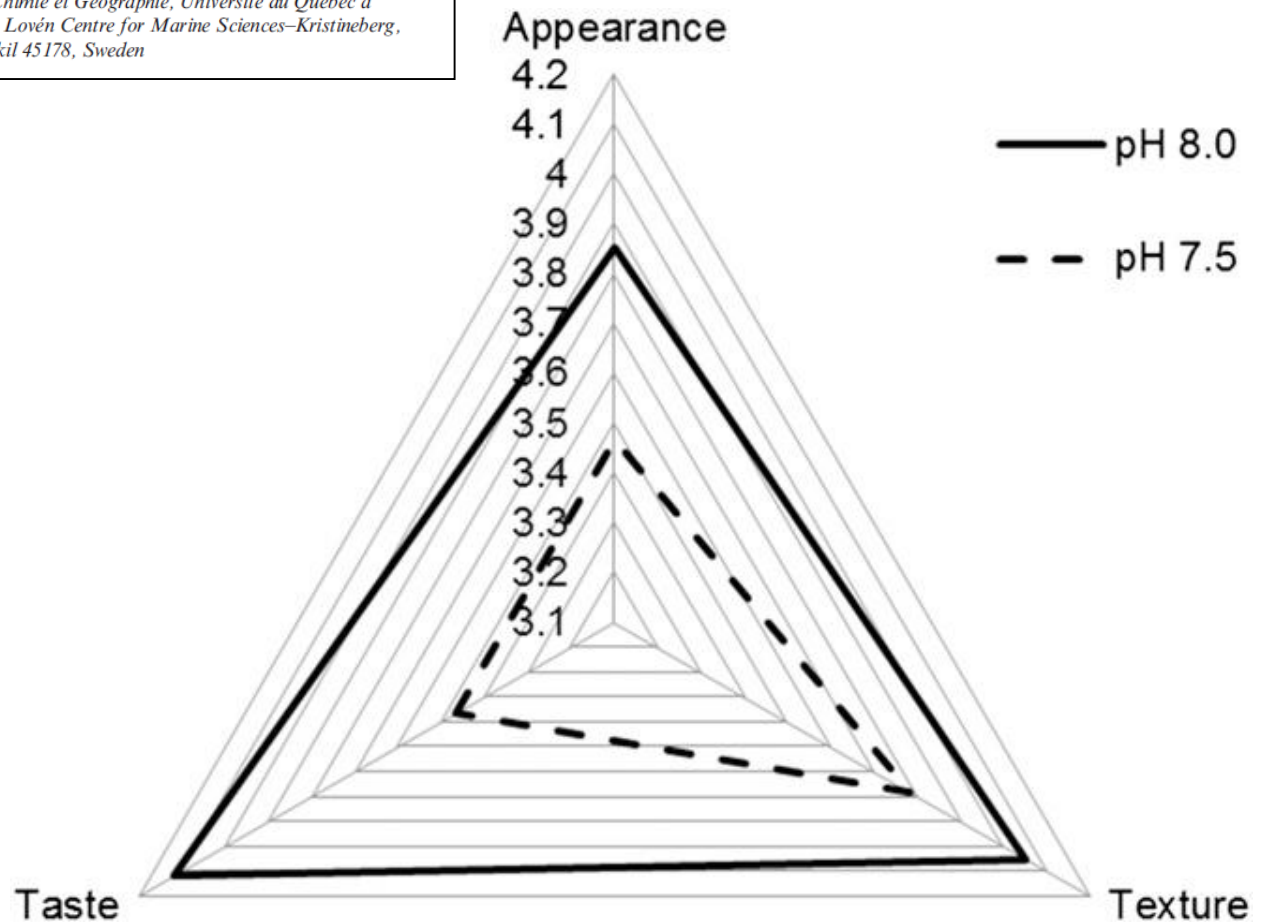
SAM DUPONT,<sup>1\*</sup> EMILIE HALL,<sup>2</sup> PIERO CALOSI<sup>2,3</sup> AND BENGT LUNDVE<sup>4</sup>

<sup>1</sup>Department of Biological and Environmental Sciences, University of Gothenburg, 566 Kristineberg, Fiskebäckskil 45178, Sweden;

<sup>2</sup>School of Marine Science and Engineering, Plymouth University, Plymouth PL4 8AA, UK;

<sup>3</sup>Département de Biologie, Chimie et Géographie, Université du Québec à Rimouski, Rimouski QC G5L 3A1, Canada;

<sup>4</sup>The Sven Lovén Centre for Marine Sciences–Kristineberg, University of Gothenburg, 566 Kristineberg, Fiskebäckskil 45178, Sweden



## Ocean acidification can alter the taste of shrimps



*“Ocean acidification is often referred as the silent storm because you can’t see it, you can’t hear it, and you can’t smell it, but our research suggests that you just may be able to taste it.”*

COMPASS



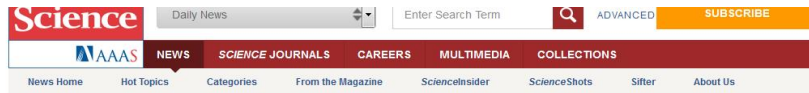
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# Scientific impact



News > Climate > Less tasty shrimp, thanks to climate change

## SCIENCE SHOT



DEZIDOR/WIKIMEDIA/CREATIVE COMMONS

### Less tasty shrimp, thanks to climate change

Tweet 203 Share 3.4k 8+1 17



By Puneet Kollipara | 19 December 2014 4:45 pm | 91 Comments

Climate change won't just harm marine life—it could also affect how it tastes. A new study finds that as oceans become more acidic—thanks

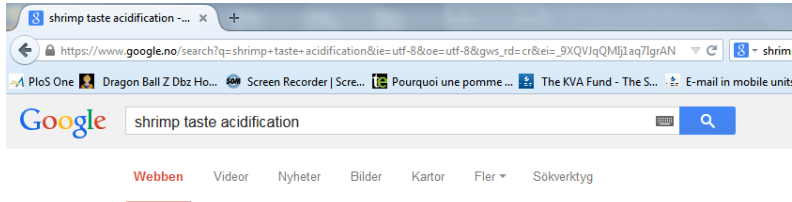


Stimulate research:

- China
- USA
- Chile
- etc



# Popular impact



Ungefär 87 100 resultat (0,39 sekunder)

**Ocean acidification can alter the taste of shrimps** - University ...  
[science.gu.se/.../ocean-acidification-can-alter-the-t...](#) - Översätt den här sidan  
 Ocean acidification can alter the taste of shrimps. News: Dec 29, 2014. A recent scientific study published in the Journal of Shellfish Research demonstrates that ...

**Study shows rising ocean acidification likely to cause shrimp ...**  
[phys.org > Biology > Ecology > Översätt den här sidan](#)  
 ★★★★★ Betyg: 3,7 - 14 röster  
 23 dec. 2014 - All of the **shrimp** were cooked by professional chefs and fed to volunteer **shrimp** lovers who rated the **shrimp** on how well they **tasted**.

**Ocean acidification affects the flavour of shellfish, study ...**  
[www.dailymail.co.uk/.../Climate-change-leave-pra...](#) - Översätt den här sidan  
 22 dec. 2014 - Climate change will leave a sour **taste** in our mouths - literally: Study ...  
 Biologists put **shrimp** into tanks of sea water with pH 8 and pH 7.5 levels ...

**Tasting Ocean Acidification | Ocean Currents**  
[blog.oceanconservancy.org/.../tasting-ocean-acidif...](#) - Översätt den här sidan  
 15 jan. 2015 - Ocean acidification didn't affect texture at all, but it significantly hurt the **shrimps'** appearance and **taste** scores. **Shrimp** raised under regular ...

**bad-tasting shrimp** - Los Angeles Times  
[www.latimes.com/.../la-fi-mh-badtasting-shrimo-2...](#) - Översätt den här sidan

Los Angeles Times

LA VANGUARDIA

NRK

## Через сто лет креветки станут невкусными

текст: Анна Геворова/Info.ua опубликовано: 22 дек '14 17:52



Группа ученых из Великобритании, Канады и Швеции пришла к выводу, что в будущем (к 2100 году) креветки станут менее вкусными. Причиной ухудшения их вкусовых качеств, считают авторы, станет глобальное потепление климата и повышение уровня кислотности Мирового океана.

科学网  
 生命科学 | 医学科学 | 化学科学 | 材料科学 | 信息科学 | 地球科学 | 能源科学 | 环境科学 | 交叉科学 | 综合科学 | 人文科学 | 社会科学 | 艺术科学 | 其他科学

首页 | 新闻 | 博客 | 群组 | 院士 | 人才 | 会议 | 论文 | 基金 | 科普 | 小白

作者: Sean Dupont 来源: 《贝类研究杂志》 发布时间: 2015/1/8 24:41:19 选择字号: 大 中 小

气候变化让虾美味受限



气候变化不只会损害海洋生物的生活,还会影响它们的味道。一项新的研究发现,由于海洋会吸收二氧化碳,海洋酸度在不断增加,从而导致了海鲜味道变酸。研究人员把数百只中国毛蚶(Pandanus borealis,如图)放入目前的酸度(pH值为8)或预报的2100年海洋酸度(pH值为7.6)的海水容器中。水温为11摄氏度,这是海鲜正常情况下可以适应的高温段。



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# Evaluating the engagement



Values and physical connection leads to real changes

# #2 I am the ocean

**Henrik Wallgren** är musiker, allkonstnär och äventyrare. Han arbetar med musik, film, teater, som författare, tidningskrönikör med mera. Henrik har samarbetat med TILLT kring en rad olika utvecklingsprojekt av olika längd och innehåll.

**Sam Dupont** är forskare vid Institutionen för biologi och miljövetenskap vid Göteborgs Universitet. Han forskar framför allt på den ökade mänskliga aktiviteten på de marina ekosystemen.



Henrik Wallgren



Sam Dupont

**No limit:  
think out of the box**





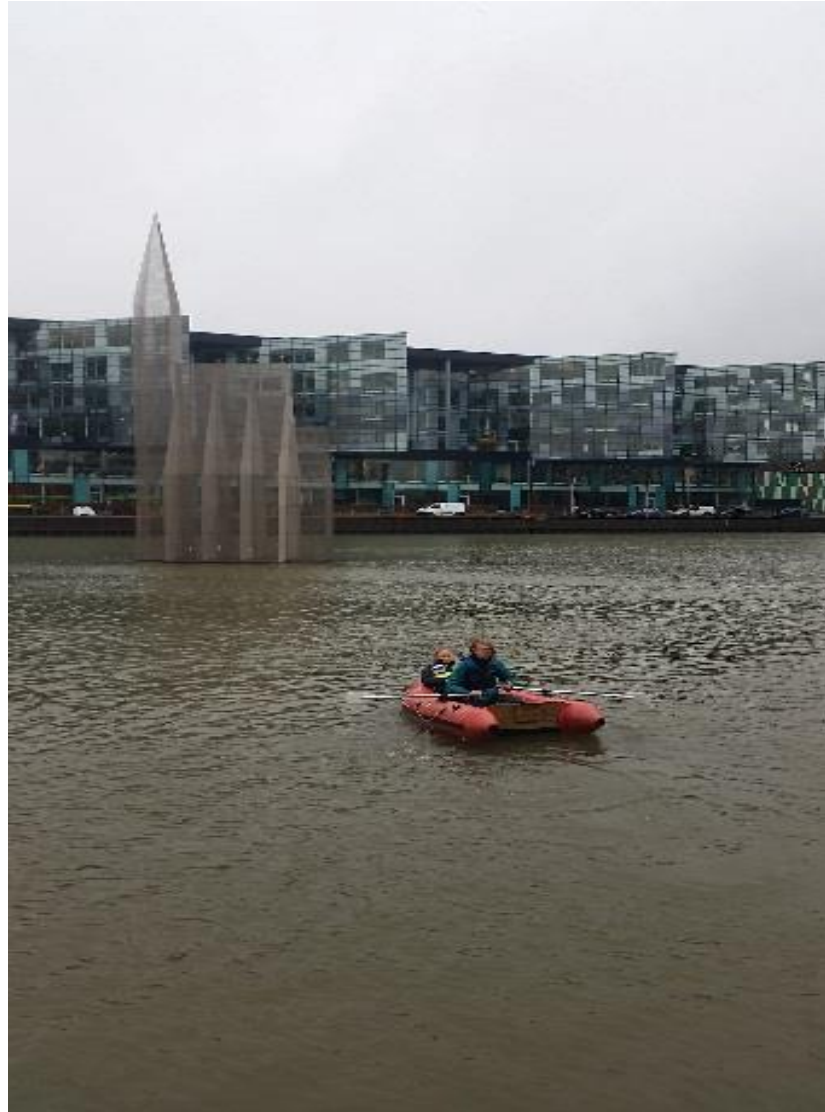
# Magic and the blue pill





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# Fish for ideas



<https://www.youtube.com/watch?v=n3jcbcUG3LA>





*Knowledge and Solutions for Sustainable and Resilient  
Aquatic Production*



**Four Themes:**

- Technology and biorefinery
- Environmental quality and sustainability
- Social and economic sustainability
- Governance and communication

**Partners and Affiliations**

- 13 Research partners
- 16 Industry partners
- 10 Further Affiliations



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# *Interesting and challenging times...*



**KEN CALDEIRA**  
on *Inquiring Minds*

"People have to sacrifice a little bit of their short term self interest to help the world be a better place for the long term. And how you get people to do that, I think, is the most important research that can be done."

@inquiringshow

# *... but change is possible*

A black and white photograph of Keith Richards. He is wearing a light-colored, long-sleeved button-down shirt with a dark collar. He has a dark headband wrapped around his head. He is looking down and to the right, holding a lit cigarette in his right hand near his mouth. He has a serious expression. The background is dark.

**WE NEED TO START WORRYING ABOUT WHAT KIND OF  
WORLD WE ARE GOING TO LEAVE FOR KEITH RICHARDS**