The Contexts and Cultures of Interdisciplinary Research Discourse

Susan Hunston, University of Birmingham

Investigating interdisciplinary research discourse: the case of Global Environmental Change

Aug 2013 – Aug 2015

ESRC-funded: ES/K007300/1

Paul Thompson

with Susan Hunston, Akira Murakami and Dominik Vajn

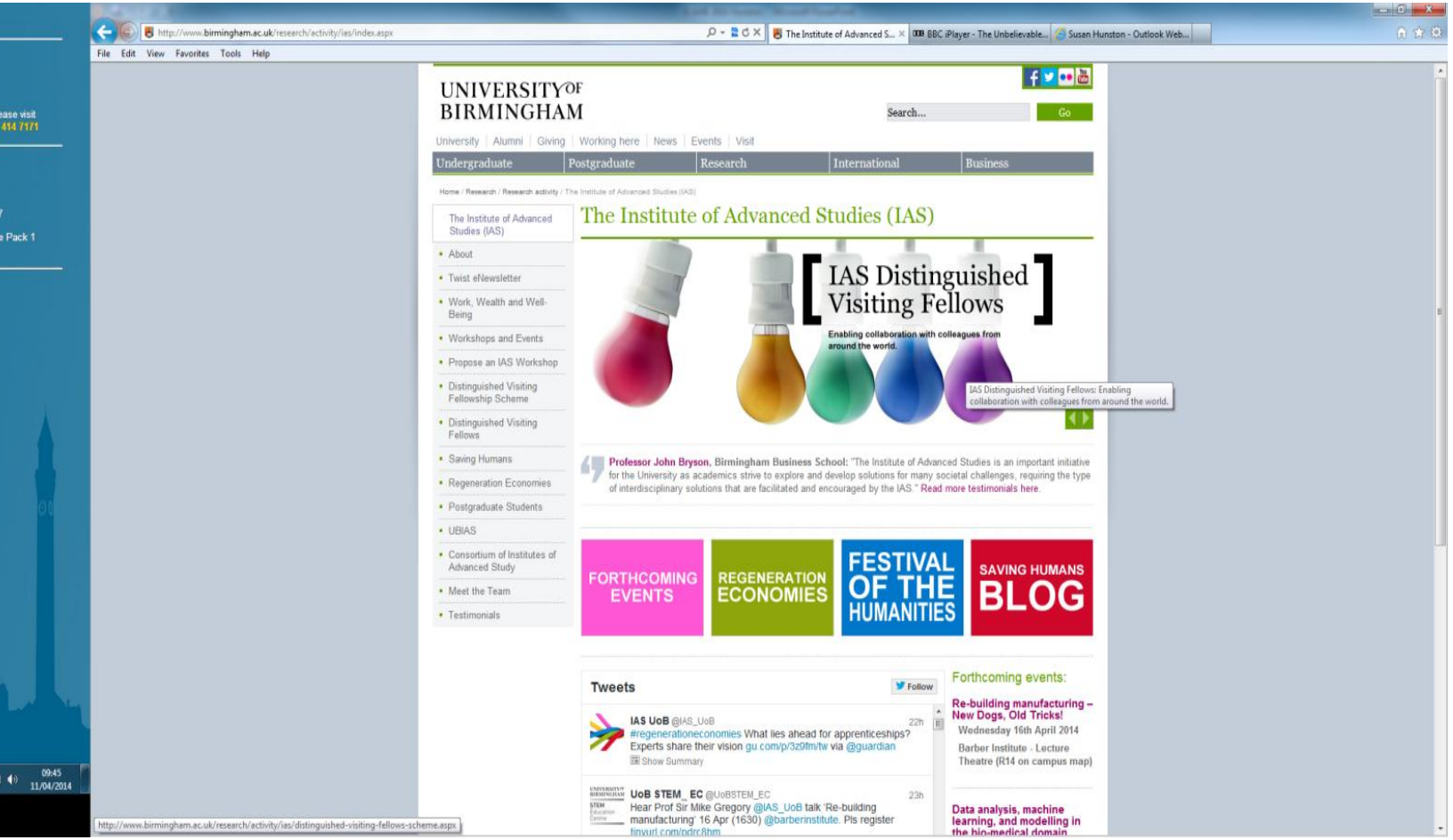
The discourse of disciplines

- Hyland and Bondi (eds.) 2006 *Academic Discourse Across Disciplines.* Peter Lang.
- Hyland 2004 *Disciplinary Discourses: Social interactions in Academic Writing*. University of Michigan Press.
- Nesi and Gardner 2012. *Genres across the Disciplines: Student writing in higher education. Cambridge University Press*
- *Fløttum, Gedde-Dahl & Kinn 2006.* Academic Voices: Across languages and disciplines. Benjamins.
- Olson 2013. *Academic Writing across the Disciplines.* Literacy Design Collaborative.

The importance of ID discourse

- Interdisciplinary research is promoted by universities, funding bodies and the like as having more potential than single disciplines to solve today's problems.
- Anecdotally, some researchers engaged in interdisciplinary research describe it as involving difficulties not present in monodisciplinary research.

Interdisciplinary research



- "The Institute of Advanced Studies is an important initiative for the University as **academics strive to explore and develop solutions for many societal challenges, requiring the type of interdisciplinary solutions** that are facilitated and encouraged by the IAS."

“redundancy”: a historian

- …now what interests me here is that using the very notion of redundancy … forces us … to **rethink conventional historical questions** and to **rethink some of the assumptions** which underpin our understanding of resilience in … warfare

“resilience”: a bioscientist

- I think that’s something that maybe (.) in our resilience network we probably start saying well **what sort of software do we use** to look at resilience in our different disciplines…

Talking about disciplines

- What we've found is that the unconscious mind
- [did not really work] the way Freud Jung and people in the twentieth century believed
- who didn't have access to these new technologies
- and in fact **they weren't even scientists**.

Talking about ID research

- Interviews with ID ‘enthusiasts’.

‘speaking a different language’

- I think it might have been harder because it was interdisciplinary because people **talk their own languages** in their own disciplines
- …who I’d met in advance…to think about **whether we could actually speak a common language**
- I’m really interested in **seeing…how they use a different language**
- it’s just trying to get the language right so **what you say is a model** and **what I say is a model** is a different thing

A contested concept: ‘culture’

- This colleague suggested a title for a new joint programme between our departments –Cultural Encounters was the title suggested. I suggested it at our meeting and people weren’t so keen on Cultural Encounters. So I returned to this colleague and I said (.) you know it’s a very good title but I think anthropologists don’t react well to it (.) because in anthropology the term culture is very sensitive and you have the discussion with British social anthropologists cultural anthropologists there is always the doubt that you may be ( ) or essentialising the culture and here I’m trying to explain to a non anthropologist or to an outside colleague why the term he chose may be okay from his perspective (.) slightly not okay from a different perspective and what does an anthropologist mean when he or she says it’s just the risk of essentialising culture.

A contested concept: ‘culture’

- This colleague suggested a title for **a new joint programme** between our departments – **Cultural Encounters was the title suggested**.
- I said (.) you know it’s a very good title but I think **anthropologists don’t react well to it** (.)
- because **in anthropology the term culture is very sensitive**
- **there is always the doubt that you may be … essentialising the culture**
- and here I’m trying to explain to a non anthropologist why **the term he chose may be okay from his perspective** (.) slightly **not okay from a different perspective**
- and what does an anthropologist mean when he or she says it’s just **the risk of essentialising culture**.

A contested concept: ‘wellbeing’

- …you know in psychology we’re quite s- well in our group we’re quite specific about what wellbeing means and what wellbeing and ill-being means and are they two ends of the continuum or are they separate entities is wellbeing a state thing that you experience from hedonic perspectives is it a more sustained or you know more linked to (2) erm made of more varying components in your life I guess
- …it’s something which I have read various papers on what wellbeing means and have a yeah so when other people talk about wellbeing or measuring it or b-my head goes back to that literature
- …whereas for somebody that hasn’t been in that literature it’s just wellbeing you know its cause we see it on the TV and we see it on the news and its just this optimal state that we’re meant to have
- …we say were going to measure wellbeing that’s actually incredibly complex erm to do well
- …I guess it generally is quite vague and it’s one of those terms that is used in the newspapers on the news
- …but it is there are there is quite a lot of literature on what the term actually means and if it’s something you’re going to measure in research you need to be clear about your operational definition before you move forward so I guess that yeah things like that erm you know people often throw out health and wellbeing you know just kind of were going to improve health and wellbeing okay (laughs)

A contested concept: ‘wellbeing’

- …you know **in psychology we’re quite specific about what wellbeing means** and
- …it’s something which **I have read various papers on what wellbeing means** so when other people talk about wellbeing my head goes back to that literature
- …whereas for somebody that hasn’t been in that literature it’s just wellbeing you know …**we see it on the TV and we see it on the news and its just this optimal state that we’re meant to have**
- …we say were going to measure wellbeing **that’s actually incredibly complex to do well**
- there is quite a lot of literature on what the term actually means
- and if it’s something you’re going to measure in research **you need to be clear about your operational definition before you move forward**
- **people often throw out health and wellbeing you know** just kind of we’re going to improve health and wellbeing

Some ‘small words’

- whereas for somebody that hasn’t been in that literature **it’s just wellbeing you know** …we see it on the TV and we see it on the news and **its just this optimal state** that we’re meant to have
- …we say were going to measure wellbeing **that’s actually incredibly complex** to do well
- … they weren’t **even** scientists

In short…

- Models of the relationship between disciplines:

- MINE IS BETTER THAN YOURS
- YOURS ENLIGHTENS ME
- YOURS CAN ASSIST MINE (BUT MINE IS THE ONE THAT MATTERS)

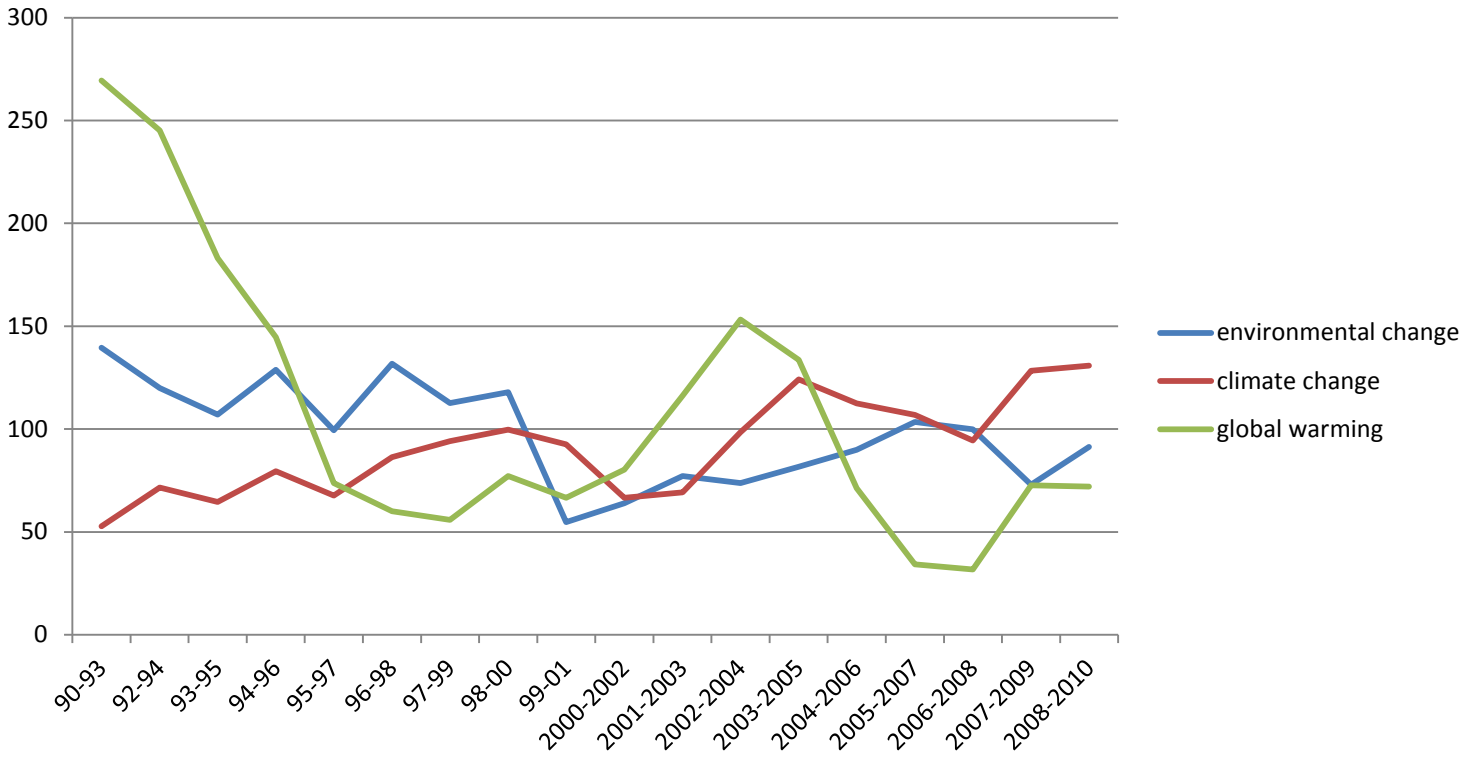
Global Environmental Change

The *GEC* corpus

- Timescale: 1990-2010
- Texts: 676
- Tokens: 4,714,877 (4.5 million)
- 'Other' and 'Non-other'
- Increase in number of papers:
  - 1990-1991 24 papers per year
  - 2000 24 papers
  - 2010 78 papers
- Increase in joint authorship

environmental change; climate change global warming

	1990-1993	1995-1997	1999-2001	2004-2006	2008-2010
En'mental change	139.5	99.4	54.8	89.9	91.3
Climate change	52.8	67.6	92.5	112.5	130.8
Global warming	269.5	73.7	66.6	71.2	72


300
250
200
150
100
50
0
90-93
92-94
93-95
94-96
95-97
96-98
97-99
98-00
99-01
2000-2002
2001-2003
2002-2004
2003-2005
2004-2006
2005-2007
2006-2008
2007-2009
2008-2010
environmental change
climate change
global warming

4-5 word sequences

- *impact / effect of climate change on*
- *implication / consequence of climate change*
- *threat of climate change*
- *vulnerability to climate change*
- *adapt / adaptation / response to climate change*

Co-texts

assess *evaluate* *analyse* *quantify* *investigate* *study* *examine* *measure* **etc** *assess* *evaluate* *analyse* *quantify* *investigate* *study* *examine* *measure*	*impact/s* *effect/s*	*of climate change* *on*	*agriculture* *biodiversity* *crop yields* *flood probabilities* *food production / security* *human health*

environmental change: 'what is often said'

- It is a problem: *dealing with*; *the range of concern over; the dominant problems; the problem that; problems of gec; various risk management strategies; global risk management; forces of destruction;* ***coping with; forces of destruction; many of these problems; our inability to grapple with; unless action is taken****; meet the challenge of gec; the task will be compounded…; strengths and weaknesses with respect to coping with; composed of multiple interpretations of problems; signs of deterioration; solutions to the various environmental changes*
- It is human: *the increasing ability of humankind to affect or alter directly the basic physical systems…; society may already be committed to some large-scale ec. Unlike other animals, we cannot rely on instinct;* ***the human actor is the source, as well as the object, of change;*** *the motives which lead human beings to behave…; human activity can escalate the magnitude of natural events; there are many examples of social responses*

…continued

- Research is needed: ***strengthen efforts to study****, explore, and anticipate*
- We are talking about the future: *anticipate;* ***in the future****; predicted;*
- It is complex: ***the complex dynamics*** *governing human interaction with the total Earth system; attention to cumulative change is essential;* ***gec is a complex process; faced with complex contexts***
- It involves multiple research agendas: *scientific understanding; human dimensions;* ***both the natural and social sciences****; debates over economic development strategy…influence the contributions of marine environmental science and policy; the comparison of marine pollution science and policy;* ***were largely unexplored by the scientists…to many social scientists the environment remained an obscure area****; the discourse about gec was initiated by natural scientists…; human purposes are either discussed…or they are treated superficially; a set of recommendations could be developed; debates draw in many more interest groups than would previously have gathered around scientific issues; problems that are open, unstable and not solely determined by scientific factors. Economic theory indicates that..; identify broad social strategies to prevent or mitigate;*

…continued

- It is currently unknown and uncertain: *increase awareness of; improve scientific understanding; if…are to be understood; enlarging and clarifying;* ***uncertainties of the scientific data; the uncertainties of marine environmental change; humanity as a whole does not really know what the phenomenon gec is****; different interpretations of decision making*
- It is global and local: ***distinguish the study of global environmental change from that of environmental change in general****; can no longer be dealt with in isolation…global economy; is global in scope*

Fluctuations between years and papers

- *Global warming*
- 2001 14 instances 10 from 2 papers
- 2002 57 instances 34 from 1 paper
- 2003 101 instances 79 from 1 paper

Contested concept

- Public perceptions:
  - While some **saw climate change as a result of the gods' anger**, …
  - The temporal culmination …led to a peak in **public perception of climate change as a pressing problem**.
  - Finally 3% of the sample **identified climate change as a global problem** …

...continued

- Discipline focus
  - By **constructing climate change as a matter of simple physics** ….
  - The scientific **construction of climate change as a problem of carbon emissions** ….
  - As such ministries typically **perceive climate change as an atmospheric issue**….
  - Such a focus on specific words as nodes or hubs of different argument may go some way towards **illuminating the complexity of climate change as a multifaceted cultural problem**.
  - Its [PIU] output, published in 2002, **framed climate change as a critical issue** for the energy sector…

…continued

- Competing definitions
  - …the Framework Convention **defines climate change as** a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere…
  - …the IPCC adopts a broader **definition of climate change as** 'any change in climate over time whether due to natural variability or as a result of human activity'

Context and Text

- The relationship between text and context is bi-directional.

Context precedes text

- ‘Registers differ in both their situational and linguistic characteristics. However, the situational characteristics are more basic. …’
- ‘[E.g.] …you find yourself in a conversational situation, and because of that you start to produce language with the linguistic features that are appropriate for a conversation.’
- Biber and Conrad 2009:9

Text constructs context

- Identity is discursively constructed (Benwell and Stokoe 2006);
- Events are differentially represented in discourse (Fairclough 2003:136);

SFL: construal

- We can use the term ‘construe’ to talk about this kind of reflexivity. … [The language features] simultaneously reflect and construct that context. (Thompson 2014: 10)
- Cf:
- Writers construe the academic field of Environmental Change Studies as they write.

Two principles in corpus design

- The essence of what characterises a corpus lies in the difference between it and another corpus.
- When two corpora are to be constructed for comparison purposes, they are identified on external criteria.

“Millenibrum”

- NO: divide the corpus into sub-corpora based on the characteristics of the writer
- YES: identify features of commonality and subsequently identify shared writer characteristics
- (A. Sealey 2010)

The context of *GEC*

- It is neither feasible nor desirable to assign each text to a disciplinary context;
- Rather, the texts construe their academic /intellectual/empirical contexts;
- They construe the field of 'Global Environmental Change';
- And they construe the disciplines contributing to that field.

Some of our questions

- To what extent does the field construed by GEC draw on disciplines, and to what extent does it establish its own discipline?
- Can this be observed to change over time?
- What sub-corpora can rationally be established ‘bottom up’ from the entire corpus of the journal?

Clustering papers

- Multi-Dimensional Analysis
- Citation Analysis
- Manual classification of paper ‘types’

Explorations of lexis

- Keywords creating topic clusters;
- A reflexive view of research;
- Contested concepts.

Keywords and Topics

- Identify Keywords in each text compared with the whole GEC corpus.
- Compare each text with every other text.
- Record number of shared Keywords.

Comparing longevity of topic

1991 paper	Percentage of papers with >5 shared keywords in 1990-1991	Percentage of papers with >5 shared keywords in 2010
Boxer	43%	38%
Wescoat	19%	7%
Brookfield	6%	4%
Turnerll	24%	16%
Haas	19%	9%
Downing	33%	28%

Topic Clusters

- Identify words most significantly co-occurring as keywords.
- Cluster words co-occurring most frequently.
- Cluster texts with those words as keywords.

Cluster 1

- Change; climate; land; the; forest; deforestation; farmers; forests; water; global; agricultural; environmental; et; al; crops; production; we; ha; that; and

Cluster 2

- Climate; change; environmental; global; the; al; et; and; social; water; was; were; we; policy; countries; of; vulnerability; capacity; is; research

Cluster 3

- Countries; emissions; climate; change; energy; developing; environmental; international; the; greenhouse; global; be; and; co2; country; emissions; gas; fuels; protocol; s

Cluster 4

- Climate; change; science; and; the; scientific; global; policy; environmental; that; water; research; human; be; we; new; information; actors; decision; governance

Cluster 5

- Climate; model; scenario; scenarios; change; co2; changes; the; temperature; crop; emissions; growth; regions; environmental; precipitation; estimates; in; population; rate; that

Cluster 6

- Climate; change; and; impacts; the; al; et; scenarios; environmental; future; water; scenario; be; mitigation; model; was; we; global; adaptation; costs

Making intuitive sense

- Cluster 1
- Change; climate; land; the; forest; deforestation; farmers; forests; water; global; agricultural; environmental; et; al; crops; production; we; ha; that; and
- This is not a topic as a single entity, but as a nexus of ideas.
- It is not a pre-existing topic, but an instantial one.

Overlaps and nuance

- Water
- Cluster 1: farmers, forests
- Cluster 2: social, policy
- Cluster 6: scenario, model

Water in Cluster 1

- Water is something used by people in rural communities for keeping cattle, crops, and for personal use.

- '…the gardens are supplied by small wells from which the owners fetch water for cash crops like tomatoes, potatoes…'

Water in Cluster 2

- Water is an abstract entity that interacts with people as an abstract entity.

- ‘Although the extent to which these pastoralists are likely to…, the short run impact due to less grazing land and water shortage could be important.’

Water in Cluster 6

- Water is an insecure resource to be managed and measured.

- ‘Biophysical sensitivity and impacts is measured by the change in regional water supply for a given level of global climate change.’

Lexical studies

Research reflexivity

- *Discipline*
- Frequently used in: **JSIS**, **GEC**, **JRS**, **CEUS**

- *Approach/es*
- Frequently used in: **CEUS**, **AWR**, **JSIS**, **GEC**

- **Journals: interdisciplinary; monodisciplinary**

GEC and *scientific*

- *Scientific* 2807

- **knowledge**; understanding
- consensus; certainty
- uncertainty; controversy; debate; opinion
- community; discipline; discourse
- finding; **evidence**
- information; literature; report
- research; assessment; inquiry; work
- credibility; expertise
- advice; input

scientific knowledge

- 193 instances across 80 papers.
- One paper has 40 instances.
- 11 other papers have four or more instances.
- Few frequent collocates:
  - *Sociology of scientific knowledge*
  - *Scientific knowledge is*

scientific knowledge is…

- …the advancement of scientific knowledge is a slow process…
- The state of scientific knowledge is growing impressively, but remains inadequate.

- Scientific knowledge is elevated above local knowledge…
- …whether…scientific knowledge is socially constructed.

Theme 1: necessary

- The plan, however, **failed to draw adequately on existing scientific knowledge** of marine pollution sources, transport, fates, and effects to guide management and to help set spending priorities.
- Policy makers can therefore begin now to establish domestic policy instruments and international institutional arrangement to stabilize global CO2 emissions with the knowledge that **this target will most likely be strengthened as scientific knowledge improves**.
- Glaciological processes in the main stem of the upper Indus would not be modelled due to **a lack of data and scientific knowledge**.

Theme 2: insufficient

- A key issue affecting societies' ability to manage global environmental change is **the proper role of scientific knowledge in policy formation** and execution.
- Implementable agreements are amenable to changes in **scientific knowledge and political and economic realities**.
- These matters are complicated by the question of **the role and status of scientific knowledge within the policy process**.

Theme 3: dependent

- The sociology of scientific knowledge has developed a wide array of terms and concepts for revealing **how scientific 'facts' are constructed**.
- This institutionalized exaggeration of the scope and power of scientific knowledge creates a vacuum in which should exist a vital social discourse about **the conditions and boundaries of scientific knowledge in relation to moral and social knowledge**.
- However, a growing area of scholarship stresses the need to also study **the role of culture and politics in the very production of scientific knowledge** and associated adjudications.

scientific evidence

- Subject of: *shows, suggests, points to, tells us, supports;* also *is/was unreliable, is not clear, is thin*
- Agent of: *is shaped by, is compounded by, is decided by*
- Modifying (adjectives): *changing, convincing, emerging, further, growing, hard, increasing, recent, solid, strong, substantial, wealth of, weight of*; also *inconclusive*

scientific evidence…continued

- Object of: *depend/s on, cited, reflects, build up, interpretation of, sifting of, strength and validity of, rely on, require, there is (no), rooted in, examination of, summary of, provided*; but also *challenges, reassessment of, criticism of, use and misuse of, selection of, overstated*
- Subordinators, prepositions: *as a result of, despite, like, as well as, in terms of, without, in the absence of*

Political ecology

- 30 papers
- 3 or more instances in 9 papers
- A key point of reflexivity
- Develops as a concept between 1994 and 2010.

1994-2002: *Political ecology* meets research goals

- **Political ecology** … is … **a way of grasping** what we called 'potentiality'…
- In this study the discussion of land use changes **is enhanced** with the use of the **political ecology** perspective.
- **Facilitated by** theory and approaches that link complex system insights and **political ecology**…
- Last, we suggest present priorities for research, **based on** what we call a 'local **political ecology**' approach.

2007-2008 The value is questioned

- It is the absence of such a mechanism that **prevents political ecology from generating a framework** capable of integrating the above perspectives on vulnerability.”.

- Hence, the non-personal…elements of vulnerability are likely to gain more emphasis in approaches such as health ecology and the **political ecology** of health… [But] **The more individual, compositional elements … are likely to be the analytical focus** of approaches in medical anthropology …

2010 A new approach

- Although these changes can be constructed in terms of **political ecology**, the incorporation of labour, food safety and local development considerations among stakeholders **creates a new conceptual framework of analysis, that of governance for sustainability**.

A contested concept*: biodiversity*

biodiversity

- 1,392 instances, in about 80 papers
- *conserve, preserve, restore, protect, maintain; conservation, preservation, perpetuation, maintenance*
- *threaten reduce, affect; decline, loss, fragmentation, threat, reduction*
- *hotspot, priority, value, crisis*
- *degree, quality, level*

2007_3_Visseren

- 43 instances, of which 38 are *forest biodiversity*
- Frequent sequences are:
  - conserve forest biodiversity / forest biodiversity conservation
  - forest biodiversity governance / governance system for forest biodiversity
  - threat/s to forest biodiversity / forest biodiversity is threatened
  - solution to forest biodiversity conservation/loss

…continued

- An undifferentiated entity … abstracted action

- There are a large number of partnerships active in the field of forest biodiversity conservation; the ontology of global forest biodiversity governance has indeed changed from a single-centric structure, with states regulating forest biodiversity, to a more complex structure in which governance is both a public and private affair.

2009_2_de Chazal

- 74 instances.
- Frequent sequences:
  - *biodiversity change; land-use change and (associated) biodiversity,*
  - *biodiversity models; studies of biodiversity / biodiversity studies*
  - *biodiversity responses,*
  - *loss of biodiversity / biodiversity loss,*

…continued

- …**assessments of biodiversity change** must…include both climate and land-use change as drivers
- …**more sophisticated representation** of these processes in **biodiversity models** would be necessary…
- Projected **estimates of biodiversity as** an output of these models tend to be constrained to quite general estimates
- …and how **biodiversity is characterised**
- …only a small number of **biodiversity studies** include the effects…

O-2005_1_Faith

- 76 instances
- Frequent phrases:
  - *global biodiversity change,*
  - *(rate of) biodiversity loss,*
  - *biodiversity value/s,*
  - *biodiversity is*.

Problematising the concept

- Given that only a small proportion of biodiversity is known to science, the term '**biodiversity**' **symbolizes our lack of knowledge** about the components of life's variation and their potential importance to future human well-being.
- Rather than calling anything and everything '**biodiversity**' (and **struggling to monitor a jumble of different things all under that biodiversity umbrella**), we can acknowledge that sometimes we will be monitoring aspects of nature that do not have any particular biodiversity link…

And more…

- …an observed change… **can be a misleading indicator** of actual rate of **biodiversity** loss.
- This integrated perspective **raises challenges** for monitoring global **biodiversity** change.
- While '**biodiversity**' clearly is a well-established term, **we still have no clear scientific basis…**

Status markers

17 lemmas, 11 journals

- ARGUE, ARGUMENT
- CLAIM
- SUGGEST, SUGGESTION
- ASSUME, ASSUMPTION
- SHOW
- DEMONSTRATE
- HYPOTHESIS, HYPOTHESISE
- EVIDENCE
- DISCOVER, DISCOVERY
- CONCEPT
- THINK
- BELIEVE

Example

Journal	1-4	5-8	9-11
AEE	HYPOTHESISE	SUGGEST, ASSUME, SHOW, HYPOTHESIS, CONCEPT	ARGUE/MENT, CLAIM, SUGGESTION, ASSUMPTION…
B	SHOW, HYPOTHESIS, DISCOVER/Y	ARGUE/MENT, CLAIM, SUGGESTION, DEMONSTRATE…	SUGGEST, HYPOTHESISE, EVIDENCE
CEUS	CLAIM, SUGGESTION, DEMONSTRATE, HYPOTHESIS/E, DISCOVER/Y, CONCEPT	ARGUE/MENT, ASSUME/PTION, SHOW, EVIDENCE, THINK, BELIEVE	SUGGEST

Status markers

JSIS	**argue, argument, claim, suggest, suggestion, evidence, discover, discovery, concept, think, believe**
REE	**Argue, argument, assume, assumption, hypothesis, evidence, discover, discovery, think, believe**
GEC	**Argue, argument, claim, suggest, suggestion, assumption, evidence, concept, think, believe**
JRS	**Argue, argument, claim, suggest, suggestion, demonstrate, hypothesise, evidence, concept, think, believe**
PS	**Suggest, show, demonstrate**
AWR	**Assume, assumption, show, demonstrate**

Significant features?

- Whether the actors in the processes are necessarily or possibly human
  - *Argue, concept*
  - *Show, suggest*
- Involvement of an 'objectivised' research process
  - *Hypothesis, assumption*
  - *Think, believe*

Conclusions

- This research problematises the text-context relation and the text-corpus relation. We need to look at individual texts as well as overall trends.
- I have argued for the importance of: ‘research reflexivity’ and ‘contested concepts’.
- ID discourse is a site for future research, re-invigorating research into academic disciplines.

FINISHED!