

Science for the environment

**Biodiversity in an uncertain
future**

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EASY READING SERIES

THE LOSS OF THE S.S. TITANIC

Its Story and Its Lessons



BY
LAWRENCE BEESLEY

Forgotten Books

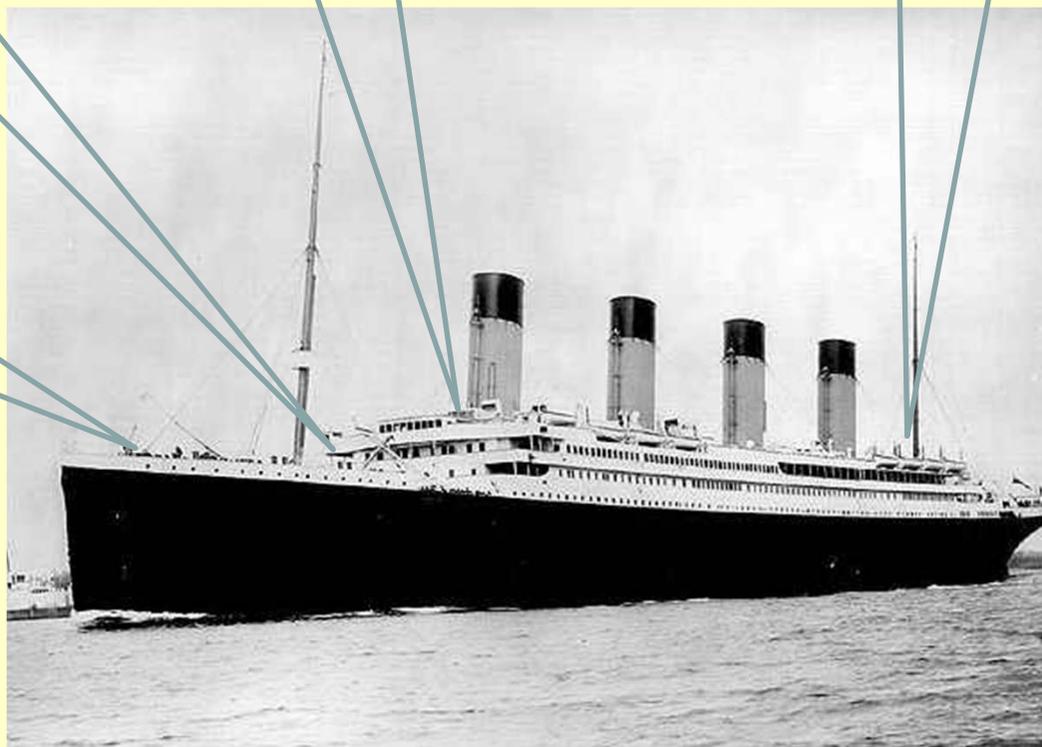


Do we know where we are going?

Are we working effectively?

Have we shared the lessons?

What is on the horizon?



Are we on the bridge or in the gym?

Ecologists

**Practitioners
and policy
makers**

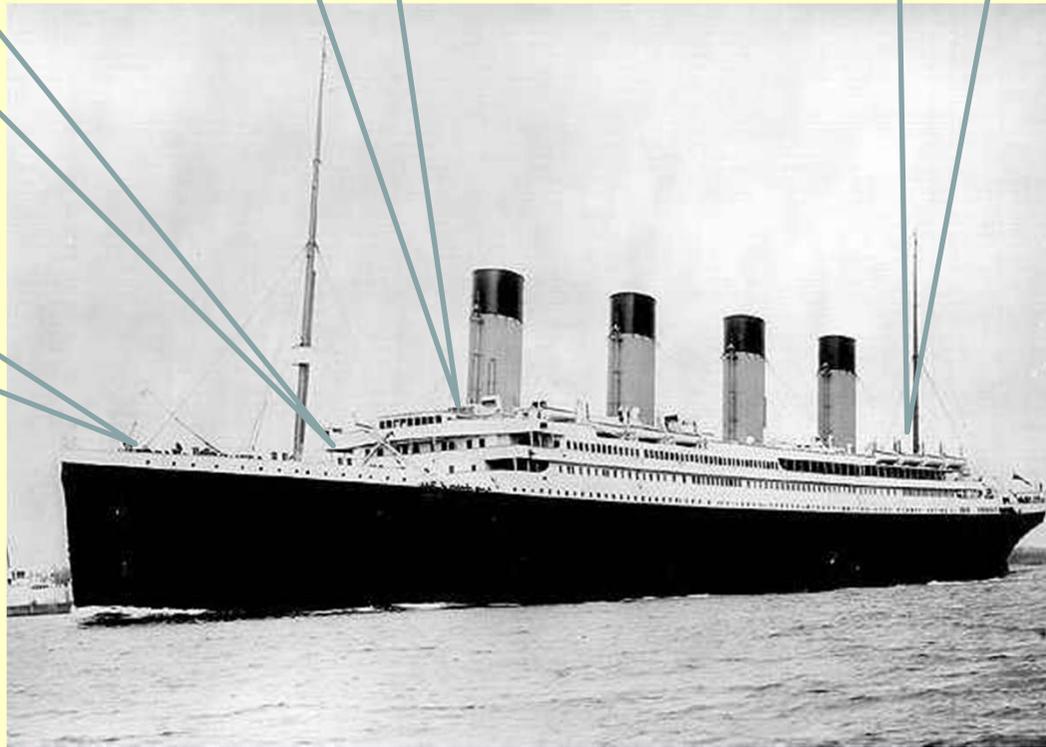


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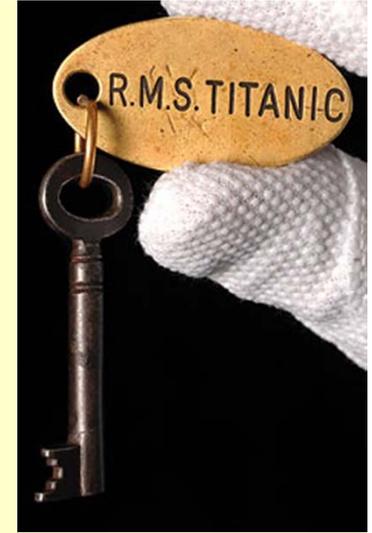
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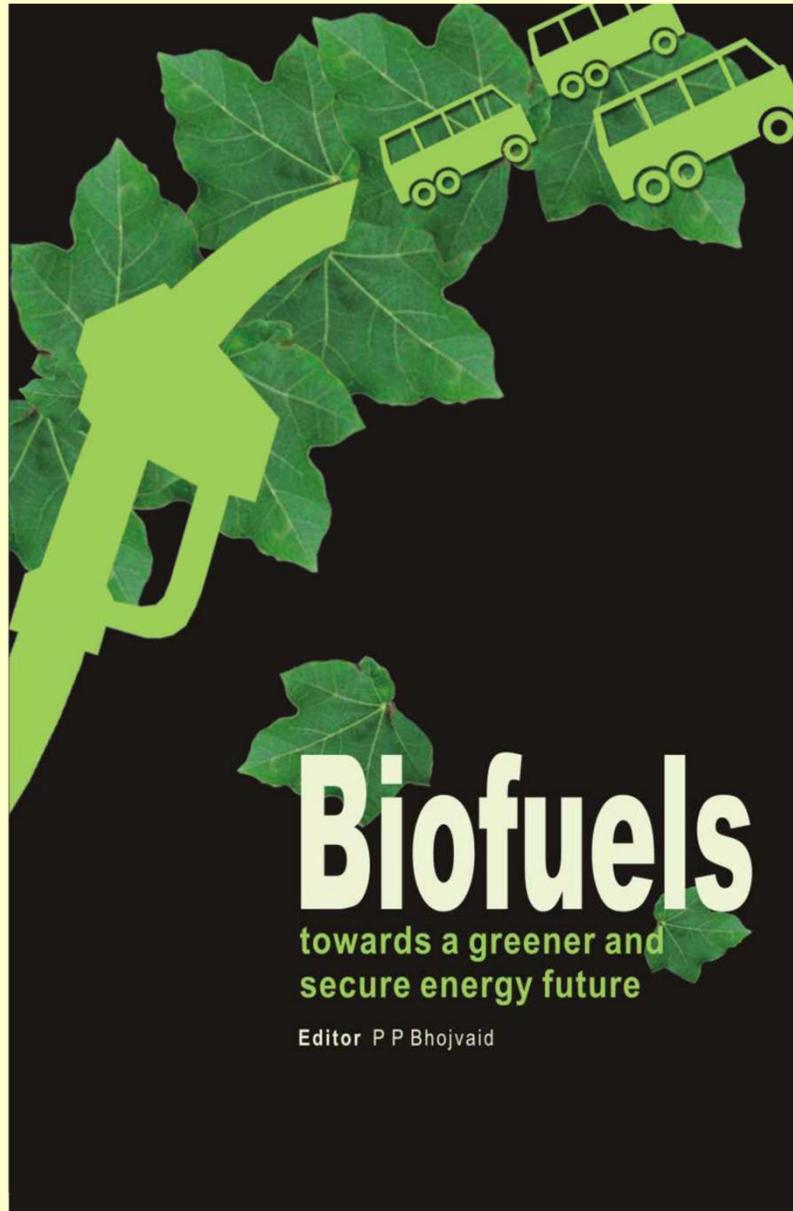
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- Senator Smith, chair of the inquiry "Suppose you had glasses ... could you have seen this black object [the iceberg] at a greater distance?"
- Fleet : "We could have seen it a bit sooner."
- Smith "How much sooner?",
- Fleet "Well, enough to get out of the way."



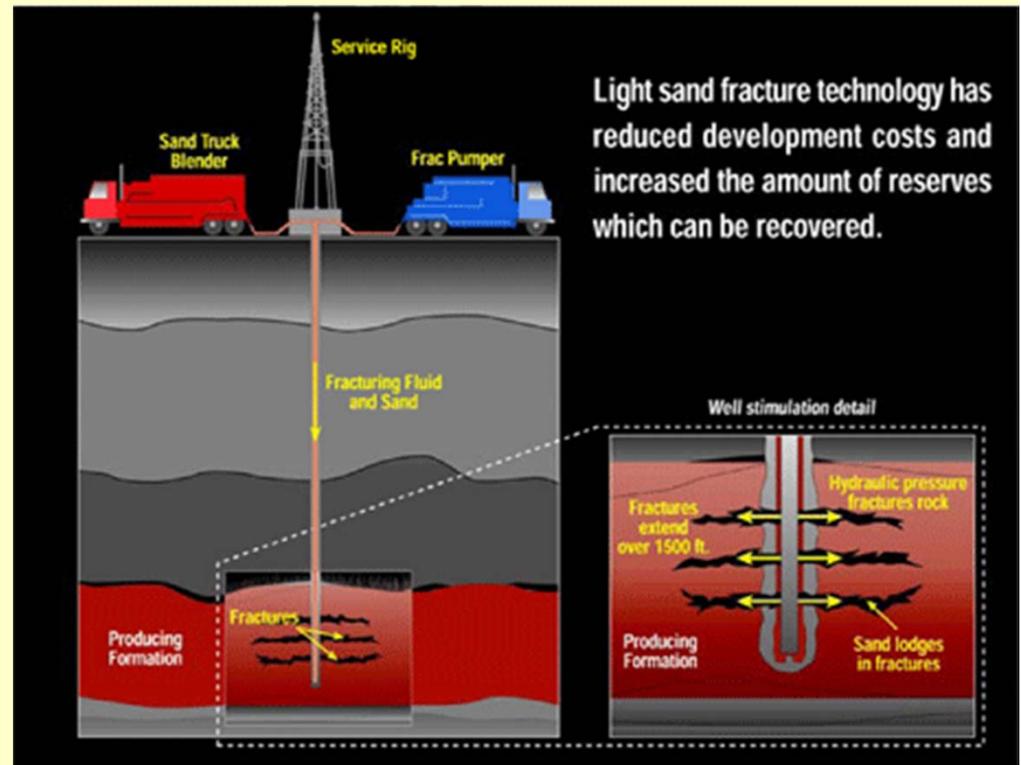
High latitude volcanism

- Large areas of volcanic activity covered by ice.
- Prospects of future large scale effects.
- Small-scale volcanic activity being progressively uncovered,
- West Antarctic Ice Sheet underlain by a large continental rift system with associated volcanism.



Hydraulic fracturing

- 50 km³ of natural gas could be recovered from US shales
- Pumping water at high pressure displaces gas
- Huge rise in planned drilling in US and elsewhere
- Instances aquifer and surface water pollution



Dry rice

- Rice requires extensive freshwater and rice paddies have high methane emissions
- Drought-tolerant rice by backcrossing *Oryza sativa* with drought-tolerant African cultivar, *Oryza glaberrima*
- Alternatively mixed-management for wet varieties of rice where the fields are drained immediately after harvest



Synthetic meat

- Muscle stem cells taken, multiplied in a growth medium and stretched to make muscle fibres
- Transform pig stem cells into muscle fibres in two weeks



Promotion of biochar

- Organic matter burnt in the absence of oxygen
- May also help boost agricultural yields and remediate degraded soils
- Argument for inclusion within the Clean Development Mechanism



Microplastic pollution

- 60-80% of general litter
- Degrades forming tiny fragments
- Hydrophobic marine pollutants adsorb onto plastics



Nanosilver in wastewater

- Nanosilver can kill nitrifying species
- Increased incidence of deformities and mortality of exposed zebrafish embryos
- Unclear whether nanosilver could reach concentrations to pose a serious problem



Legislative horizon scan - global

- Nagoya Protocol on Access and Benefit-sharing under the Convention on Biological Diversity
- Code of Ethical Conduct in Respect of Indigenous Heritage
- Kyoto Protocol to the United Nations Framework Convention on Climate Change
- Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, including Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks (REDD+)
- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)

Legislative horizon scan - Europe

- EU Budget Reform 2014-2020
- Common Agricultural Policy reform
- Common Fisheries Policy reform
- Soil Framework Directive
- European Landscape Convention

Legislative horizon scan - United Kingdom

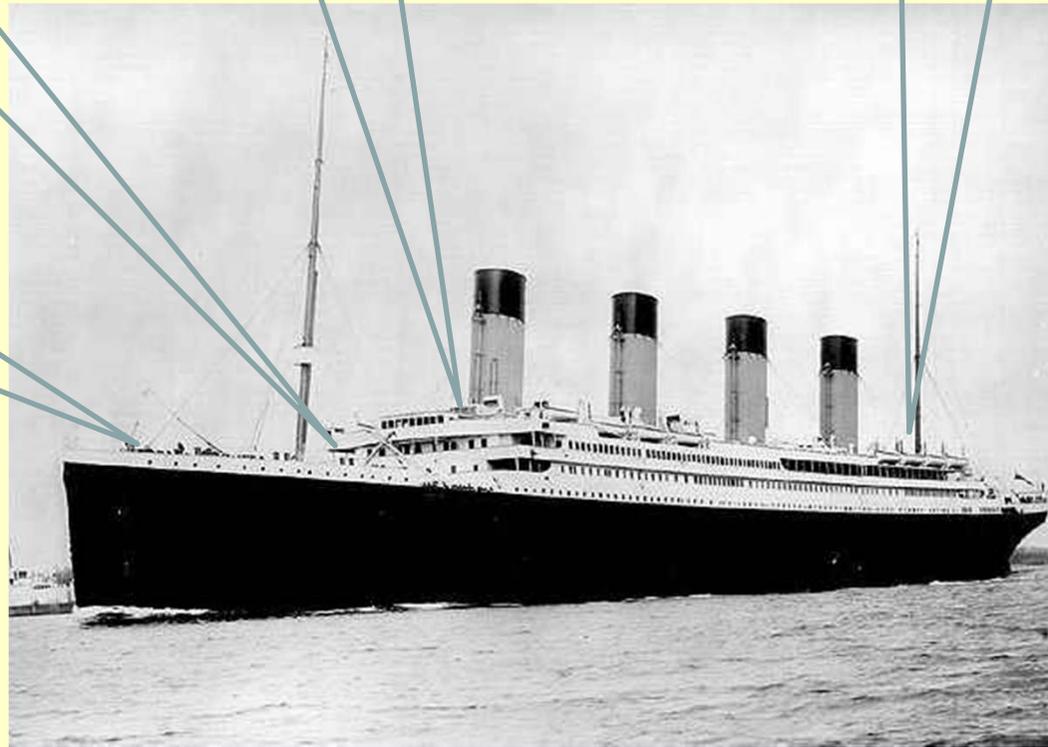
- Marine and Coastal Access Act
- Carbon Reduction Commitment (CRC)
- European Union Bill
- Public Bodies Bill
- Localism Bill

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Identifying priorities

- 100 ecological questions
- 100 global questions
- 40 questions relating to science and policy
- 40 US questions
- 40 Canadian questions
- 60 Israeli questions

Identifying UK policy opportunities (Organised jointly with Andy Clements BTO)

- New issues (e.g. "lifestyle" chemicals)
- New challenges (e.g. incentives for ecosystem service provision)
- Issues requiring rethinking (e.g. ballast water)

For each of 25 issues identify gap, policy options and research needs.

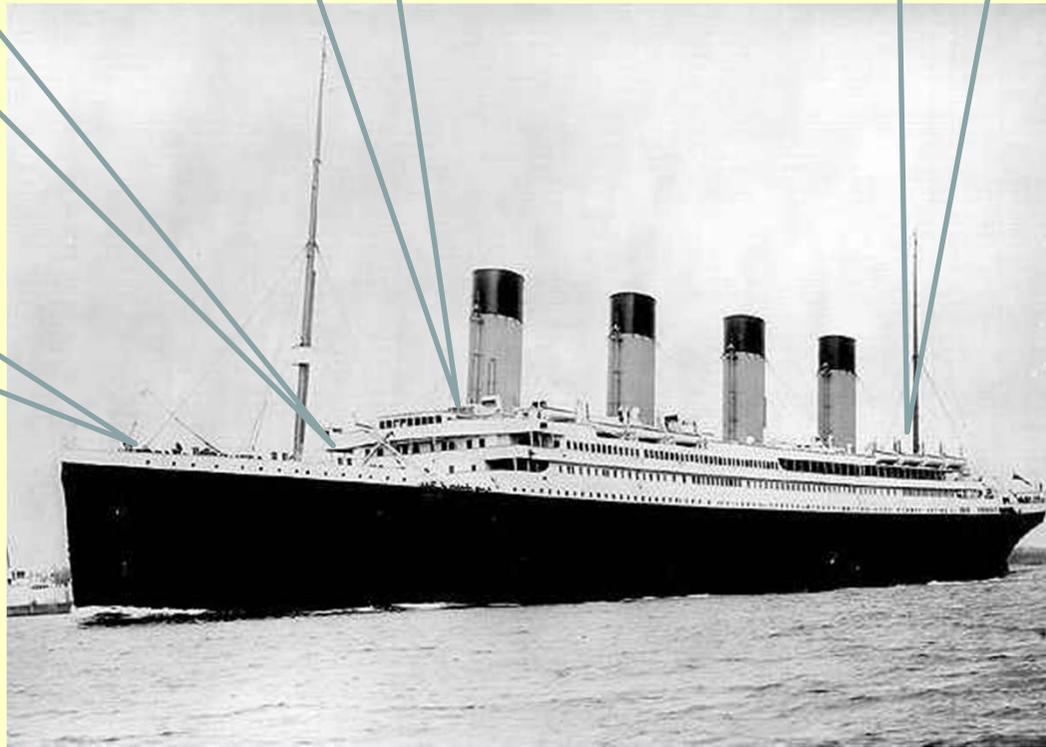


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Option scanning

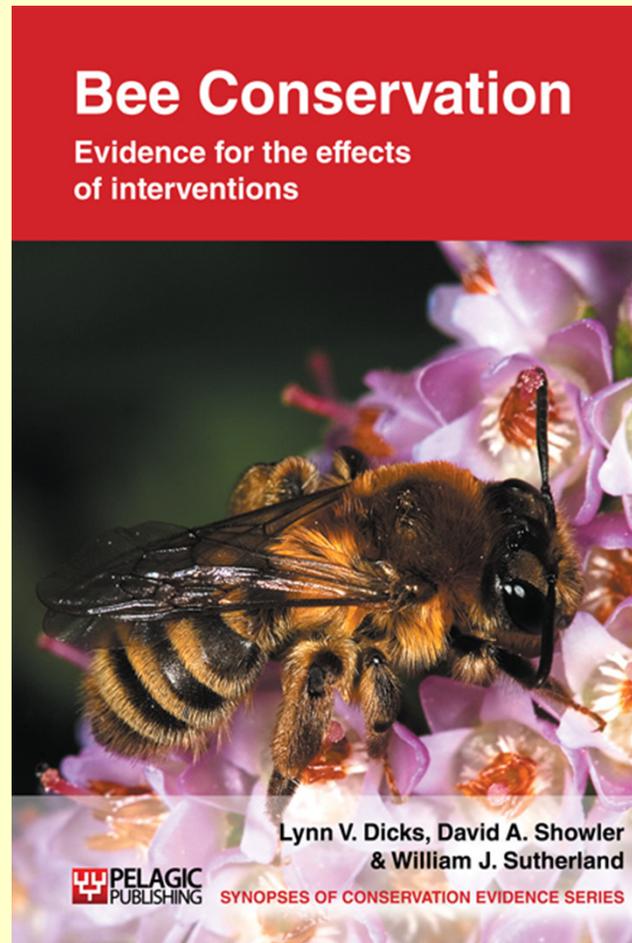


Streamer lines
Underwater setting
Line-weighting
Use of shark liver oil
Blue dyed bait
Bait-casting machines
Strategic offal discharge
Water cannon
Acoustic deterrents
Night setting
Season and area closures
A lining pipe
Externally weighted lines
Integrated weighting of lines
Side setting
Underwater setting funnel
Line shooter
Thawing bait
Single bird scaring line
Paired or multiple bird scaring line
Strategic offal discharge
Hook size & shape
Gear configuration
Towed buoy
String of lightly visible netting in the upper part of the net

What is the evidence for effectiveness in maintaining or restoring bee populations?



Pictures by: Andrew Bourke, Mace Vaughan



Do nest boxes help bumblebees?



- Nest boxes are a useful means of helping bumblebees
- Nest boxes are a complete waste of time
- Six studies test this type of nest box
- Three (pre-1978, USA or Canada) find 10-40% occupancy
- Three (post-1990, UK) find very low occupancy 0-1%
- Four studies test underground nest boxes
- Three (pre-1978, USA or Canada) find 29-48% occupancy
- One (2009, UK) finds 6% occupancy
- Nest box use increased over time for introduced bees in NZ.

MANAGING FIELD MARGINS FOR BEES

ACTION Leave margin unsprayed (Conservation Headland)

- No more bumblebees than conventional margins (2 studies)

ACTION Allow margin to naturally regenerate

- More bumblebees than cropped margins, in some years (4 studies)
- Value to bumblebees depends on thistle species (2 studies)

ACTION Sow with wildflower seed mix

- Greater abundance and diversity of bumblebees than cropped (4 studies), grassy (2 studies) or naturally regenerated (1 study) margins
- More long-tongued bumblebees than on annual forage plants (1 study)

ACTION Sow with agricultural bee forage plants (clovers, borage..)

- More bumblebees than cropped or naturally regenerated margins (2 studies)
- More bumblebees than on wildflower seed mix in some years (3 studies)

ACTION Sow with grasses

- Greater abundance (2 studies) and diversity (1 study) of bees than cropped margins
- More nest-searching queen bumblebees than conventional margins (1 study)

Habitat
synopses

Taxa
synopses

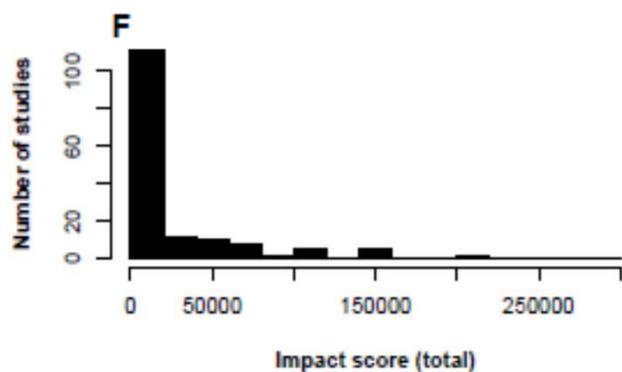
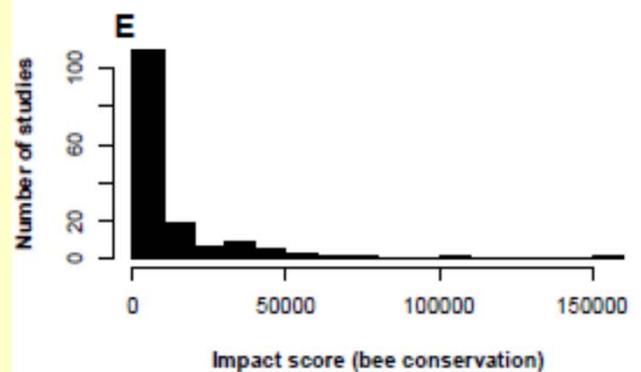
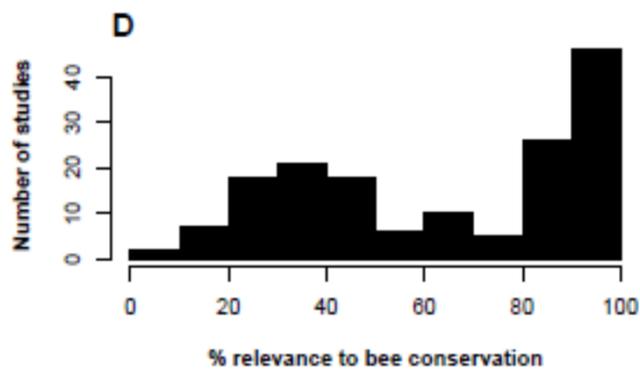
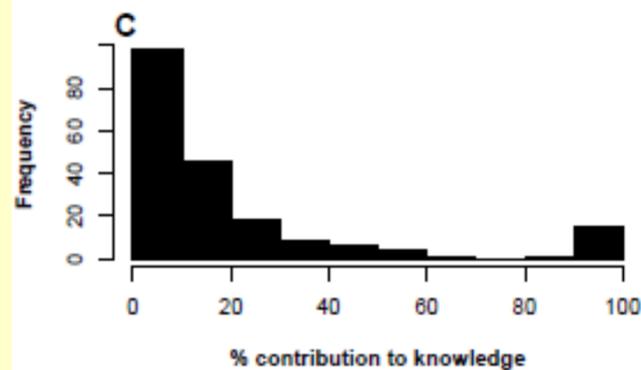
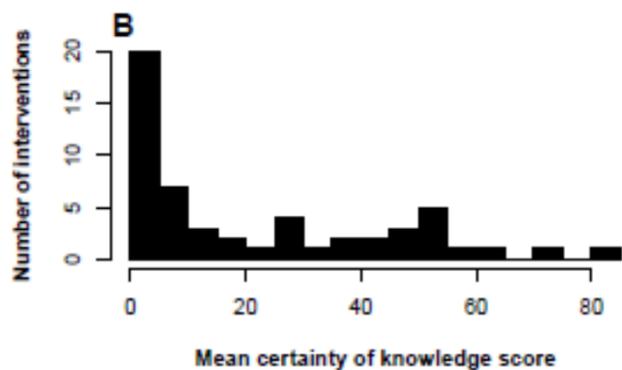
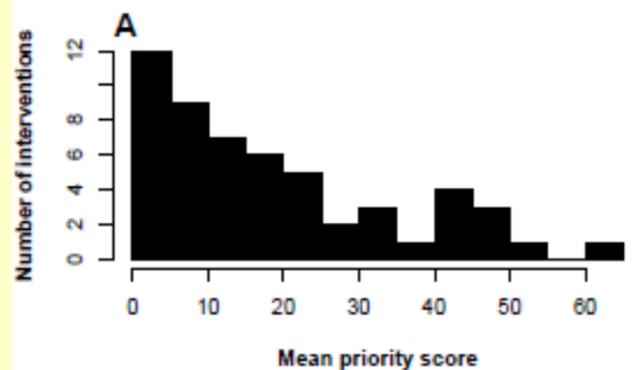
Issue
synopses

Global
synopsis

Tagging of interventions
e.g. Denmark, Galapagos?

Translation?

Local
synopses



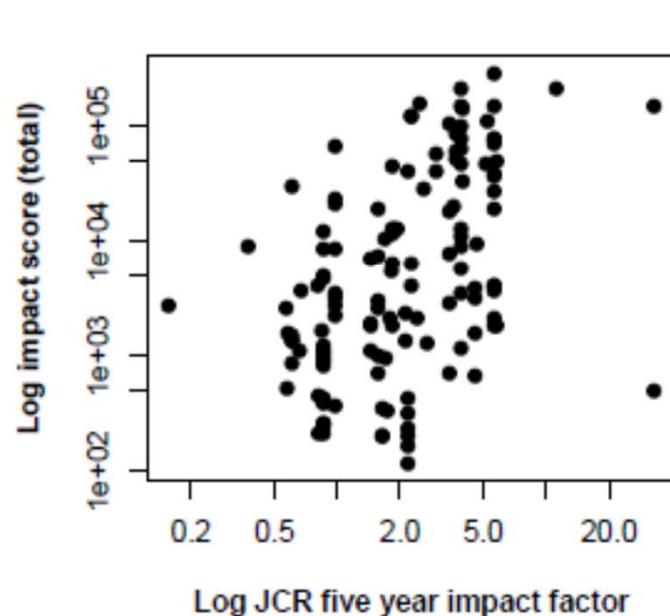
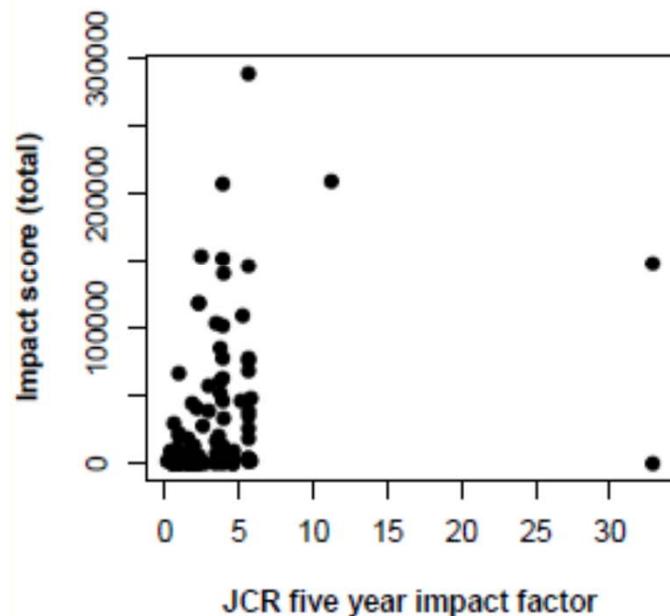
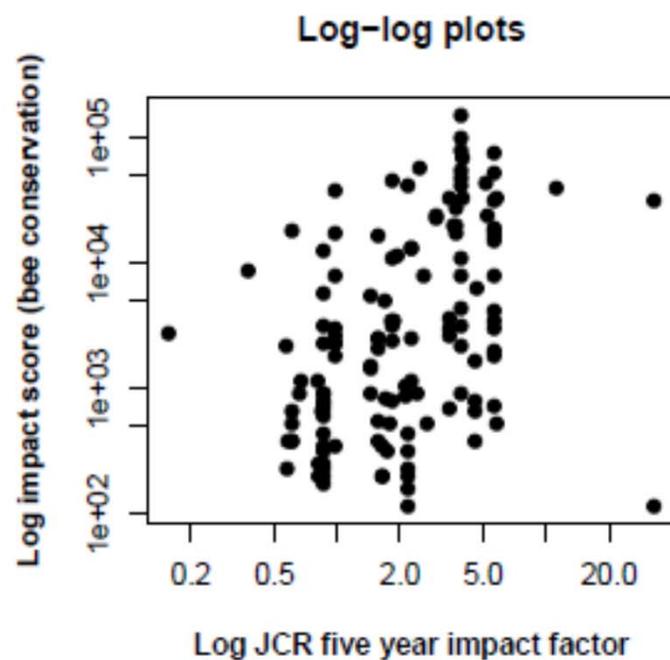
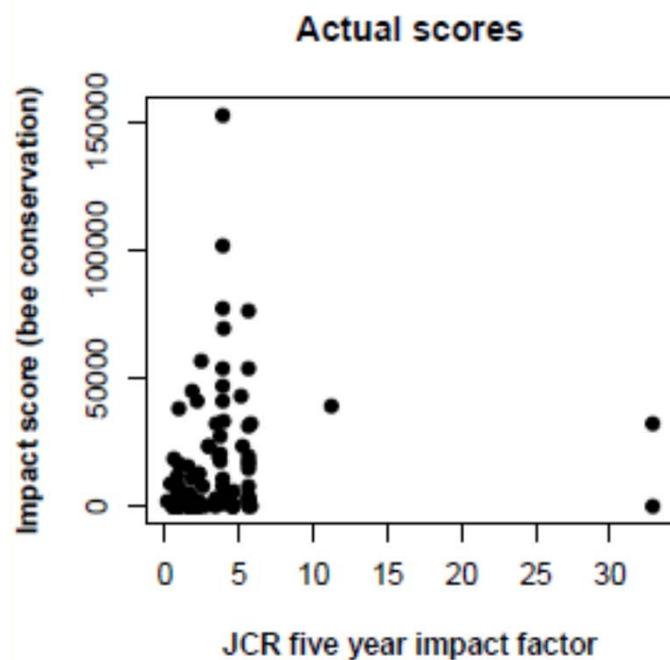
Bee Conservation

Evidence for the effects
of interventions



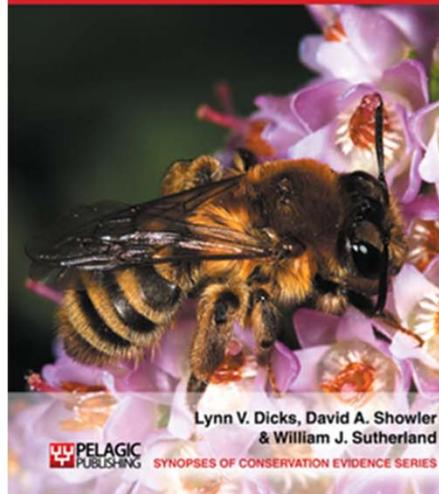
Lynn V. Dicks, David A. Showler
& William J. Sutherland

WILEY-**PELAGIC**
PUBLISHING SYNOPSIS OF CONSERVATION EVIDENCE SERIES



Bee Conservation

Evidence for the effects
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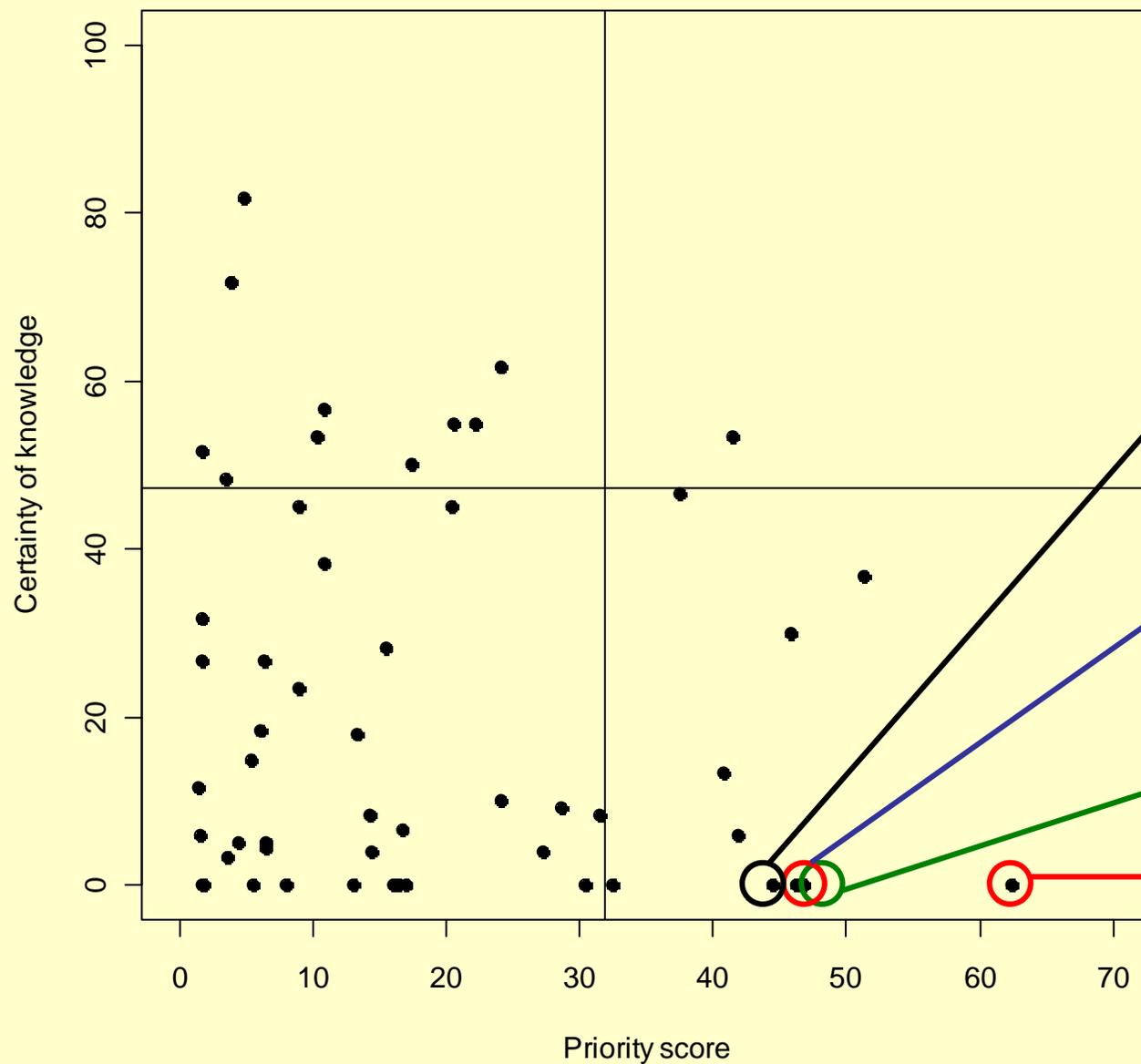


Lynn V. Dicks, David A. Showler
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WILEY-INTERSCIENCE
SYNOPSIS OF CONSERVATION EVIDENCE SERIES

Bee Conservation

Evidence for the effects of interventions



Train land managers

Connect natural habitat

Protect existing habitat

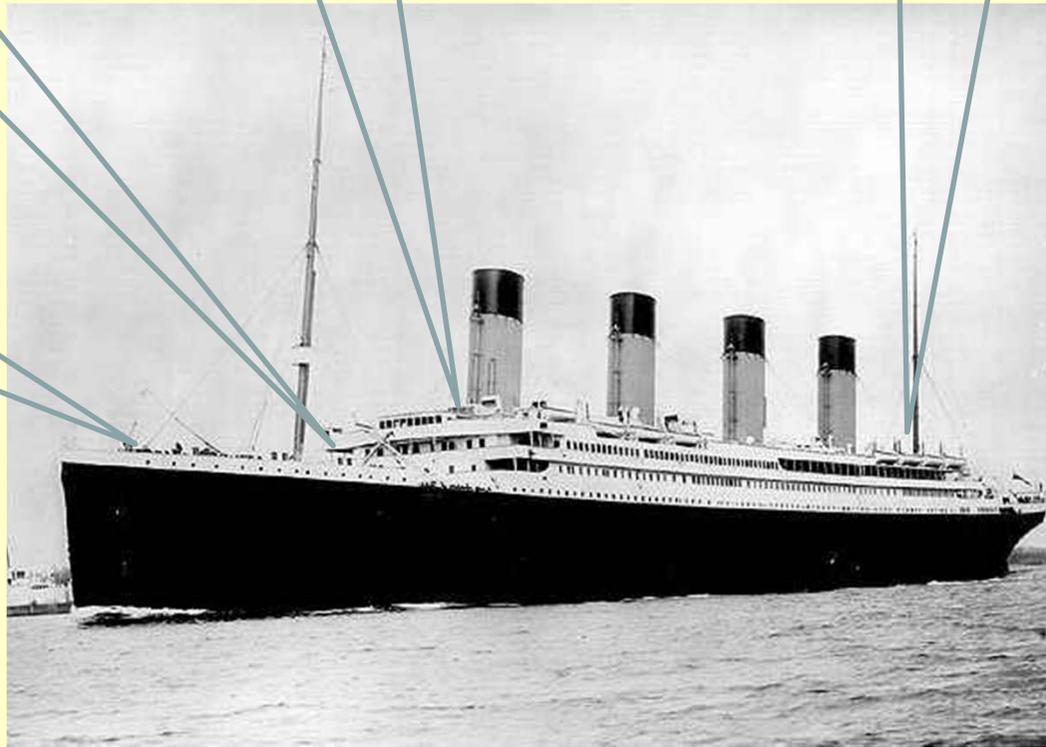
Increase % natural habitat

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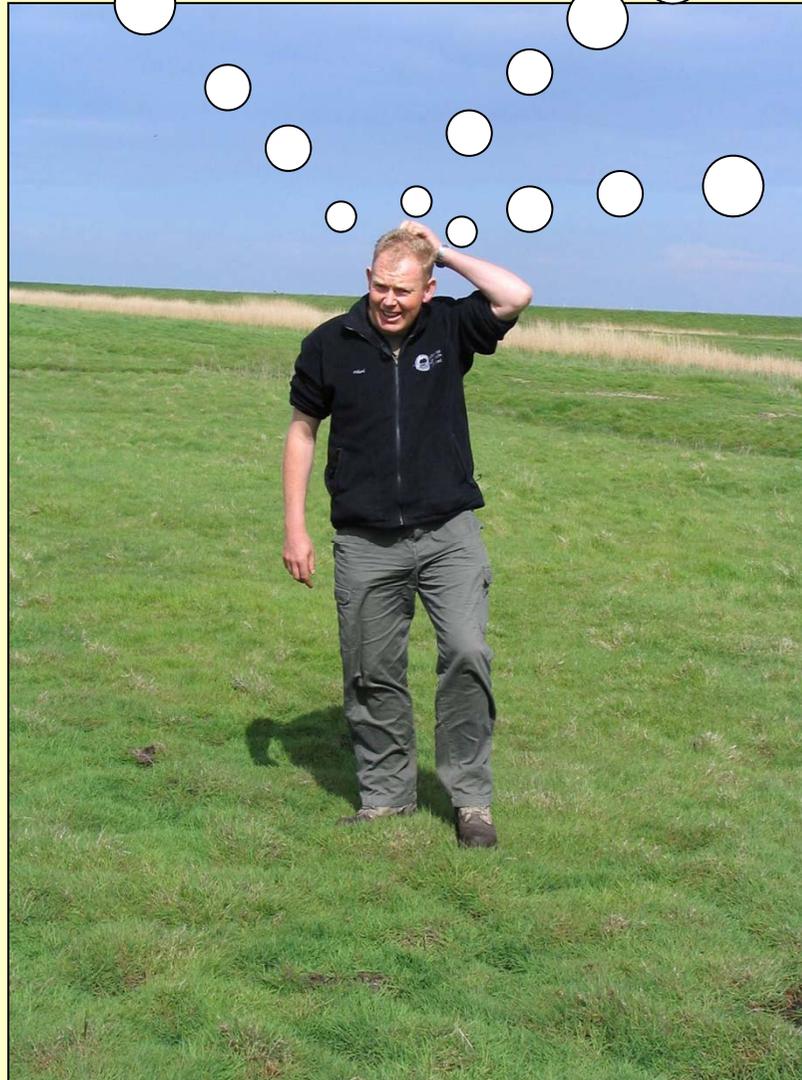
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What interventions are best?

Relevant literature takes time to find



Extracting scientific messages is time consuming and challenging

The key to the future

Need to measure
project success

Always success

Never repeated

Nearly impossible

Lots of unread reports

Examine intervention
consequences

Mixed response fine

Repeated

Practical

A better planet

Providing nest boxes for Java sparrows *Padda oryzivora* in response to nest site loss due to building restoration and an earthquake, Prambanan Temple, Java, Indonesia

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SUMMARY

A small but important population of the endangered Java sparrow *Padda oryzivora* nests within crevices between stone blocks of an ancient temple complex in Java. In response to nest site losses due to temple restoration, and subsequently further damage to nest sites caused by a major earthquake, artificial nest sites (wooden nest boxes, sections of bamboo, and coconut shells) were provided. In the subsequent breeding season (2007), two pairs of Java sparrows successfully nested in these wooden boxes, one pair fledging seven young and the second pair two young. In 2008, three pairs again nested in the wooden nest boxes (located in different trees): one nest had nine eggs but failed as the parents were taken by a local birdcatcher; the second nest had 12 eggs, six of which hatched and subsequently fledged; the third pair fledged three young. A coconut shell was prospected by one pair but not used for nesting.

BACKGROUND

The Prambanan Temple complex on the island of Java supports a remnant of lowland forest in an otherwise mainly urban landscape. One important bird species at this locality is the endangered Java sparrow *Padda oryzivora*, which is endemic to the islands of Java, Bali and Kangean (Indonesia). Primarily a lowland species, it was formerly widespread and abundant but its numbers have crashed in recent years, as a consequence of which it is listed as Vulnerable by the IUCN (van Ballen 1997, BirdLife International 2004). The main reason for the dramatic decline is attributed to extensive collection for the bird trade. In 2000, the Java sparrows nesting at Prambanan represented the largest single extant population in Java (Laudisensius *et al.* 2000), with surveys (conducted since 1998 by Aji and Yuda) recording no fewer than 16 nesting pairs in 2004. Their nests were located in slots (a few centimetres wide) between stone blocks of the Roro Jonggrang temples (part of Prambanan Temple complex), with most nests located about 10 m above the ground.

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However, from 2003 to 2005, renovation of Siwa (the largest Roro Jonggrang temple building and the main nesting area) was undertaken. This included closing the gaps between the main building stones by gluing small stones within them, consequently preventing Java sparrows from entering and nesting. Loss of nesting sites is just one of the threats facing this small but important Java sparrow population; other threats include the presence of local birdcatchers and habitat loss, especially a reduction in foraging areas (e.g. loss of rice paddies due to road and housing development). In light of this, the Kutilang Indonesia Foundation (KIF) decided to provide some artificial nest sites within the temple complex in an attempt to mitigate for those that had been lost, with the plan being to put them up in early May 2006. However, because of technical and administration problems, this was delayed.

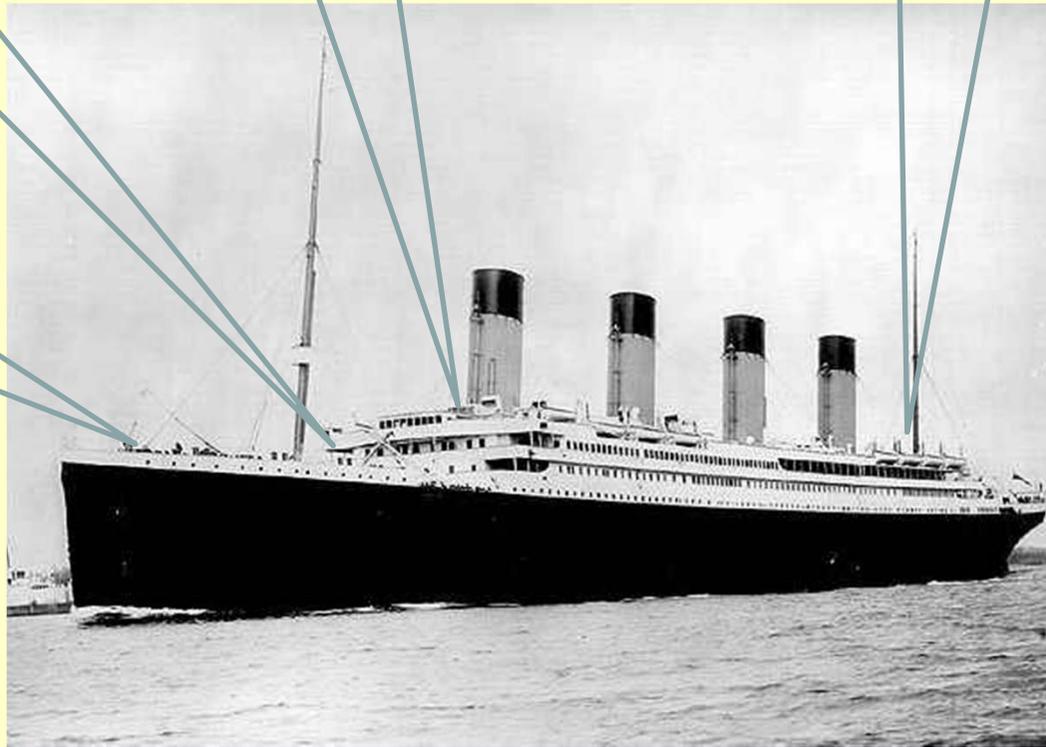
Then on 27 May 2006, a major earthquake occurred, centred near Yogyakarta City, 15 km to the east of Prambanan. An estimated 6,000

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The linear model

