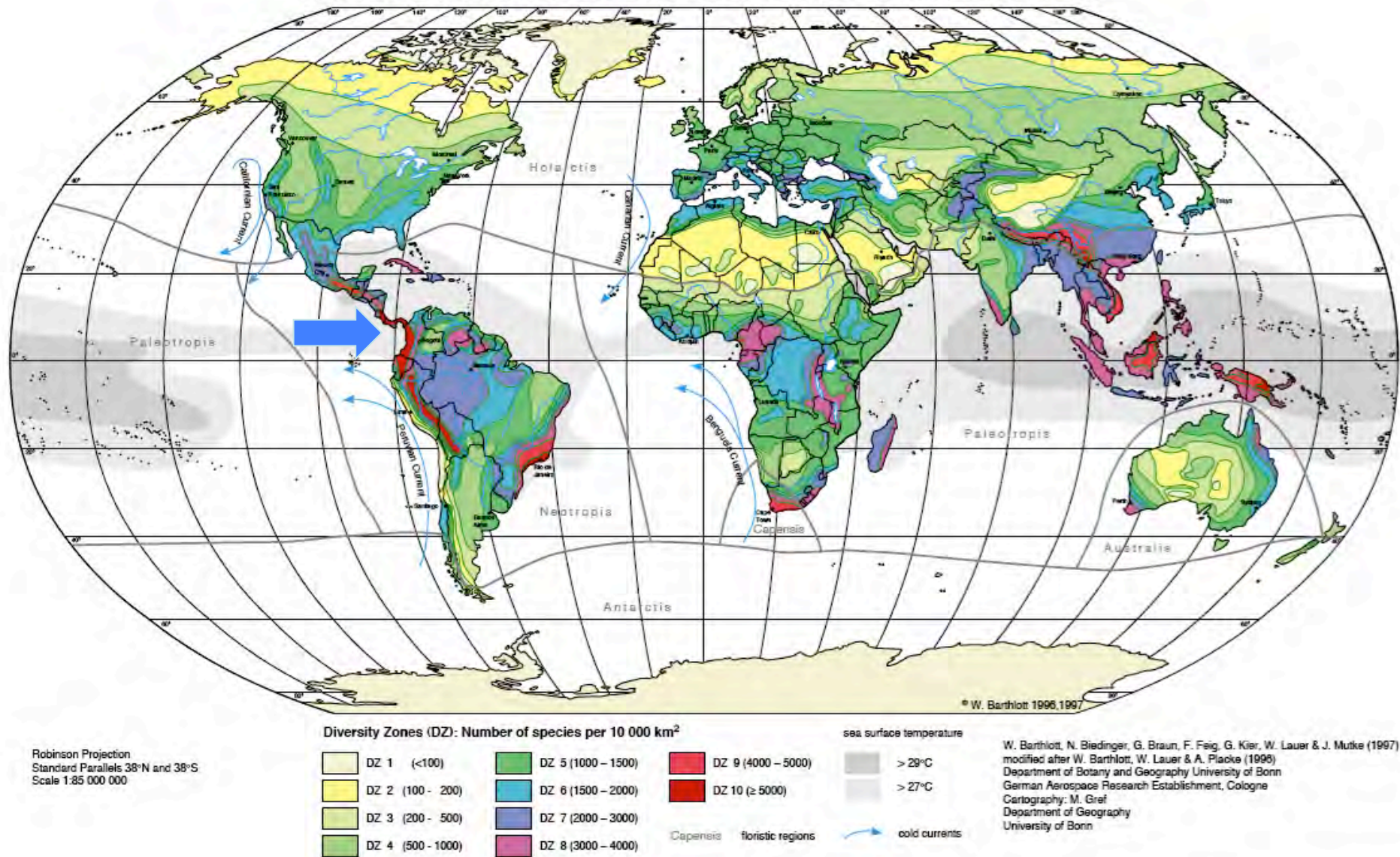
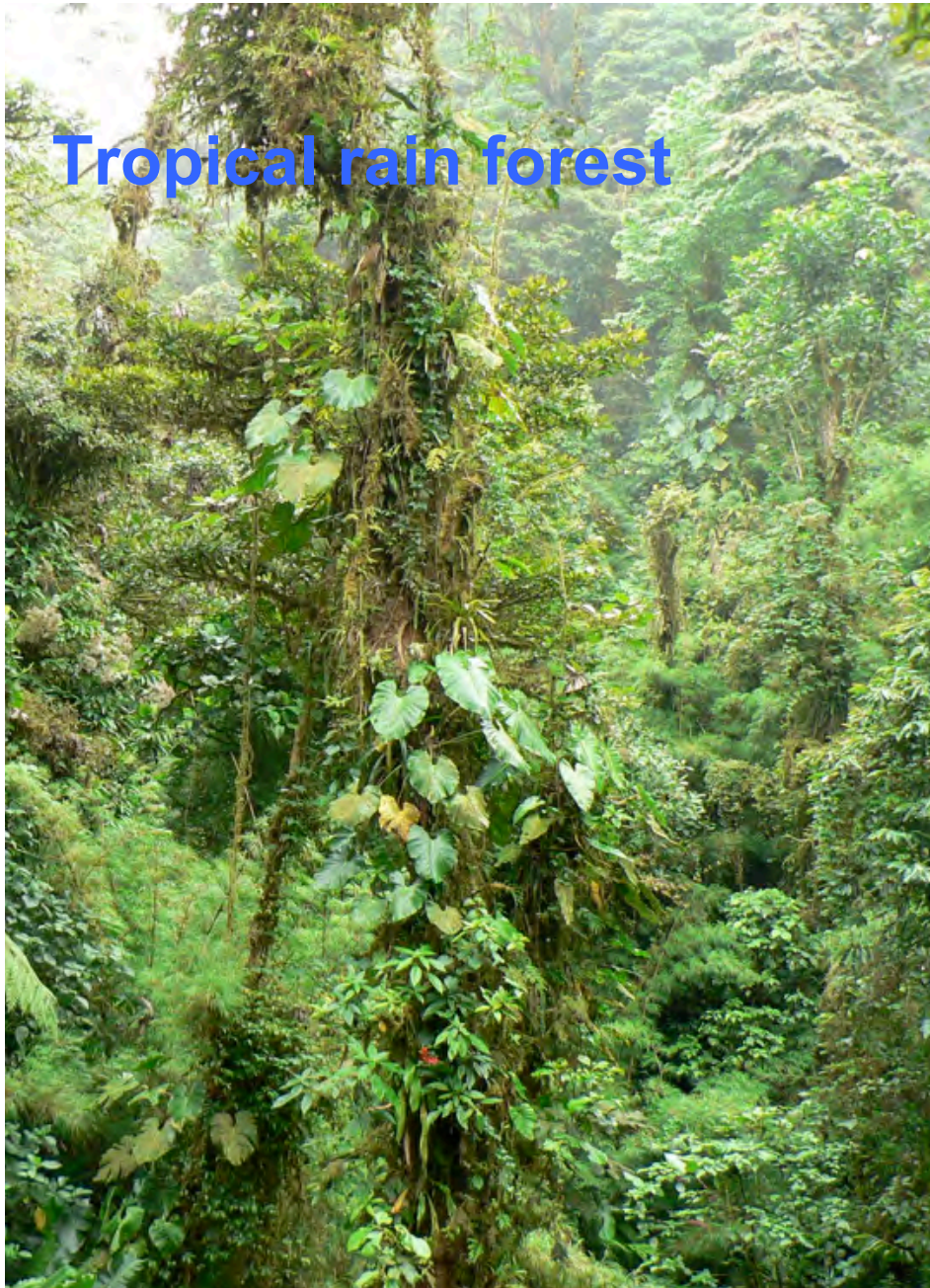

Biodiversity, Ecosystem Services, Natural Capital – what is it all about?

**Biodiversität und Wirtschaft
SWIFCOB 14, 17. Januar 2014, Bern**

Prof. Dr. Thomas Koellner
Professorship of Ecological Services, University of Bayreuth

GLOBAL BIODIVERSITY: SPECIES NUMBERS OF VASCULAR PLANTS

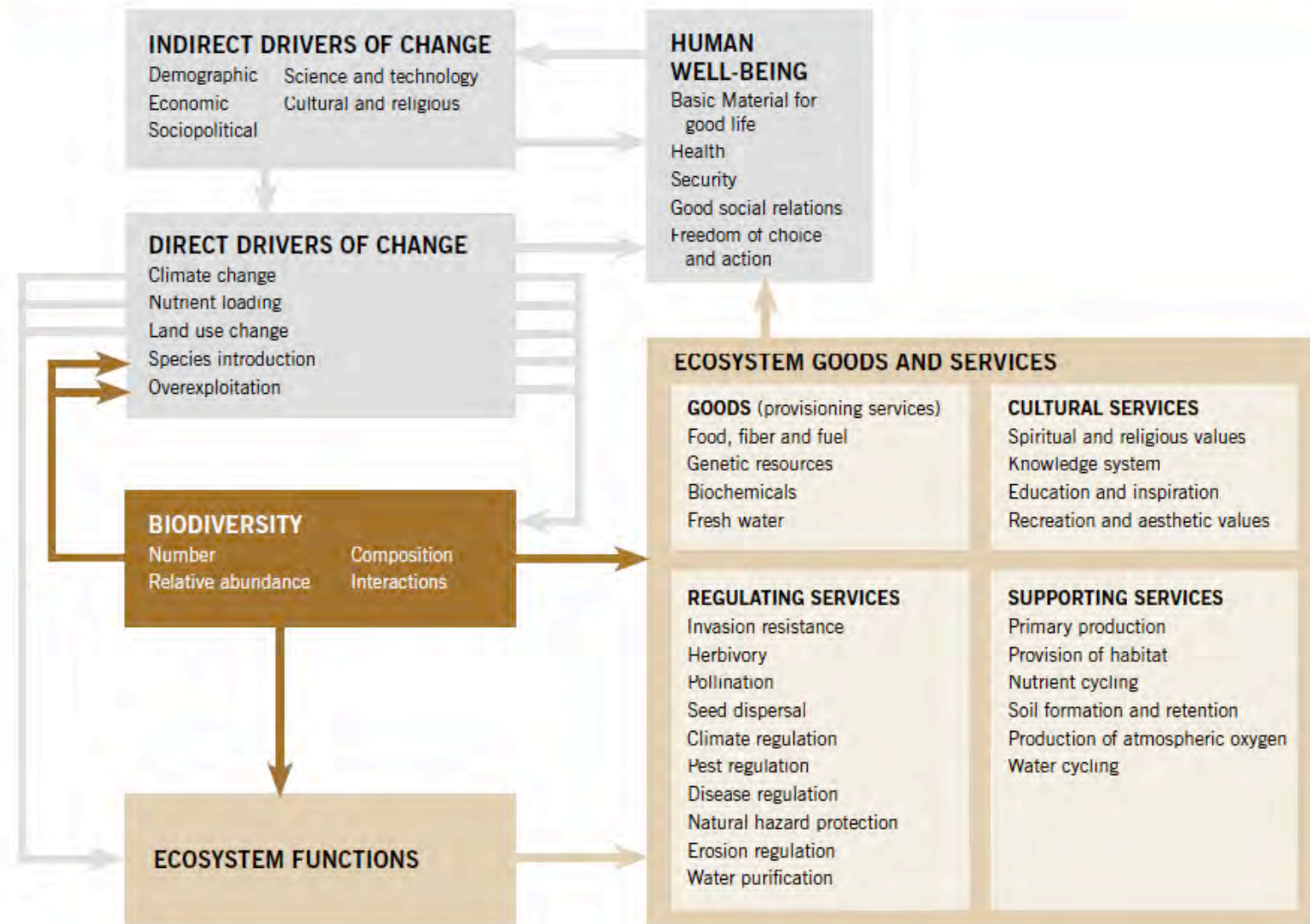




Tropical rain forest

- Biodiversity
 - Variability of information in ecosystems (genes-species-habitats)
- Natural capital
 - Stock of green infrastructure
- Ecosystem services
 - Flow of functions to beneficiaries

FIGURE 1.1 | Biodiversity, ecosystem functioning, ecosystem services, and drivers of change



Source: Global Biodiversity Outlook 2, 2006

Biodiversity of forests in Costa Rica



Tropical rain forest

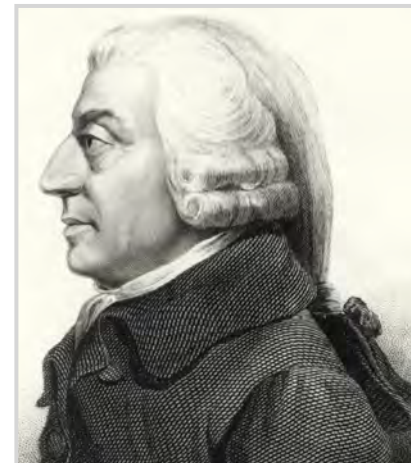


Plantation with exogenous species

THE ECONOMIC VALUE OF NATURE

The labour of nature

- “Nature labours along with man; and though her labour costs no expense, its produce has its value, as well as that of the most expensive workman.” (Adam Smith, 1767, An Inquiry Into the Nature and Causes of the Wealth of Nations - page 241)



The economic value of ecosystem services

- Costanza et al. 1997. The value of the world's ecosystem services and natural capital. Nature 387: 253-260. Value is 33 Trillions US\$ per year
- Balmford et al. 2002. Economic reason for conserving wild nature. Science 297: 950-953. Return on investment is 100:1
- Ecosystem services have no price, as consequence we treat them as they would have no value

Net Present Value NPV for natural ecosystems is always larger than for highly managed ones.

Why are then natural ones destroyed?

Balmford et al. 2002

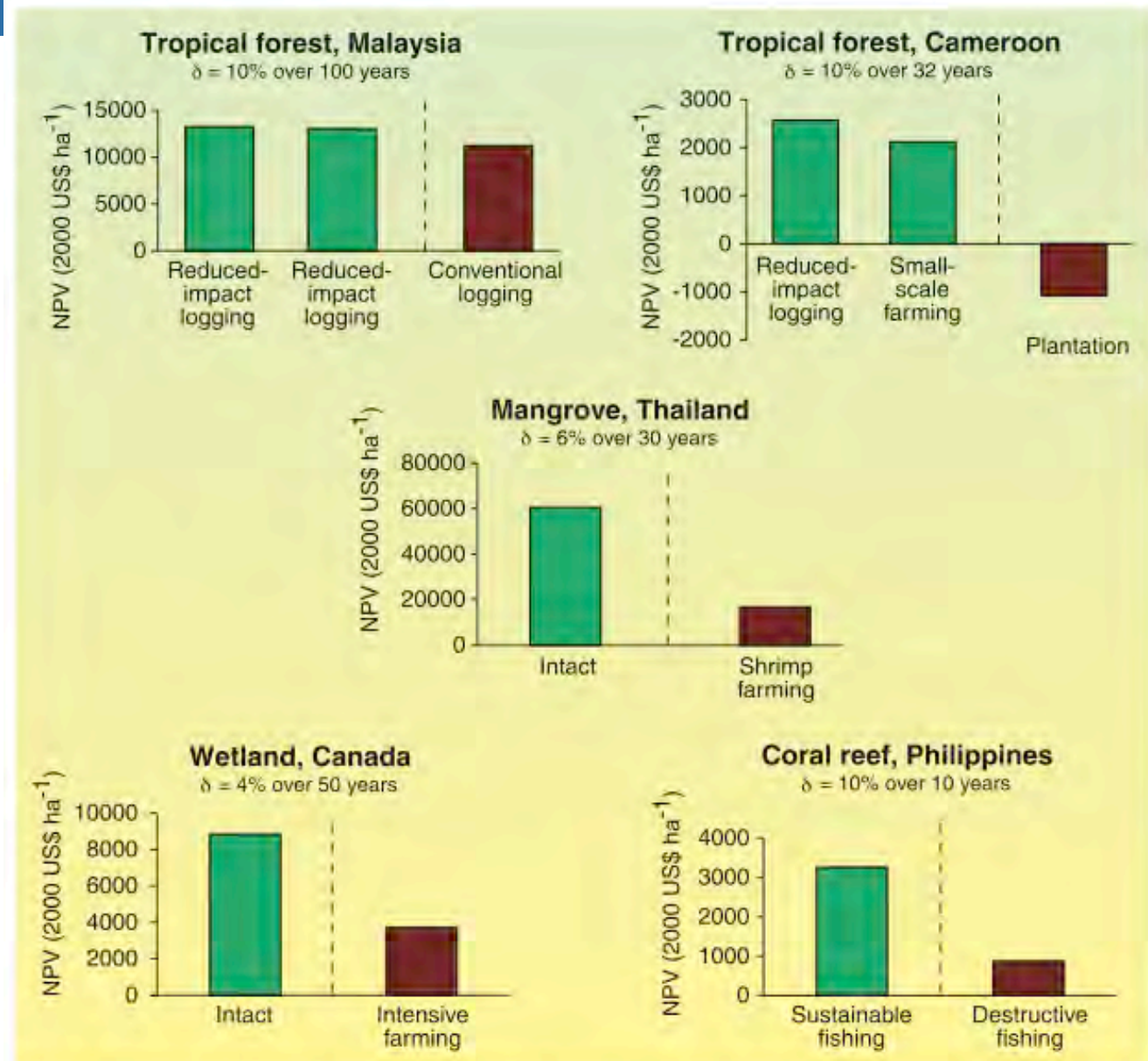


Fig. 1. The marginal benefits of retaining and converting natural habitats, expressed as NPV (in 2000 US\$ ha⁻¹) calculated using the discount rates (δ) and time horizons presented. Values of measured goods and services delivered when habitats are relatively intact and when converted are plotted as green and black columns, respectively. [From (11–15); see (10) for further details.]

WILLINGNESS TO INVEST IN ECOSYSTEM SERVICES

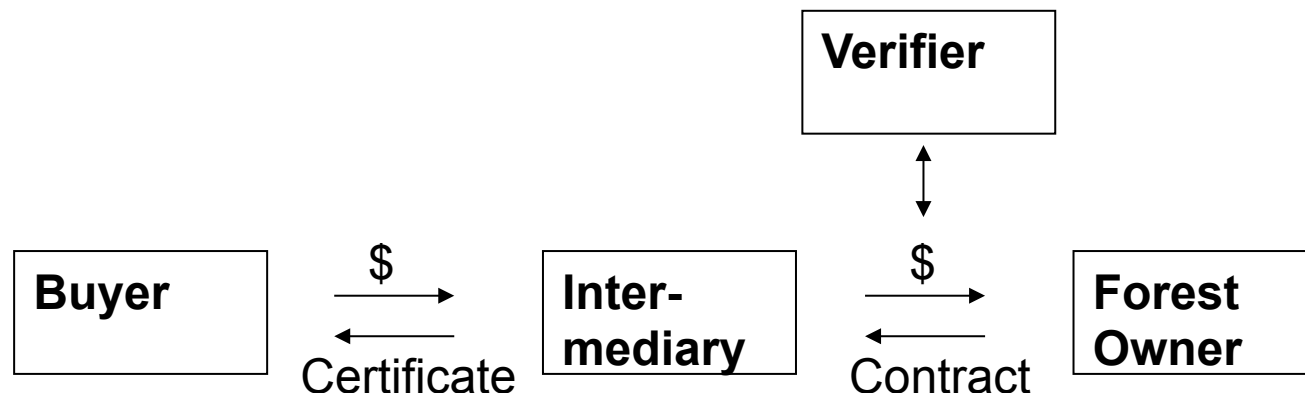
What is demand in \$ for ecosystem services and what are motivations to invest?

- Goal
 - Quantification of demand of companies in \$
 - Professional motivations for buying ecosystem services
- Universe: Multinational companies chosen from MSCI World and Costa Rican Companies
- Method: Questionnaire, Multiple Regression

Koellner T, J Sell and G Navarro (2010): Why and how much are firms willing to invest in ecosystem services from tropical forests? A comparison of international and Costa Rican firms. *Ecological Economics* 69: 2127-2139.

Questionnaire: General introduction

- Explanation of tropical forest types and ecosystem services
 - (A) Biodiversity conservation
 - (B) Carbon sequestration
 - (C) Scenic beauty
 - (D) Watershed protection
- Framework for payments for ecosystem services



Surveyed companies

	INTERNATIONAL SAMPLE			COSTA RICA SAMPLE		
	Surveyed	Completed	Response	Surveyed	Completed	Response
	N	N	rate	N	N	rate
			%			%
ENERGY (1)	37	3	8.1	16	2	12.5
MATERIALS (2)	62	7	11.3	39	1	2.6
INDUSTRIALS (3)	177	4	2.3	69	0	0.0
CONSUMER DISCR. (4)	37	2	5.4	57	5	8.8
CONSUMER STAPLES (5)	47	3	6.4	80	5	6.3
HEALTH CARE (6)	59	4	6.8	26	3	11.5
FINANCIALS (7)	142	5	3.5	73	6	8.2
UTILITIES (8)	52	3	5.8	15	7	46.7
Total	613	31	5.1	375	29	7.7

Willingness to invest (WTI) in \$ per certificate

	INTERNATIONAL				COSTA RICAN				Total			
	Mean	Std	Medi	Valid	Mean	Std	Medi	Valid	Mean	Std	Medi	Valid
		Dev	an	N		Dev	an	N		Dev	an	N
BIO	14	32	0	20	63	109	40	24	40	86	0	44
CA	65	143	0	21	88	148	15	24	77	144	10	45
SC	10	29	0	22	78	203	10	24	46	150	0	46
WA	11	30	0	21	82	132	50	25	50	105	11	46

BIO: Biodiversity protection

CA: Carbon Sequestration

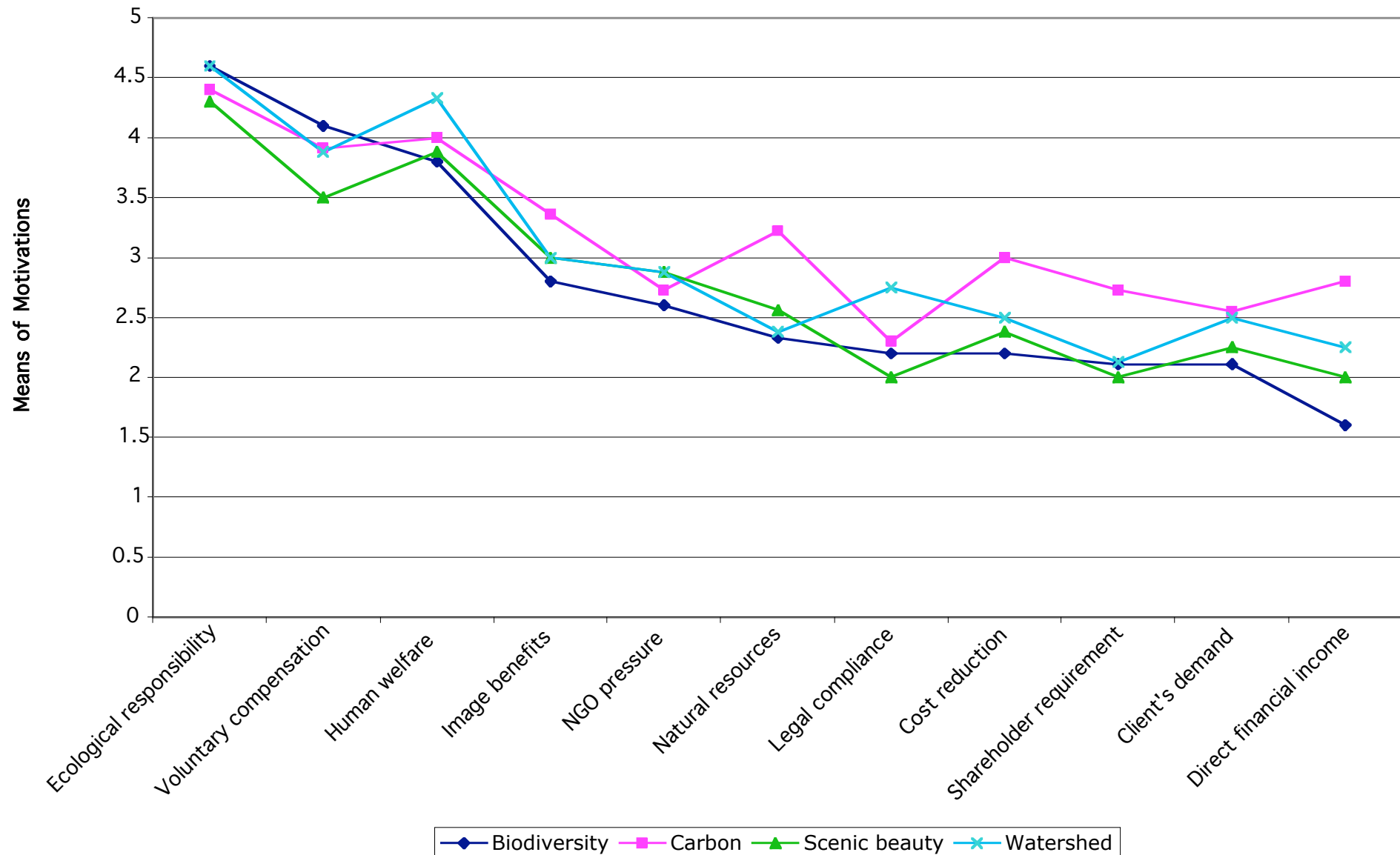
SC: Scenic beauty

WA: Watershed protection

Expected benefit of companies to invest in ecosystem services

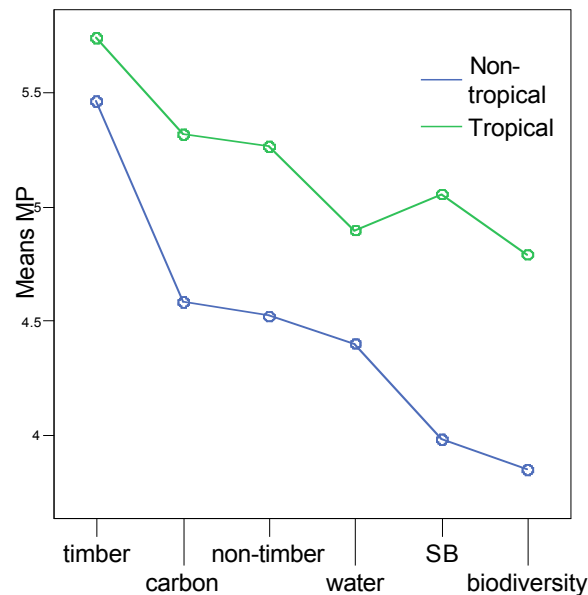
Type	Factors influencing WTI for each ES
Direct financial benefit	a. The service creates <i>direct financial income</i> for my company.
	b. The service <i>reduces costs</i> for my company.
	c. This ecosystem service ensures my company's <i>natural resources</i> .
	d. We are active in this field due to our <i>clients'</i> demand.
Indirect financial benefit	e. It is a requirement by our <i>shareholders</i> .
	f. We do mandatory compensation due to <i>legal compliance</i> .
	g. We compensate our impacts on a <i>voluntary</i> basis.
	h. We expect <i>image benefits</i> in the public.
	i. We perceive high pressure by <i>NGOs</i> .
Non-financial benefits	j. We want to contribute to <i>human welfare</i> .
	k. We want to act <i>ecologically responsible</i> .

Stated motivations of companies to invest into ecosystem services



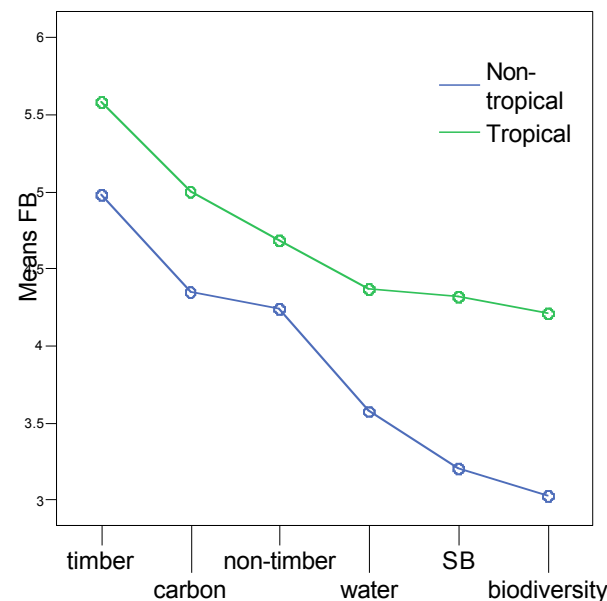
Market potentials and benefits from ecosystems

Market potential



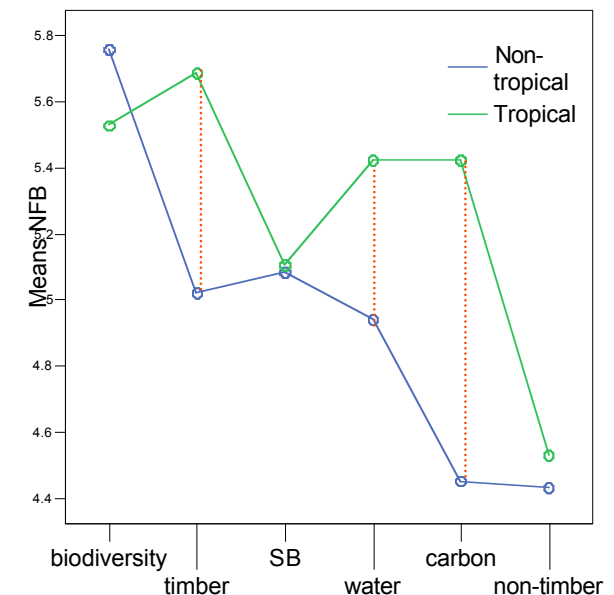
- main effect: $p=.013$
- no interaction!
- Same ranking except scenic beauty

Financial benefits



- main effect: $p=.004$
- no interaction!

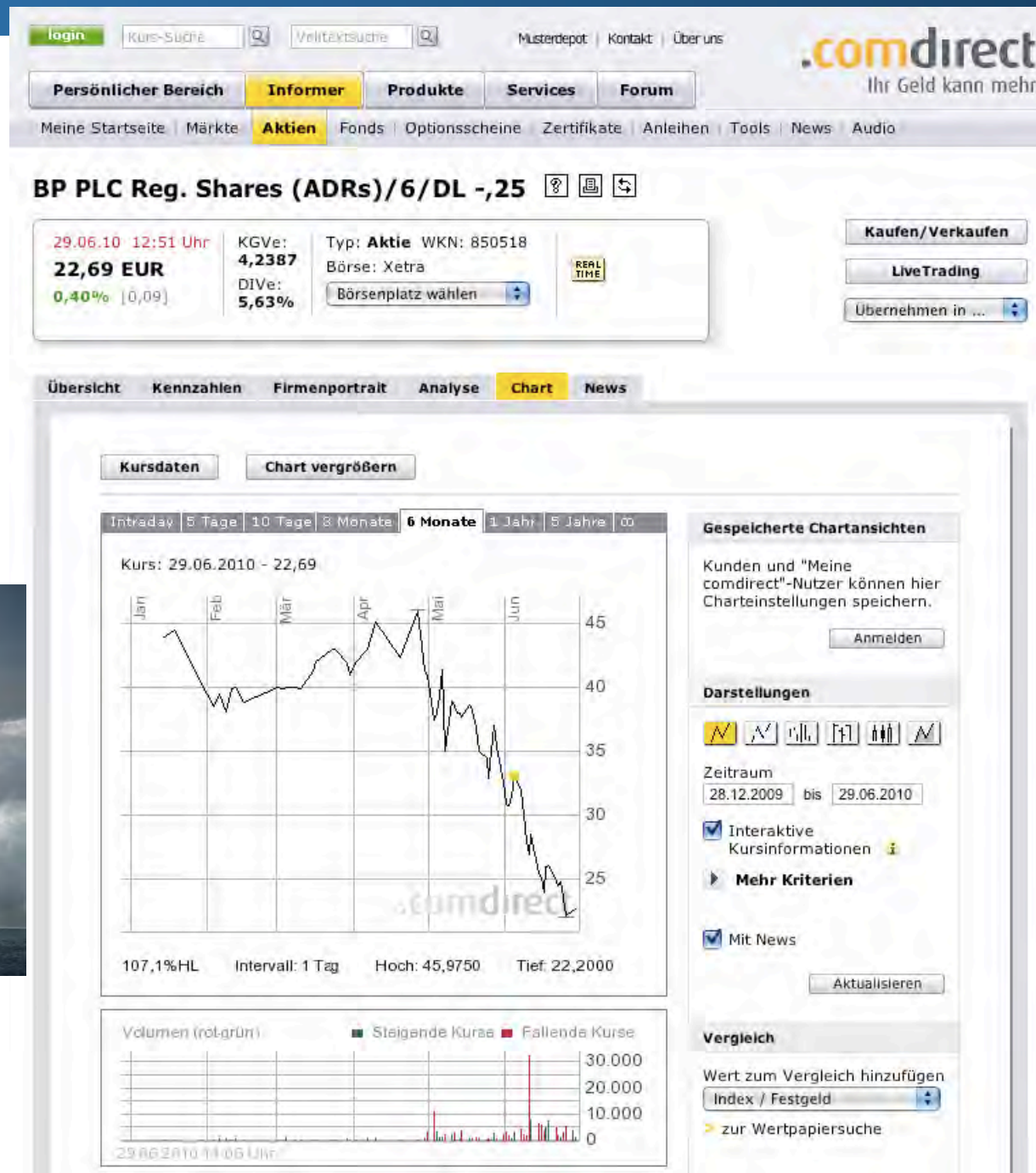
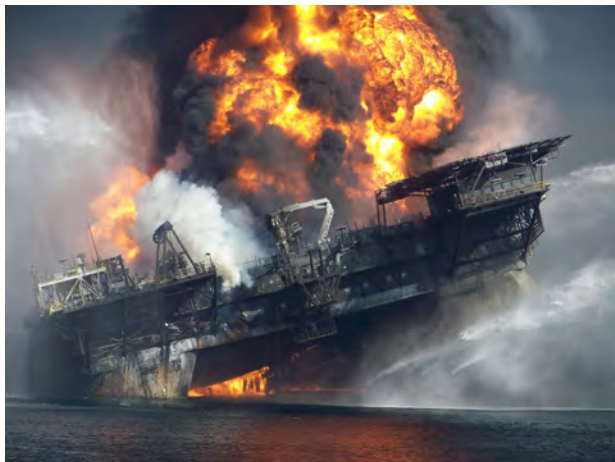
Non-financial benefits

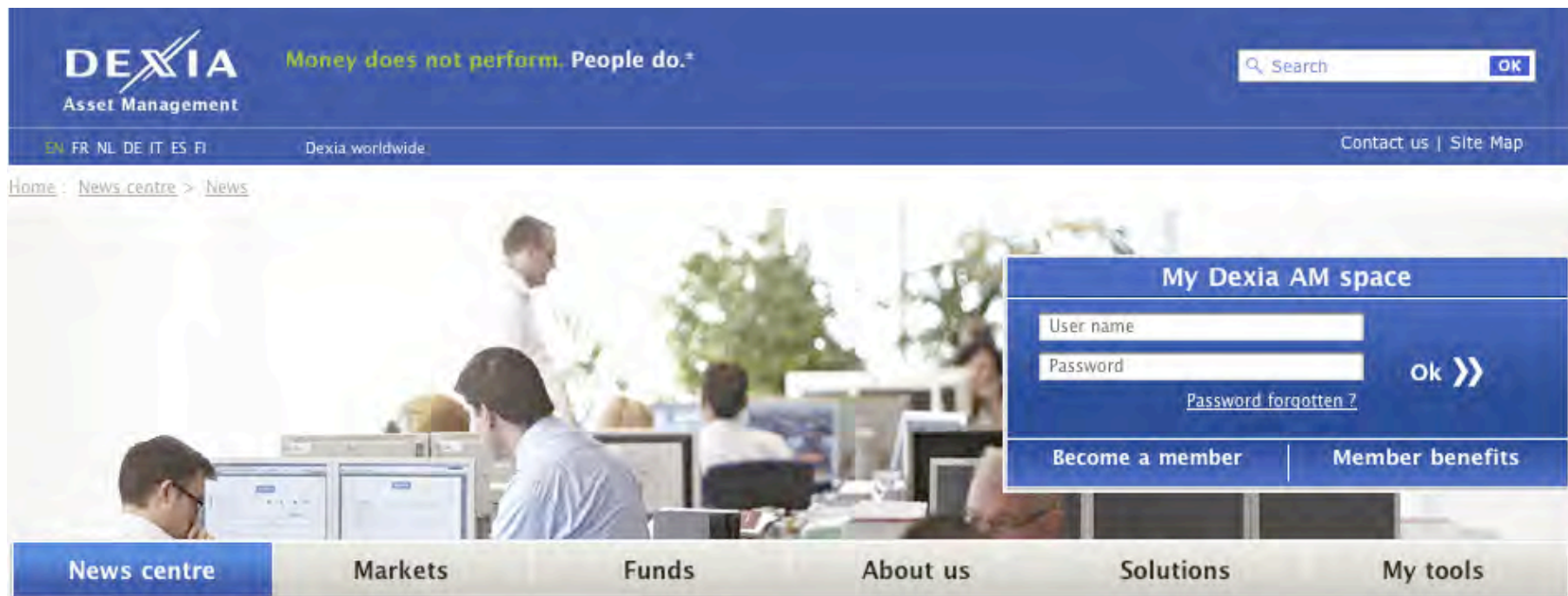


- main effect: $p=.266$
- interaction: $p=.051$
- Disagreement on carbon, timber and water

Sell J (2006): Decision making of market actors in the context of ecosystem services from tropical forestry. Criteria, preferences, and expected benefits, PhD thesis, Zurich, IED, ETH.

BIODIVERSITY RISKS AND OPPORTUNITIES IN FINANCIAL INDUSTRY





News

BP removed from Dexia AM's SRI universe

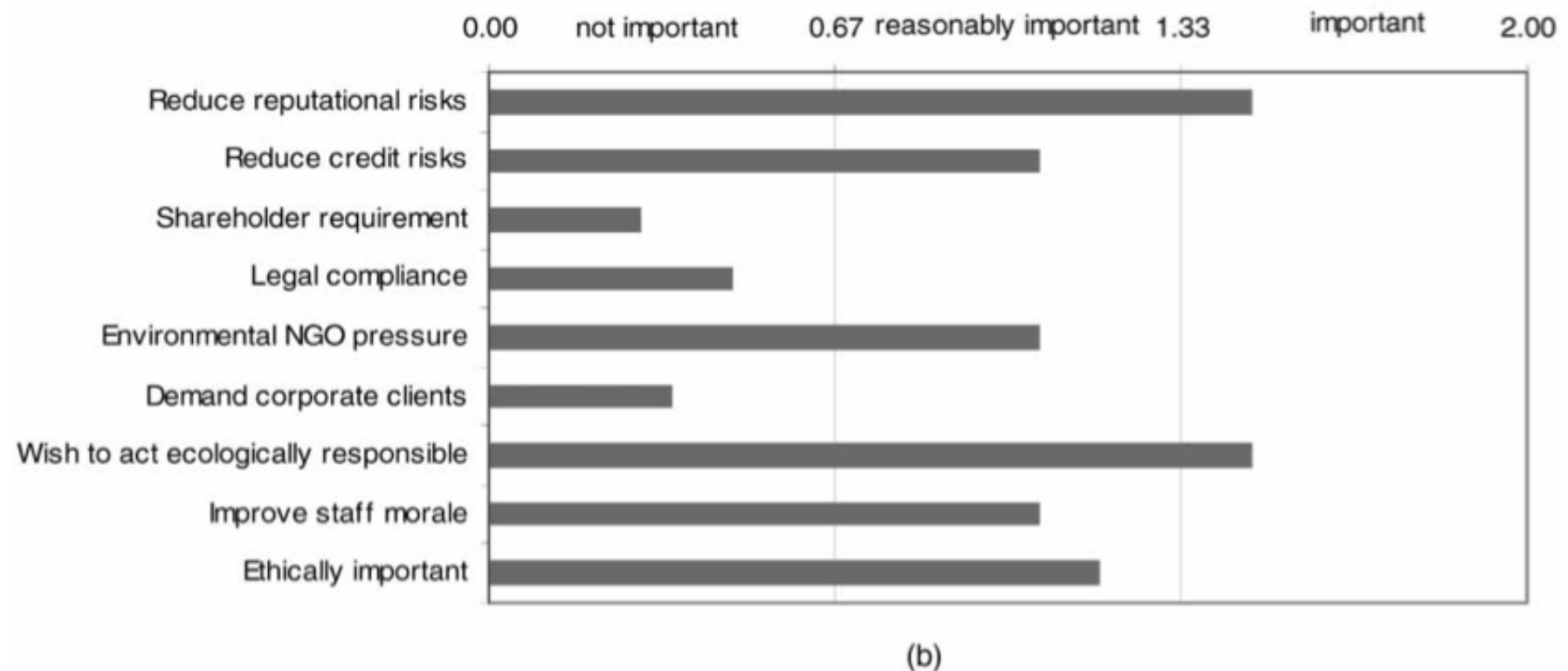
Deepwater Horizon oil spill leads to a fundamental review of the energy sector's business model.

Following the oil spill in the Gulf of Mexico, Dexia AM's sustainability analysts removed BP from their best-in-class SRI selection on 21 June 2010.

Immediately following Dexia AM's April SRI alert on BP, the company's SRI fund managers started to reduce exposure to BP. With the formal removal, Dexia AM's SRI funds are now no longer allowed to invest in BP equity or bonds and existing positions must be sold within 6 months.



Motivations of banks to integrate biodiversity into their own business (Survey of 50 banks)



Mulder I and T Koellner (2011): Hardwiring green – How banks account for biodiversity risks and opportunities. *Journal of Sustainable Finance & Investment* 1: 103-120.

CONCLUSION



Biodiversity, Ecosystem Services and Economics?

- **Motivation of surveyed company members is surprisingly altruistic**
- **Ecosystem services as a functional link between biodiversity and economy**
- **Business cases are needed in Public-Private Partnerships!**