A NEW SILK ROAD: SCIENCE AND SOCIETY IN ASIA AND EUROPE

Final report of the roundtable on
'Science and nature in Europe and Asia: scientific traditions and new technologies'

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Cover photograph: relief depicting Dutch scholars and colonial administrators at the National Monument (*Monas*) in Jakarta, Indonesia (photo by J. van der Ploeg 2009).

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Organizers roundtable:

International Institute for Asian Studies (IIAS), the Netherlands

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&

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Preface

Science and nature in Asia and Europe. Nature and science. Science about nature, the nature of science. Which science? Biology, geography, ecology, philosophy, medicine, anthropology. Which types of nature? Animals, plants, insects, ecological processes. Icons of nature, pandas, whales. Nature and culture, or nature as culture. Is there nature beyond culture and how can we understand it? Man living in nature, man dominating nature, man exploiting nature, man conquering nature. Monocultures, GMOs or slow food and natural food? Nature strikes back. Tsunamis, eruptions, earthquakes, bird flu, mad cow disease, SARS. Natural disasters, man-made natural disasters. European nature, Asian nature. Japanese tourists in the *Keukenhof* gazing at tulips. Almost one million Dutch people donate money for the panda and what it stands for. Trade in nature. Trade in resources. Issues of sustainability, certification as a way to improve. Better timber, better soy or better palm oil. Perceptions about the future. Responsibilities towards nature and generations after us. The values of nature. Restoring nature. *Kolder in de polder.* Compensation for loss of nature. Use it or lose it. Wilderness, wildness, wild men in wild countries. Does the love of nature include the evils of nature? Scientists know. Scientists should know, but scientists don't know. They ask for more time. They also want more money. Scientists make mistakes. Can we still trust them? The Green Lie, Lomborg, IPCC, risks, precautionary principle. Science in politics. Politicians using science. Politicians ignoring science. Science and the media. Science in the media. Public intellectuals. Censorship. Self-imposed censorship. Freedom of speech. Games of shaming and blaming. Who is responsible? Decreasing trust in science. Popular science takes over. New media provide platforms for self proclaimed 'scientists', for people who claim to know.

All kinds of associations come to mind when talking about science and nature in Europe and Asia. Images appear from our own experiences. The roundtable on 'Science and nature in Europe and Asia: scientific traditions and new technologies' explored these images and associations and identified common interests between researchers of various academic institutions in Europe and Asia. We stimulated creative, associative and imaginative thinking, and did not expect clear-cut answers to the questions posed. In this report we have tried to summarize the lively discussions during the roundtable on 20 and 21 October 2011. We have opted not to provide a literal description of the meeting. Instead we present an overview of the most interesting insights and questions that came up in the discussion. As these often resulted from a rather chaotic interaction between the participants we have refrained from mentioning specific names in the text. On the first day of the roundtable the participants were locked up in a medieval prison in Leiden: the '*Gravensteen'*. On the second day we travelled to the village of Nieuwkoop in the so-called Green Heart of the Netherlands. These venues provided a suitable backdrop for discussions on the role of science in mitigating natural disasters, producing food, conserving nature and improving human health.

The roundtable was organized by the International Institute for Asian Studies (IIAS) in the Netherlands, and the College of Humanities, Arts and Social Sciences of Nanyang

Technological University (NTU) in Singapore, and is part of the Europe-Asia Policy Forum (EUforAsia). The roundtable was made possible by the financial support of the European Commission and NTU. Manon Osseweijer, the former deputy director of IIAS, and Monique van Donzel, the former associate dean of the College of Humanities, Arts and Social Sciences of NTU, took the initiative for the roundtable. Martina van den Haak organized the logistics and facilities. Eva Orta and Caelan Keelan took the minutes of the meeting. We would like to thank the following people for their valuable inputs to the roundtable: Greg Bankoff, Augustin de Benoist, Jan Boersema, Janet Browne, Raymond Bryant, Chang-Tay Chiou, Wataru Iijima, Andreas Janousch, Lina Jansson, Stephen Lansing, Patrice Levang, Lisa Onaga, Florencia Palis, Wulf Schiefenhövel, Hiromu Shimizu, Hallam Stevens, Shirley Hsiao-Li Sun and Willem Vogelsang. All errors and omissions in this report are solely the responsibility of the authors.

Figure 1: The participants in the *Nieuwkoopse Plassen*. From left to right: Lina Jansson, Greg Bankoff, Lisa Onaga, Stephen Lansing, Hallam Stevens, Raymond Bryant, Eva Orta, Hong Liu, Jan van der Ploeg, Janet Browne, Jan Boersema, Gerard Persoon, Shirley Hsiao-Li Sun, Willem Vogelsang, Caelan Keelan, Andreas Janousch, Patrice Levang, Hiromu Shimizu, Wulf Schiefenhövel and Wataru Iijima (photo by Martina van den Haak, 2011).

Introduction

The 'Silk Road' was a network of interlinking trade routes that connected Asia and Europe. The caravans that travelled between China, the Indus Valley, Asia Minor and the Mediterranean enabled the spread of products, knowledge, technology, ideas, values and cultures across the Eurasian continent. The Silk Road was a significant factor in the development of the great civilizations of China, India, Persia, Arabia, and Rome, and helped laying the foundations for the modern world. The 'New Silk Road' is a metaphor for the on-going flow of ideas and knowledge between Asia and Europe (Hecht 2003), which in turn contribute to the reconfiguration of global economic and diplomatic relationships (Simpfendorfer 2009).

Science has provided a phenomenal understanding of nature, and enabled people in Asia and Europe to master and manipulate the world (Huff 2011). The benefits have been immeasurable: collectively, we live a longer, happier and healthier life than ever before in history. Technological advances provide economic opportunities, healthcare, food, safety and pleasure for billions of people around the globe. Science and technology have become indispensible and inextricable parts of modern society.

However, science and technology no longer generate the unquestioning public support that it did two decades ago. Citizens in Europe and Asia are increasingly questioning the environmental risks and social impacts of scientific progress (Wynne 2006; Frewer & Salter 2002). A number of environmental disasters have eroded the public's trust in science and technology, and the advances it offers to society. The Bovine Spongiform Encephalopathy (BSE) crisis in Europe, the so-called 'mad-cow disease', the melamine milk poisoning scandal in China, and more recently the Fukushima nuclear disaster in Japan have proved to be landmark cases. These human-made disasters lead not only to public distrust of politicians and scientific experts, but erode faith in technological development and scientific progress itself (Beck 1992). Scientific knowledge is now often greeted with skepticism, distrust and sometimes even hostility. This loss of public authority and legitimacy of science poses a major challenge for scientists and policy makers in Europe and Asia.

The roundtable on 'Science and nature in Asia and Europe: scientific traditions and new technologies' aimed to investigate the causes and consequences of the growing public skepticism about science and technology, and to identify ways to address these societal concerns. By bringing together Asian and European scholars from different academic disciplines, the roundtable intended to highlight different perspectives on the 'public mistrust in science problem'. The roundtable focused on four interrelated themes: (1) natural disasters, (2) food production, (3) nature conservation, and (4) medicine (for more information see the background document for the roundtable: van der Ploeg & Persoon 2011). The discussion on these themes was introduced by the keynote speech of Janet Browne. This report summarizes the main findings of the roundtable, and highlights key research questions and policy recommendations.

Keynote speech

Janet Browne

One of the most talked-about science books in the USA in recent months is *Merchants of Doubt*, written by two well-accredited historians, Naomi Oreskes and Erik Conway (2010). This book tells the story of the controversy over global warming from a completely new angle. The authors argue that a number of prominent American public figures starting in the 1970s and continuing through to today have done their utmost to create uncertainty in the mind of the public about the facts of climate change. They write about individuals who assert that acid rain is caused by volcanoes, that the hole in the ozone layer is not troublesome, that established changes in atmospheric carbon dioxide are attributable to fluctuations in the sun's intensity rather than to human activities. In contrast, in the world of science, every expert agrees on the reality of global warming. So why, the authors ask, is there so much doubt in the mind of the public? Oreskes and Conway suggest that there is a deliberate strategy in American political and industrial circles to cast doubt on scientific methodology as it relates to climate change. And these uncertainties get repeated in the mass media to such an extent that ordinary people begin to think that perhaps there are genuine reasons to question the scientific results. In case after case, Oreskes and Conway show how scientific expertise on climate change has systematically been undermined to the extent that many people now believe that the situation is still undecided.

In coming sessions we will be turning our attention to this and similar issues related to interactions between science and the public. The excellent pre-circulated document composed by Jan van der Ploeg and Gerard Persoon indicates that science no longer generates the unhesitating public support that it did some decades ago. Citizens in Europe and Asia are increasingly questioning the environmental risks and social impacts of technological development. Our task during the next two days will be to explore the causes and consequences of this public skepticism about science. What I want to focus on this morning is the theme of communication that Oreskes and Conway illuminate, and to push that theme a little further into more general questions to do with the popularization of science. Van der Ploeg and Persoon ask, "what has happened to public trust in science?"?

Let me begin with a small but well-known example relating to the history of biology. In England on 18 June 1858 Charles Darwin received a manuscript from Alfred Russel Wallace which outlined a theory of evolution based on natural selection. Wallace's letter came from the island of Ternate in the Malay Archipelago where he was collecting field specimens. Darwin's immediate reaction was one of dismay. He had been working on the very same topic for twenty years ever since his return from the voyage on the Beagle (1831-1836), and it seemed to him as if Wallace, a relatively unknown naturalist out in the field, had forestalled him. Darwin wrote "If Wallace had my [manuscript] sketch written out in 1842, he could not have written out a better short abstract!" This celebrated incident invites many questions, but the biggest one for me has always been why did Wallace do such a surprising thing.

Rather than submitting his article directly to a journal, he sent it to Darwin with a covering letter. Why? Why send the very best idea that you have ever had to another scientist who you hardly know? I believe that some of the answer lies in the system of trust and communication prevalent in 19th century natural history sciences. There were no particular reasons for Darwin and Wallace to know each other. Darwin and Wallace could hardly have been more different in their social background, financial means, and education. Charles Darwin was well-connected, prosperous, independent, and at this point in his life an established scientific author and expert, having published a series of respected geological and zoological works, as well as his popular account of the Beagle voyage. By contrast Alfred Russel Wallace was not a member of any of the elite scientific institutions of the day, he did not have anything like the social connections that Darwin enjoyed, nor did he have any university contacts. His natural history voyaging in South East Asia, and in the Amazon basin several years previously, was undertaken as a self-financing enterprise in order to collect rare bird and beetle specimens for sale on the museum market back in Europe. The two men would probably never have even met each other in the normal course of their daily lives.

Figure 2: Illustration by T. Baines from *The Malay Archipelago* by Alfred Russel Wallace (1869).

DOBBO, IN THE TRADING SEASON.

Yet my point is that the social structure of science brought them together as correspondents. Wallace and Darwin had exchanged a few short and courteous letters beforehand seeking information about natural history specimens. These were

letters in which each man also found time to make a small compliment about the other's published writings. Drawing on a longstanding tradition in Europe, their mutual interest in science created a social space where the two men were able to discuss issues of common concern and display the civility and virtuous attributes of men of science as described by my colleague Steven Shapin (1991). This tradition can be traced back certainly as far as the 16th century. Slight as they were, these letters reveal a well-established form of social engagement based on trust. So I believe that there was already in operation a social code that allowed Wallace, after exchanging only three or four letters with Darwin, far away in England, a man he had never met, to trust Darwin sufficiently to send him a brilliant and unusual essay. In turn, Darwin knew that scientific convention and gentlemanly honor required him to acknowledge that Wallace had forestalled him in first writing up the theory of evolution by natural selection and that Wallace should take all the credit.

This particular story ended, as you know, with Wallace and Darwin jointly publishing an abbreviated version of their theory of evolution by natural selection in an article in the journal of the Linnean Society of London, followed by Darwin's publication of *On the Origin of Species* in 1859. My reason in recounting it is not so much to draw attention to the extraordinary impact of this simultaneous discovery, although that is indeed notable, but more to open up the question of communication and networks of contact in the past. By exploring the correspondence of early naturalists, we gain an insight into the accepted norms of earlier times and the development of mutual trust in science; and perhaps we see something of what has been lost, although perhaps not completely, in the modern world of Wikileaks and Twitter. When Darwin and Wallace wrote to each other they linked East with West; provincial England with tropical South East Asia; they came from opposite ends of the social and professional scale, the reputable expert corresponding as an equal with the lowly natural history collector. In short they were confident that their scientific interests generated a mutual intellectual territory in which they could exchange information, concepts, and actual gifts of specimens of birds, shells, insects, and plants. The intriguing aspect of this social space is that it also included an inbuilt code of honor that was sufficiently robust to accommodate unforeseen events like a priority clash or the possibility of intellectual theft.

Not all networks of communication had the same high level of embedded trust. Another historical example is being explored by one of our PhD students at Harvard University. It relates to paleontology in America during the exciting decades at the end of the 19th century when dinosaurs were discovered to have been as prolific in North America as they were already known to have been in Europe. American fossil hunters treated dinosaur bones like any other scarce natural resource one could dig out of the ground, like gold, or oil, or diamonds. Among other things, this meant that negotiations over the value of fossils, like negotiations over the value of a new mineral prospect, were conducted under conditions of relative ignorance, with information distributed asymmetrically between the various players. This can be seen very clearly in the negotiations conducted by letter between W.H. Reed, a fossil hunter in the western United States, and Otniel C. Marsh, professor of paleontology at Yale University from the 1860s onwards. In retrospect the situation seems clear

enough: Reed had found large new fossils that he regarded as a commodity that he wanted to sell; and Marsh wanted to acquire any such large new dinosaurs to put on display in his university museum. The complex negotiations and interactions that took place between these two individuals, who were brought together only by a shared interest in establishing the financial value of the fossils, implicitly rested on mutual trust. But neither man wished to trust too much. The fossil hunter did not wish to disclose the location of his fossil site, since this was his unique selling point, a fossil version of intellectual property rights. Nor did he want to send samples to the possible purchaser in case they were simply taken without payment. Yet he needed the Yale professor to invest money into excavating the site and to confirm that these were sensational unknown specimens. In turn, the Yale professor could not authenticate any new species of dinosaur without having some bones in his possession. He deeply desired spectacular display items and was prepared, up to a point, to buy sight unseen. Each man had to trust the other to a certain degree and was prepared to put time, money, and effort into generating that relationship. But their letters reflect a market-based approach to value in which different parties engage in cautious transactional relationships to satisfy non-overlapping interests.

Correspondence and the practice of communication take us into the inner life of science more vividly than any other form of record, opening up the world of the past as it was actually experienced, revealing personal feelings and the practical details of daily existence, as well as the bonds of the society in which the letter-writers lived. Those of us lucky enough to work with collections of historic correspondence feel the magic every time we unfold the original pages. Who can resist the scientist Thomas Henry Huxley, writing to a friend in the 1870s to say that the newly invented fountain pen didn't help his handwriting but at least it spelled properly? Or his letters from HMS Rattlesnake while charting the dangerous waters of the Timor Sea, creased and dirty along the folds, showing how the letter actually travelled from port to port across the ocean to England. Letters, as I have indicated, offer the prospect of reconstructing networks and patterns of sociability. For letters do much more than communicate news and views: they are part of the structure of literate societies. They have always been essential items of governance and international diplomacy. They can be anonymous, sent with the intention of causing trouble, or can serve as a gift by offering some unknown piece of information. They can be forgeries, as in the notorious 19th century case when letters purportedly written by Cleopatra, Judas Iscariot, Joan of Arc and Dante, fooled the brilliant but unworldly mathematician Michel Chasles and led him into a humiliating controversy from which he never recovered.

Most of all, and sometimes easiest to forget, correspondence used to be the main way that scientists and naturalists collected data for large-scale projects. Letters were one of the primary vehicles for the globalization of science, in much the same way as email is today. Charles Darwin's correspondence network has been a popular source of attention, but other naturalists maintained equally wide ranging communication networks such as anatomists and museum directors like Georges Cuvier in Paris or Richard Owen in London who ran the great natural history museums; or Spencer Baird, the director of the Smithsonian Institution in

Washington DC (1823-87); or Joseph Hooker, the director of the Royal Botanic Gardens at Kew in London and mastermind of the British colonial plantation system, especially the introduction of rubber trees to Malaya.

Yet one can see much the same thing in place two or even three hundred years earlier. The 600 letters that survive in the archives of Conrad Gesner, the 16th century Swiss naturalist, reveal a republic of letters connected by the then universal language of Latin. Because letters were so central to the emergence of a community involved in the exchange of information, both the author and the facts that were reported had to be verifiable as truthful and reliable, and a number of elaborate techniques emerged in Gesner's day to safeguard this aspect, such as the citation of authoritative witnesses who could support whatever fact was being described (the antecedent of the scholarly footnote), or the introduction of the role of 'corresponding member' in early scientific societies or the 'secretary' who would write and receive letters on an institution's behalf.

By the 19th century, these techniques made it possible to assume that an individual contributing information to science by letter would not be a charlatan. Hence, a great traveler such as Alexander von Humboldt could augment his practical observations in South America with knowledge gathered from thousands of letters after his return to Europe. It was only by gathering data through correspondence that Humboldt was able to reflect on how the physical variables he had noted related to one another throughout the 'cosmos'. Using letters as a database substantially increased the amount of information to which each naturalist had access, a sort of written accompaniment to the expanding boundaries of the developed world, or, as I'd like to suggest, a globalization of the practices of Western science as pervasive in its own way as colonial extension.

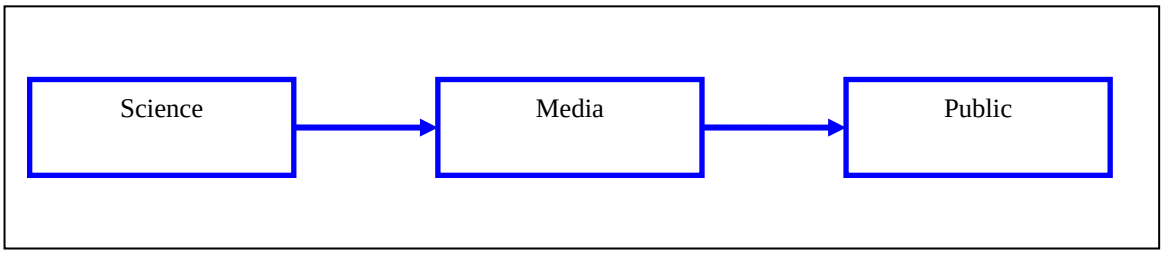
Why might this be useful to consider in our workshop? Hard as it is to imagine nowadays, natural history used to be the big science of the 18th and 19th centuries, a worldwide search for scientific understanding rooted in voyages of exploration, collecting expeditions, geological and geographical surveys, international competition for natural resources, and the consolidation of a wide range of private and company investments in global prospecting and trade. Museum curators longed for unusual organisms to put on display. Anatomists called for increasingly diverse specimens. Circuses and zoos and botanic gardens clamored for rare exotics. More notably, and with more obvious impact on the environment and world history, human labor and plantation crops were moved around the globe from place to place. Great international trading companies like the Dutch East India Company, as our hosts for this meeting will readily recognize, invested heavily in the search for new drugs, remedies, foodstuffs, commodities and consumer goods of all kinds. Government officials hoped for the discovery of new cash crops to open up new markets. In his prizewinning book, *Matters of Exchange*, Harold Cook (2007) describes all this and more, in his account of how Dutch commerce inspired the rise of science in the 16th and 17th centuries. Cook argues that engaging in commerce changed the thinking of Dutch citizens, leading to a new emphasis on such values as objectivity, accumulation, and description. The preference for accurate information

that accompanied the rise of commerce also laid the groundwork for the rise of science globally, wherever the Dutch engaged in trade. This desire for accurate information was also to be found in letters moving through the now accredited channels of trustworthy scientific networks.

Similarly, the worlds of the founding fathers in North America, of the French Enlightenment, and of imperial Europe were worlds where geographical exploration, science, and commerce were inextricably linked and functioned as important routes to national prosperity. So much so, that individual naturalists like Georg Rumphius, Joseph Banks, Lewis and Clark, Carl Linnaeus, or Stamford Raffles were deeply committed, as patriots as well as scholars, to the enterprise of collecting natural history specimens and the communication of natural history facts. These channels of communication spread across the globe hand in hand with trade and commerce. My message here is that communication is a vital part of international science and has been so for many centuries.

Natural history is also an especially felicitous site to examine the relations between science and the public. For many years studies on the relations between science and popular culture have tended to focus on an older diffusion model in which expert knowledge is thought to be generated and authenticated in established centers of expertise and only subsequently spreads outwards via the mass media to enter a wider cultural context. One might easily characterize, for example, the history of bacteriology in this way: the first significant steps towards understanding the pathogenic properties of bacteria and the identification of particular organisms with particular diseases were lab-based inquiries conducted at a sophisticated level stretching out over many decades from Pasteur and Koch to Paul Ehrlich and beyond. However the vast majority of individuals learned of the bacterial origins of disease through some intermediary, through a journalist, or some popularizing form of publication that explained and probably simplified the science. There is much truth in this model of the diffusion of scientific knowledge. So much of modern science is incomprehensible in the eyes of even rather well educated persons that there is a necessary place in our culture for intermediaries like journalists and TV pundits to describe and explain. The popular press, science magazines, radio, movies and TV shows, the internet, all perform an essential function in presenting the knowledge of experts to the public.

Figure 3: The top-down diffusion of science model.



Yet we now also know that knowledge actually circulates back and forth among a lively network of participants, some expert, some not, each of whom brings his or her own commitments and local circumstances to bear on the process. The existing scholarship rightly emphasizes the role of communication and negotiation in these exchanges. James Secord (2004) at the University of Cambridge, for example, has argued that the very category implied by the term 'popular science' requires revision: he says we should now think in terms of densely populated networks of communication in which the process of making scientific knowledge involves communication, rather than merely being followed by it. He calls this 'knowledge in transit', an active terminology that captures something of the dynamic interaction between scientists and the public in the modern world (see also: Topham 2009). Thinking again about recent developments in the debates over climate change, it is clear that scientists spend a great deal of their time trying to reiterate established facts that are being contested by members of the public. Even more recently, the Wikileaks phenomena vividly demonstrated the public's desire for information and its distrust of expert opinion.

Since we are here to explore scientific traditions and new technologies perhaps we will find a moment to think constructively about the new world of electronic globalization and what this signifies for the public as a means for expressing discontent. The challenge of doing so is even more urgent today than it was a hundred years ago: global climate change, widespread habitat destruction, technological and natural disasters, epidemics, and the loss of biodiversity, are all problems that cannot be solved by scientists alone. In democratic societies, science relies on a broad base of public interest, involvement, and support. The roundtable on Science and Nature in Europe and Asia has the potential to help us better understand why it can be so difficult to establish meaningful communication across widely dispersed social and cultural contexts.

Session 1: Natural disasters

Chair: Stephen Lansing

Discussant 1: Greg Bankoff

Until 1900 natural disasters and hazards were primarily local concerns. But in modern societies in Europe and Asia risk became 'nationalized', usually at the expense of local practices and traditional knowledge. Trust was placed in large technological and scientific projects of governments. Governments however are increasingly unable to maintain the illusion of safety. In Europe, natural disasters are often seen as 'abnormal breaks'; as random a-historical events with clearly defined boundaries; as 'acts of God' (Bankoff 2001). In fact natural disasters can best be seen as processes: a continuum between past, present and future. Disasters such as hurricane Katrina, which destroyed the city of New Orleans in 2005, should be analyzed as moments of intersection between historical trajectories. In most parts of the world natural disasters are the norm and not the exception. Asian cultures for example seem better adapted to the frequency and severity of natural disasters. These societies have normalized the risk, and have formed so-called disaster cultures. It might be interesting to study similarities and differences of adaptations to natural hazards (typhoons, flooding, earthquakes, etc.) between different cultures, particularly in areas where several natural disasters interact (for example in Manilla where people have to cope with the risks of earthquakes, fire and flooding). How does for example urban planning and architecture accommodate these conflicting demands? And what do these 'disaster cultures' teach us in terms of resilience?

Discussion

- **Anthropogenic disasters**: Natural disasters are increasingly the outcome of anthropogenic actions. The rate and scale of human impact on Earth over the last 50 years may have passed humanity's ability to prevent (or perhaps even to cope with) these changes (Steffen et al. 2004). As a result of growing human population and their ecological footprint the impacts of natural disasters are much larger than before.
- **System flips**: Humanity is fundamentally altering global environmental processes. Abrupt shifts in nature are often rapid, irreversible and counter-intuitive. This makes coping with these phase transitions very problematic. Our understanding of these changes is yet inadequate. Do we still have enough time to respond to these environmental changes? Or are we too late?
- **Societal boundaries**: There is a growing recognition of the natural boundaries of planet Earth. However, the social boundaries of human societies remain unclear; particularly regarding risks that transcend social and political boundaries such as pollution, biodiversity loss and climate change. New types of international governance structures are needed to respond to global

challenges, but can human societies adapt quickly enough to these new threats?

- **Blame game**: Public confidence in the ability of scientists to predict hazards is decreasing. Scientists are blamed for failing to accurately predict natural disasters (see for example Nosenga 2011). In certain instances, for example the Fukushima nuclear disaster in Japan in 2011, scientists are blamed for deceiving the public. In fact defining responsibilities in modern liberal societies is increasingly complex. Governments have devolved responsibilities to the private sector. Citizens demand accurate information from science and government, but do not like to be confronted with 'inconvenient truths.' In the words of Wulf Schiefenhövel: 'Humans are crazy animals: they want to be lied to.'
- **Disaster capitalism:** Discussions about growing public mistrust of science mask fundamental questions about the role of global capitalism in decision making processes. Risk management is often seen by corporations and governments as a cost-benefit analysis. Power relations structure to a large extent societal responses to natural disasters.
- **Catalyst of change**: More positively, natural hazards also function as catalysts of change. Human cultures are to a large extent the product of adaptations to natural disasters. In the long term disasters can be beneficial: catastrophes galvanize societies and lead to social change.
- **Historical reversals**: A paradigmatic change in the way we think about natural disasters is urgently needed. A comparative historical analysis in European and Asian societies might offer clues to prevent and cope with natural hazards. Instead of relying on increasingly complex technological solutions, much can be gained by restoring natural processes and re-localizing responsibilities (for example building houses on artificial dwelling hills and re-flooding polders instead of strengthening and raising dykes).

Discussant 2: Chang-Tay Chiou

Taiwan is in a seismically active zone, on the Pacific Ring of Fire. Geologists have identified 42 active faults on the island. Most of the earthquakes detected in Taiwan are due to the convergence of the Philippine Sea Plate and the Eurasian Plate. The first recorded earthquake in Taiwan was in 1624, when the Dutch conquered Formosa. Between 1901 and the year 2000 there were 91 major earthquakes in Taiwan. The most recent major earthquake was on 21 September 1999, which killed 2,415 people. Taiwan is also frequently hit by tropical typhoons, which develop in the northwestern part of the Pacific Ocean. Typhoons form throughout the year, with peak months from August to October. Traditionally, the government focused on developing technology to predict earthquakes and typhoons. However, scientists regularly fail to predict natural disasters. As a result, people lose confidence in the ability of scientists to predict them. Science no longer generates unquestioning public support. Therefore, the Taiwan government shifted its focus from prediction to communication; and from knowledge creation to knowledge diffusion. The aim is to educate people on how to react to earthquakes and typhoons. Activities included:

(1) setting up an early warning system; (2) encouraging self-help action; (3) designing evacuation strategies; and (4) creating disaster-resistant communities. Scientists are encouraged to play an active role, not only in the function of knowledge creation, but also in that of knowledge diffusion. Science education traditionally pays too much attention on the accumulation of 'hard' knowledge (problem-solving, fact-finding, truth-seeking). We should encourage the acquisition of 'soft' knowledge (knowledge dissemination, risk communication and policy influence).

Figure 4: Tropical typhoon Imbudo hit the Philippines on 22 July 2003 causing massive destruction (photo by J. van der Ploeg, 2003).

Discussion

- **Migration**: The movement of people from ancestral environments is a major cause of vulnerability.
- **Scientific autonomy**: In many Asian countries science and the state are closely interwoven. Science depends entirely on government and business for funding, which results in a strong focus on applied research. In Europe in contrast science seems more independent of government and corporations, with the important exceptions of nuclear energy and bio-medical industry. How these differences between Asia and Europe originated historically is an interesting field of study.
- **Intermediaries**: A fundamental shift is taking place in how science is disseminated to the public. Information is no longer solely diffused from government and science to the larger public. International corporations and

civil society play an increasingly larger role in disseminating and using science. Social media enable the circulation of information through society. This has positive aspects (for example the increasing difficulties of censorship and cover-ups), but also negative aspects (such as the circulation of pseudo-scientific claims). Dissemination of knowledge requires specific qualifications and means: it can best be done with the scientists, but not necessarily by the scientists.

- **'Fair science'**: The autonomy of science is closely related to the accountability of science. In post-war Europe, scientists were given relatively large autonomy in return for trickle-down benefits for society. However, this 'social contract' between science and society is under increasing pressure, as the public questions the societal benefits generated by science and technology (Lubchenco 1998).

Figure 5: Dr. Sulfikar Amir of the School of Humanities and Social Sciences of NTU (centre) with researchers of Tokyo University at Unit 1 of the Fukushima nuclear power plant in Japan (photo by S. Amir 2009).

Session 2: Food production

Chair: Hong Liu

Discussant: Florencia Palis[1]

In October 2011 thousands of people converged in Wall Street to protest against corporate greed, specifically against the bailout policy given to the financial sector of the US economy. We also see corporate greed in food production, for example in the case of the melamine milk scandal in China. Is science to be blamed? Science was supposed to be the foundation of progress and good for humanity. In the analysis of the changing public perceptions of science, it is important to analyze both the supply and demand sides of knowledge production and utilization, including the enabling environments that serve as a catalyst for these changes (Table 1).

Table 1: The production and utilization of knowledge

Production of knowledge (supply side)	Enabling environment	Utilization of knowledge (demand side)
Multiple sources of knowledge **Scientific disciplines are increasingly specialized** **Funding is shifting from public to private**	**Globalization and trade** **Public-Private Partnerships** **Mass media and Information Communication Technology (ITC)** **Democratization and participatory governance**	**Empowered and educated citizens** **Knowledge intensive industries** **High level of innovation among users** **Knowledge users increasingly critical, and active in policy making and governance**

The production of knowledge comes from multiple sources: scientists, farmers (local knowledge), public institutions, private institutions and other stake holders. Private companies have become both producers and consumers of scientific knowledge. With this, has science become commercialized? With the world's financial crisis, private funding for scientific research continues to exceed public funding, and public-private partnerships (PPPs) in agricultural research are encouraged. But is regulation and accountability compromised? Does science become a commercial enterprise, knowledge a commercial product? In turn, the enablers or catalysts, such as advanced information and communication technologies (ICT), globalization, and democratization, have created divergent views as towards science, and feelings of trust and mistrust.

The Green Revolution of Asia in the mid-1960s led to the development of high yielding rice varieties that now feed more than 60% of the world's population. Rice is

[1] Florencia Palis could unfortunately not attend the meeting due to health problems. Her paper was read by Jan van der Ploeg.

the staple food of Asia. However, these varieties require high agro-chemical inputs that cause negative externalities to human health and the environment. Since the early 1960s, Rachel Carson (1962) contended that through indiscriminate use of pesticides, humans are poisoning their environment with dire consequences to wildlife and to present and future generations of humankind. This was further supported by research done by the International Rice Research Institute (IRRI). IRRI strengthened the promotion of integrated pest management (IPM) to minimize the use of pesticides in rice production (Pingali et al. 1994). Are there lessons to be learned from the Green Revolution that are relevant for contemporary debates surrounding genetically modified organisms (GMOs) in the food chain? Europe is more defiant to GMO food products while Asia is more compliant. How to explain the divergent views on GMOs on the two continents?

How to restore public confidence in science? One avenue is perhaps the promotion of interdisciplinary research that brings along multiple views from natural and social scientists in looking at various food production issues. Social scientists can play the role as facilitator or broker.

Figure 6: A woman harvesting wheat, Nepal (photo by J. van der Ploeg, 2011)

Discussion

- **Global food system**: The world faces a severe food crisis. Changing consumption patterns, population growth, growing demand for bio-fuel feedstock, volatile food prices, environmental degradation and climate change threaten food security, particularly for the rural poor in the Third World. Paradoxically, poor farmers do not get better prices for their products. Scientific advances have led to growing food security and safety. But from a social and environmental point of view the global food production systems are utterly irrational. In the words of Raymond Bryant: 'what can scientists do? It's a folly world.' (See also Bryant 2009).
- **Fast food nation**: In Europe there is a growing awareness that the contemporary production and consumption patterns are detrimental to human health, animal welfare, society and the environment. There is a growing civil movement that aims to address these problems by producing and consuming food locally. In Asia in contrast this 'slow food' movement is largely absent. Fast food is in many developing countries still regarded as a luxury product: the symbol of progress and modernization.
- **Ethics**: One billion people are obese, another one billion are malnourished. But feeding the world is ultimately not a scientific question but an equity question. Increasing food production will not feed the world. Science can play an important role in revealing the (often hidden) costs and risks of food production, for example by calculating food miles, estimating ecological footprints, assessing environmental costs, and analyzing more sustainable, healthy and equitable farming, production, distribution and consumption systems. A major problem is that scientists often think that they should not be held responsible for the impact of their work.
- **Agricultural suicide**: The Neolithic revolution enabled a few individuals to monopolize food. In fact the transition from hunting and gathering to farming was largely a failure: it led to more sickness, malnutrition and deaths.
- **Historical trajectories**: Governments have often encouraged scientists to modernize traditional farming systems. In wartime situations the State stimulated scientific inquiry in agriculture and food, with the objective to increase production. In China the central State tasked scientists to make a detailed inventory of local agricultural knowledge, and to disseminate this knowledge to other regions. This diffusion of knowledge initiated an agricultural revolution in the 11th century. In Europe in contrast traditional farming systems were perceived as backward and irrational, and governments and scientists aimed to increase productivity. In 18th century France the physiocrats argued that all human progress starts in agriculture; these economists transformed European agriculture by introducing new technologies and improved crop varieties. In the Netherlands a growing interest in 'rational agriculture' led to the creation of agricultural departments at universities in late 19th century. At the same time in Japan the Meiji oligarchy established experimental agricultural stations. Concerns about land and food scarcity stimulated the Japanese colonial expansion. Examining the relationships between the historical formation of scientific

institutions (and the different experiences of both colonized and colonizer) may be important to address the conflation of globalization and imperialism. Nowadays most scientists involved in food production work for corporations, but States continue to play an important role in food production.

- **Risk assessment**: There is a scientific framework to analyze risks, but in complex socio-ecological systems some things are unforeseeable. Risk assessment is therefore highly problematic: science is not a panacea. Scientists usually recognize that things are not always black or white: judgments are inherently value-laden. But the media often simplify science: the grey area is often not communicated to the media. Social scientists have an important role in clarifying the larger context of risk assessment.
- **'Slow science'**: Scientists are good in solving scientific problems. But many problems are not scientific. If scientists try to answer these practical, political, ethical or societal problems, they misuse their scientific authority. Scientists should be more modest. There is an urgent need to disentangle. But in practice it is difficult to say where science stops and politics begins.

Session 3: Nature conservation

Chair: Hiromu Shimizu

The Mount Pinatubo eruption in June 1991 was the largest volcanic eruption in the 20th century. Eighty thousand houses were damaged, more than one million people suffered from the damage or loss of their properties and over 100,000 people were forced to live in evacuation centers. The Aetas, the indigenous people of the Zambales mountain range, were the hardest hit by the eruption. After the areas surrounding the volcano were declared safe, many Aetas returned to their old villages only to find them destroyed by *lahar* deposits. Some were able to return to their former way of life: shifting cultivation, hunting and gathering, and fishing. But most of them moved to resettlement areas built by the Philippine government. Health conditions were poor: more than 1,000 children died of measles and flu. Each family received only a small plot of land, and many Aetas were forced to work as hired laborers for lowland farmers. The Aetas protested against these conditions. Paradoxically, the disaster fostered a strong consciousness of shared fate and nurtured a new identity as indigenous people: the Pinatubo Aetas (see also Shimizu 2001).

Another example of the resilience of indigenous communities comes from Ifugao. The Ifugao rice terraces were included in the UNESCO World Heritage List as a living cultural heritage, in 1995. But 25 percent of the terraces is eroded or abandoned. Illegal logging has devastated the forests, which lead to chronic water shortages. The future of the rice terraces is bleak. But in several locations people-centered projects that focus on reforestation, cultural revitalization and socio-economic development are initiated.

Discussant: Raymond Bryant

Nature is a social construction. What kind of nature do we want to protect, why and for whom? In the social sciences there has been much debate about the power dynamics involved in environmentalism, particularly in colonial contexts (see for example Peluso 1993; Neumann 2002). It is essential to expose and confront the power relations, conflicts and inequalities that structure nature conservation. Science is closely linked to the authority and legitimacy of the State. Often policy based on science has implied the violent coercion and imposition of restrictions on local people, as the colonial and post colonial experiences with forestry and nature conservation in Southeast Asia clearly demonstrate.

Capitalistic logic is focused on the short term. Economic rationality makes identifying sustainable solutions problematic. The destruction of the environment is often an unintended consequence of multi-scale connections and actions. This calls for indirect approaches to conserve nature: promoting gender equity, reforming land tenure, and alleviating rural poverty. Much can be gained by building epistemological communities around sociopolitical justice.

Discussion:

- **Crisis rhetoric**: Science promotes complexity. Politics in contrast is 'the art of simplicity' or even 'fact free policy'. Scientists and politicians have different time horizons: long versus short term. In societal discussions about environmental problems complexity is often simplified. In the face of widespread environmental change a sense of urgency is promoted by politicians, civil society and scientists. But the public is increasingly skeptical of these claims: 'they call the bluff.'
- **Cultural heritage**: There seems to be an interesting parallel between discourses about nature conservation and discussions on preserving cultural heritage. There seem to be large differences in European and Asian perspectives: in Europe romantic and emotional attitudes seem to prevail; in Asia however economic rationality dominates. Western efforts to preserve culture and nature are often regarded as 'neocolonialism'.
- **Biophilia**: All humans have an intrinsic emotional attachment to nature. But not everyone can afford it. It is essential to imbed this love for nature in efforts to conserve nature.

Figure 7: A father makes a picture of his son holding a Chinese alligator in Anhui Province, China (photo by J. van der Ploeg 2007).

- **Noble savage**: The neo-romantic idea of urban societies to protect 'traditional societies living in harmony with nature' is very powerful. In fact indigenous people often choose for modernity, and increasingly see their lands as a commodity. These people, like everyone else, want it all: they want to hunt and to go to the movies (see also Levang et al. 2007). Often people sell their lands to investors to obtain a motorbike. In the long run however the motorbike breaks down and people have nothing. Scientists have a duty to project and explain the future consequences of present-day choices.
- **Shadow ecologies**: Deforestation is a severe threat to people and nature in Southeast Asia. Scientists are however divided on how to solve the current crisis: science simply does not have an answer. In the Philippines for example scientists argue whether a total log ban will protect natural forests or exacerbate deforestation. In Borneo the disappearance of lowland dipterocarp forests led to fundamental changes in ecological processes (system flips). Japan in contrast maintains around 80 percent forest cover, as it relies on tropical timber imports from other countries.
- **Emotional landscapes**: Landscapes are closely interwoven with history, identity and cultural heritage. In the Netherlands for example the reclamation of polders has become an intrinsic part of national identity: 'God created the world, but the Dutch made the Netherlands'. This makes current initiatives to restore nature so controversial: proposals to off-set industrial development by re-flooding agricultural areas are for many people fundamentally at odds with their ideas of progress. Returning land to the sea is for many people unacceptable. Rational arguments are irrelevant in these, essentially political, discussions. How do we better analyze and understand emotions in society and politics?

Session 4: Medicine

Chair: Wulf Schiefenhövel

Longitudinal comparative anthropological (human ethological) research enables us to identify key characteristics of the *conditio humana* (see for example Schiefenhövel 1989 on the Eipo in West Papua):

- Humans are genetically programmed for survival. Food and water are not only physiologically necessary but also emotionally, conceptually deeply anchored in the brain. Therefore humans get worried and angry when these essentials are poisoned (and exited by 'sacred' food and water).
- Humans invest considerable resources into their offspring. Therefore they get very worried when the lives of their children are endangered.
- Humans are 'natural' natural scientists: they seek knowledge and want to explain the world. Therefore they get very worried when things happen that they cannot perceive with their senses: e.g. nuclear radiation.
- Humans seek meaning. This may lead to false beliefs.
- Humans are religious and want to believe. This may lead to conflict between science and religion and may perhaps mean that we will never have a society fully based on scientific reasoning.
- Humans tend to follow fashions (which are often not connected to science).
- Humans are reluctant to confess wrongdoing. They often only admit what has been found out already

Discussant: Hallam Stevens

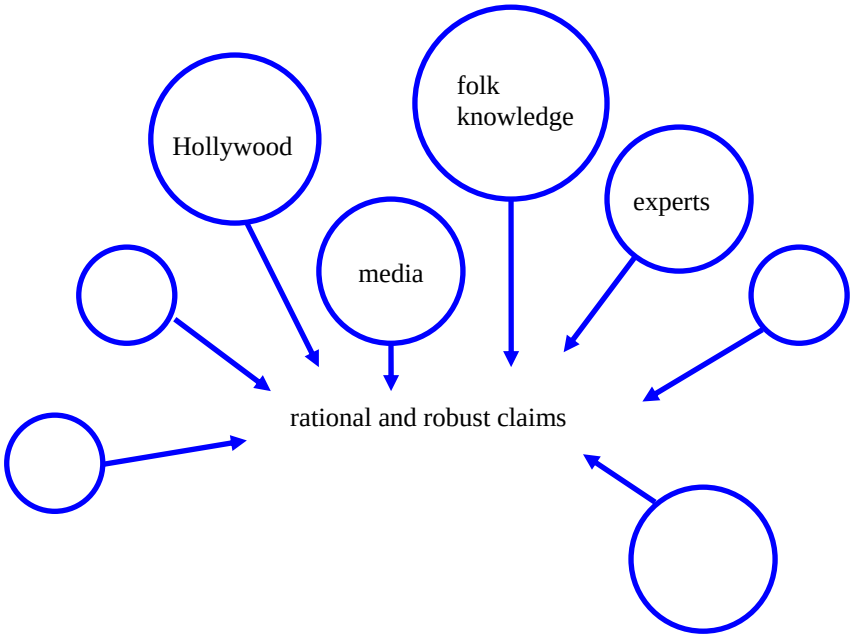
Contemporary public perceptions of science and nature are deeply influenced by Hollywood movies. Popular films, such as 'Contagion' (2011), appeal to people's imagination, fear and discontent. These movies have a large impact on people's attitudes towards science. Scientists are often depicted as frustrated or unscrupulous lunatics, and linked to bio-terrorism. Government officials are portrayed as helpless bureaucrats that are unable to address global threats.

In the 19th and 20th centuries, scientists used to be regarded as virtuous people, of a special moral character (Shapin 2008). In the 21st century scientists are more and more regarded as morally ordinary people (at best). This has important consequences for how society regards and values science and scientists.

How do different societies assess the robustness and rationality of scientific claims? How do people create knowledge? Sheila Jasanoff's (2007) concept of civic epistemology refers to the institutionalized practices by which people test knowledge claims. In all societies there are shared understandings about what credible claims should look like, and how they ought to be articulated, represented and defended. These collective knowledge-ways are often articulated through practice rather than in formal rules (see Figure 8). Science must take account of these established ways of public knowing in order to gain broad-based support,

especially when science helps underwrite significant collective choices. Social scientists can play an important role in identifying what these different ways of framing knowledge are.

Figure 8: Civic epistemology.



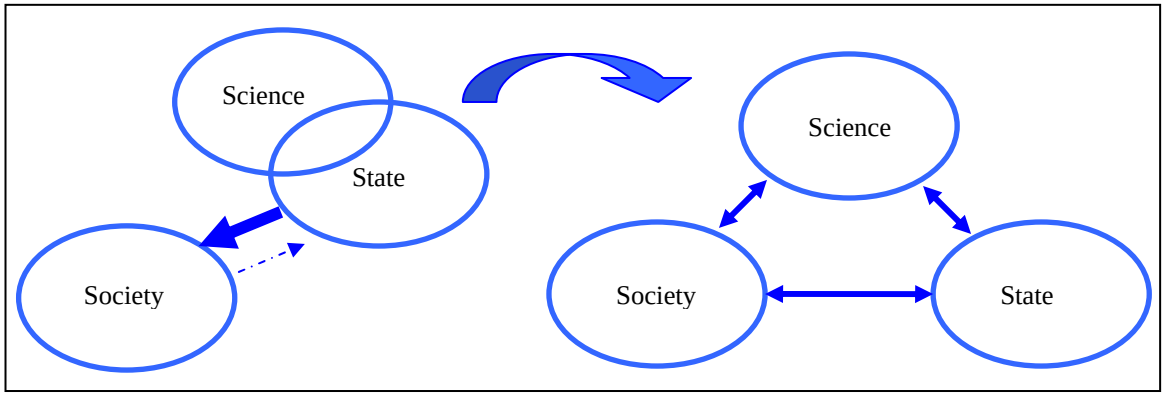
Discussion:

- **Xenophobia**: The SARS outbreak and the H1N1 pandemic caused widespread panic and had a huge impact on the global economy and policies in several countries. In fact relatively few casualties occurred.
- **Trust**: The Intergovernmental Panel on Climate Change (IPCC) system, despite the severe criticism it received in the run up to the 2009 climate change conference in Copenhagen, can function as a model to assure that scientific research is policy relevant yet politically neutral. The IPCC is a scientific body, which reviews and assesses the most recent scientific, technical and socio-economic information relevant to the understanding of climate change. Thousands of scientists from all over the world contribute to the work of the IPCC on a voluntary basis. Review is an essential part of the IPCC process, to ensure an objective and complete assessment of current information. IPCC aims to reflect a range of views and expertise. National governments also participate in the review process. Because of its scientific and intergovernmental nature, the IPCC provides balanced scientific information to decision makers. By endorsing the IPCC reports, governments acknowledge the authority of their scientific content. The IPPC model can function as an example of how to deal with other complex societal problems like biodiversity conservation and food security. However such an institutionalized platform to verify scientific claims will not be enough to convince skeptics. Social scientists are largely absent in the IPCC: a reflection of the tendency in social science to sidestep societal responsibilities. Social

scientists have an important role to play in (natural) science dominated discourses. Their contribution is about other value orientations, and the social impacts of policies and actions. There is a need to encourage social scientists to take up this role.

- **Representation**: Too often the interests of society at large are represented by the State. This is increasingly leading to friction. Democratization and globalization are leading to feelings of mistrust towards State power: there is growing support for the idea that governments should not solely decide what the public should know, or what the individual rights of patients are. There is a need to form a more equal, triangular relationship between the public, government and science (see Figure 9).

Figure 9: Towards an equal relationship between State, society and science.



- **Inconvenient truths**: Often medical doctors do not want to relay bad news, and patients do not want to hear it. How should scientists deal with unwelcome messages? How to disseminate for example that there is limited scientific evidence that deforestation leads to flooding (Bruijnzeel 2004)? Getting that message out will probably lead to more deforestation and less funding for environmental science. Controversial subjects should be presented as such in a balanced way fostering public debate: the role of scientists is to inform the debate, not to take sides.
- **Deficit model**: Policymakers argue that the public possesses low levels of basic knowledge about science and technology. This ignorance supposedly explains public resistance to science and technology. Skepticism towards nuclear power, genetically modified organisms or vaccines will be automatically reduced if citizens will only understand the science behind these technological innovations: a rational and properly informed individual could not disagree with the desirability of whatever science endorses (Allum et al. 2008). This thinking has become dominant in political discourse about public distrust of science (see for example: Eurobarometer 2010). Criticism of science is dismissed as 'unscientific' or 'emotional'. The sociologist Brian Wynne (2006) has argued that scientists and policymakers misunderstand contemporary public distrust of science and technology. In his view public mistrust of science is primarily a rejection of the autocratic and inflexible institutional culture of science, particularly the systematic denial of the limits

and uncertainties of scientific knowledge, and the unwillingness to openly discuss the purposes and expectations shaping technological innovation and scientific discovery.

- **'Good science'**: Scientists are perhaps not virtuous. But science is a system with checks and balances (peer review) that by-and-large functions (with occasional scandals). The public needs to understand how science works. Science should make more serious efforts to inform in a responsible manner the general public.

Figure 10: Medicine man collecting plants for a treatment in Siberut, Indonesia (photo by G. Persoon, 1985)

Discussion: research questions

Chair: Stephen Lansing

At the end of the roundtable, the participants were requested to write down a few research questions on the basis of what was presented and discussed in the previous two days. The idea was that these questions can be used to draft a joint research proposal, serve as input for a follow-up meeting or function as policy recommendations.

- **Dissemination**: Do we need to create new institutions to ensure the diffusion of scientific research? What form should these institutions take? Should engagement with the public be focused on the communication of results or also on the process of reaching those results? How might we better convey to the public the role of doubt and legitimate debate in scientific practice without undermining scientific authority? How to make sure that a simplified and more accessible message remains scientifically correct? What is the role of transnational agencies and international non-governmental organizations with respect to the creation and dissemination of public policies on science and nature?
- **Globalization**: How do we deal with transnational problems in a system where research is institutionalized at the national level, and communicated primarily through national media? What is the nature and character of scientists' transnational networks and how does that shape their accountability to the public, and to the society in which they reside?
- **Governance**: What is the role of the State in regulating the production, distribution, and consumption of science? Should the State be governing or regulating science more effectively than it is doing now? What is the role of corporations in scientific research, and is it necessary to regulate or control it more strictly? How to ensure a greater degree of independence of scientists from the State, commercial companies, and other agencies that fund research?
- **Trust**: On what basis should public trust in the sciences rest? Should it be founded on trust in individuals, institutions or methods? What is the goal of building trust in science? To what extent does the responsibility and authority to address the problems of public mistrust rest on the scientific community? How to build trust and dialogue between scholars of different disciplines? How might short-term goals of coordinating responses to pressing problems conflict with the goal of building long-term and stable trust? Is transparency on methods, values, and linkages a requirement for trust? And what new mechanisms (institutional, social and technological) might we find to increase scientific authority? At a time of rising importance of network in understanding economic behavior and social relationships (Jackson 2009; Rivera et al. 2010), what is the role of scientific networks in shaping public perceptions of science and nature?
- **Ethics**: Our mainstream individualistic ethic (every person is of equal importance) seems at odds with a purely evolutionary approach, and also

with the kind of ethic that might be needed for distributive fairness when resources are scarce: how to solve these dilemmas? How to make morality an integral part of the world of science and technology? What are potential conflicts of interest facing 'honest' scientists? Are there contradicting moral values, expectations, previous choices or preferences in various academic disciplines? And if polarization is an issue, how to engender reflexivity on both sides?

- **Media**: Can we define, for different parts of the world, the role of certain media that have a large degree of influence on public attitudes towards science? And if so, how can we influence these media? Can the power of the mass media and social media be utilized for improving public knowledge and understanding of science?
- **Risk**: What alternatives are there to the 'risk assessment' strategies, deployed in much work on the impact of science and technologies? What might these alternatives look like? Can social scientists help the public to better understand the different timescales involved in politics and environmental changes?
- **Civic epistemology**: How do different societies assess the robustness and rationality of scientific claims? Could we use the idea of civic epistemologies to find a role for social scientists in debates about science and technology? How to accommodate other knowledge systems?

Figure 11: The *Afsluitdijk* was constructed in 1932 to prevent flooding in the Netherlands. It became a national symbol of the triumph of technology and science over nature (photo by G. Persoon, 2007).

Conclusions or recommendations

Based on the preceding discussions we have formulated the following recommendations that could be taken up by scientists, policy makers and the media.

1. In order to better understand the differences in public attitudes towards science, there is a need to study the complex historical relationship between science, policy, business and media in Asia and Europe.

2. There is a discrepancy between 'the fastness of politics' and the 'slowness of science.' There is a need for enhanced understanding of this tension and possible ways to overcome it.

3. Intergovernmental and scientific communities can play an important role to ensure the generation and dissemination of available knowledge about first order global problems like natural disasters, climate change, biodiversity loss, food security and human health. Such communities can also help overcome the inherent limitations of the peer-review process.

4. Science and policy has a lot to gain from improved interaction between scientific communities. Interdisciplinary education and research projects are a powerful tool towards that end.

5. Societies have multiple ways of assessing the quality of scientific knowledge in which journalists, politicians and scientists play a role. An analysis of these civic epistemologies can lead to a better understanding of science-society relations in different cultural contexts and contribute to the restoration of public trust in science.

6. The scientific community should not shy away from popularizing scientific knowledge, either by themselves or with the help of committed journalists or media-specialists.

7. Scientists should have a better understanding of the role of moral values and ethics in the interactions between science, state and society.

8. Emotions and individual preferences are an insufficiently understood topic in the world of science and politics. Emotions in fact play a crucial role in the selection of research priorities and funding of scientific research.

9. Natural disasters should not be studied as incidents or abnormal situations: they are integral parts of history, and societies are partly shaped by the ways risks are being managed. This in turn has a strong influence on power networks, resource allocations and regulations.

10. There is more to food than eating. Food production, distribution and consumption are cultural phenomena. There is a need to better integrate cultural and historical perspectives in the agricultural sciences.

11. Nature is a social construction. To effectively conserve nature in a rapidly changing global economy, it is essential to create broad social consensus and support at the local level about what kind of nature to protect, for whom and why. The social sciences should play an important role in the analysis of divergent visions of nature, power relations, and costs and benefits involved in the protection of the landscapes.

12. There are important historical differences between Asian and European perspectives on the relationship between health, local healing practices and medical sciences. Modern health care can be improved by a more nuanced and open-minded perspective on psychosomatic and homeopathic diagnosis and practices.

The participants of the roundtable agreed upon drafting joint project proposals to be submitted to various grant-giving organizations. A possible follow-up activity will be the organization of a workshop at Nanyang Technological University in Singapore in 2012.

Organizing institutions

The roundtable is part of an EU financed project implemented by the International Institute for Asian Studies (IIAS) in the Netherlands, and the Nanyang Technological University in Singapore.

The **Nanyang Technological University (NTU)**, based in Singapore, is a research-intensive global university, offering a broad-based education in a wide range of disciplines from engineering and the sciences to business and the arts and humanities. The College of Humanities, Arts, and Social Sciences (HASS) is uniquely placed among one of the largest engineering colleges in the world. The college, home to some 5,000 undergraduate and graduate students, represents the dynamic interface between several major disciplines in three distinct schools: the School of Art, Design and Media, Singapore's only professional art school to offer degree programs in art, design and interactive digital media; the Wee Kim Wee School of Communication and Information, Asia's top school in mass communication; and the School of Humanities and Social Sciences (HSS), a growing community of scholars with special strengths in research on Asia. HSS has identified five strategic areas of research: (1) humanities, (2) science and society, (3) environment and sustainability, (4) global Asia, (5) new frontiers in neuroscience, and (6) cultural and literary studies.

The **International Institute for Asian Studies (IIAS)** is a research and exchange platform based in Leiden, the Netherlands. IIAS encourages the multi-disciplinary and comparative study of Asia and promotes national and international cooperation, acting as an interface between academic and non-academic partners, including cultural, social and policy organizations. The main research foci are Asian cities, dynamics of cultural heritage, and the global projection of Asia. These themes are broadly framed so as to maximize interaction and collaborative initiatives. IIAS is also open to new ideas of research and policy-related projects. In keeping with the Dutch tradition of transferring goods and ideas, IIAS works both as an academically informed think-tank and as a clearinghouse of knowledge. It provides information services, builds networks and sets up cooperative programs. Among IIAS' activities are the organization of seminars, workshops and conferences, outreach programs for the general public, the publication of an internationally renowned newsletter, support of academic publication series, and maintaining a comprehensive database of researchers and Asian studies institutions. IIAS hosts the secretariats of the European Alliance for Asian Studies and the International Convention of Asian Scholars. In this way, IIAS functions as a window on Europe for non-European scholars, contributing to the cultural rapprochement between Asia and Europe.

With the support of:

The **Europe-Asia Policy Forum (EUforAsia)** has been set up to improve Europe's understanding of Asia and to provide a growing rapport between the two regions. It is based on an extensive academic network of institutes, universities and think tanks in both Europe and Asia. Supported by the European Commission, EUforAsia addresses policy issues of concern both to the EU and to Asia for a three-year period, from 2009 to 2011. EUforAsia is managed by four partners, each with a long experience in the field of Asian Studies and Europe-Asia relations. They are the Asia-Europe Foundation (ASEF) in Singapore, the Singapore Institute of International Affairs (SIIA) in Singapore, the European Policy Centre (EPC) in Brussels, and the International Institute for Asian Studies (IIAS) in Leiden. The EUforAsia office has been set up in Brussels. By strengthening knowledge and understanding of EU-Asia relations, EUforAsia contributes to European Union policy formulation towards Asia. Using its extensive networks in Europe and Asia, decision-makers in the European Union institutions and member states are brought together with Asian diplomats, European and Asian business and trade union representatives, leading academics, representatives of civil society and the media and other stakeholders interested in Asian issues in general. EUforAsia also enhances Europe's awareness of Asian political, economic and social developments and regional processes and mechanisms.

This project is co-financed by the European Commission

List of participants

Greg Bankoff is professor of modern history at the University of Hull. He works on environmentally related topics. In particular, he writes on environmental-society interactions with respect to natural hazards, resources, human-animal relations, and issues of social equity and labor. He is currently completing projects on urban fire regimes, flooding, and forestry. New research looks at societal paralysis in the face of climate change and other environmental hazards from the perspective of 'path-dependence' and 'historical lock-in.' His most recent publication is an edited volume (together with Uwe Luebken and Jordan Sand) entitled *Flammable cities: urban fire and the making of the modern world* (University of Wisconsin Press, 2011). Among his other publications are *Cultures of disaster: society and natural hazard in the Philippines* (RoutledgeCurzon, 2003); *Mapping vulnerability: disasters, development and people* co-edited with Georg Frerks and Dorothea Hilhorst (Earthscan, 2004); a co-edited volume along with Peter Boomgaard, *A history of natural resources in Asia: The wealth of nature* (Palgrave-Macmillan, 2007) and a co-authored book together with Sandra Swart, *Breeds of Empire: The 'invention' of the horse in maritime Southeast Asia and Southern Africa, 1500-1950* (Nordic Institute of Asian Studies Press, 2007).

Jan J. Boersema (1947) got his academic training as a biologist, major ethology, at the University of Groningen and lectured on biology and environmental sciences at the same University. He graduated in theology at on a thesis titled: *The Torah and the Stoics on Mankind and Nature* (English edition published with Brill, Leiden, 2001). In 1994 he became reader in environmental science and philosophy at Leiden University and at the same time secretary general of the Council for the Environment at the Ministry of Housing, Spatial Planning and the Environment. At the same ministry he became a cofounder and member of Forum, a think-tank operating from 1999-2002. In 2002 he was appointed as special professor; and in 2005 as full Professor at the Free University Amsterdam where he is based at the IVM (Institute for Environmental Studies). His inaugural lecture entitled *Hoe groen is het goede leven* (How green is the good life) in which he developed a new theory on the ecological history of Easter Island was held in October 2002. His current research is focused on the relation between sustainability, nature, culture, worldviews and religion. Running title: *How green is progress?* His publications cover a wide range of subjects in the environmental field. With Wim Zweers he edited *Ecology, technology and culture* (White Horse Press, Cambridge 1994). His latest book is on the ecological history of Easter Island: *Beelden van Paaseiland* (Amsterdam 2011) in which he contested the collapse theory of Jared Diamond and others. He is editor in chief of two textbooks on environmental science: *Basisboek milieukunde* (Boom, Amsterdam 1984, 1992) and *Principles of environmental sciences* (Springer Publishers, 2009). In 2003 he became editor in chief of the Journal of Integrative Environmental Sciences. In 2009-2010 he was elected visiting fellow at St. Edmunds College, University of Cambridge.

Janet Browne is Aramont professor of the history of science at Harvard University. Her interests range widely over the history of the life sciences and natural history. After a first degree in zoology she studied for a PhD in the history of science at Imperial College London, published as *The secular ark: studies in the history of biogeography* (1983). Ever since then she has specialized in reassessing Charles Darwin's work, first as associate editor of the early volumes of *The correspondence of Charles Darwin*, and more recently as author of a major biographical study that integrated Darwin's science with his life and times. While it was framed as a biographical study, the intention was to explore the ways in which scientific knowledge was created, distributed and accepted, moving from private to public, as reflected in the two-volume structure of the work. The biography was received generously both in the UK and USA, and awarded several prizes, including the James Tait Black award for non-fiction in 2004, the W.H. Heinemann Prize from the Royal Literary Society, and the Pfizer Prize from the History of Science Society. She was previously based at the Wellcome Trust Centre for the History of Medicine at University College London where she taught in the MA, MSc and undergraduate programs in the history of science, biology, and medicine. She has been editor of the *British Journal for the History of Science* and president of the British Society for the History of Science. New courses to be developed in the next few years focus on natural history specimens, including 'Bringing nature indoors: museums, laboratories and the field.' She is currently working on a visual and cultural history of the gorilla.

Raymond Bryant obtained his PhD. in 1993 from the School of Oriental and African Studies in London. He is currently professor of political ecology in the Department of Geography at King's College London where he has taught since 1993. He has produced five books and numerous articles on theory and practice in political ecology, scientific forestry, multi-actor networks in environmental management, as well as the historical and contemporary politics of Southeast Asian environmental change. Relevant research interests include the politics of scientific forestry in Burma (Myanmar) as well as the geopolitics, branding and consumption of teak wood.

Chang-Tay Chiou is professor of public administration and policy at the National Taipei University, Taiwan. He was a visiting professor of the Yale University in 2000 and a visiting research fellow in the Chinese University of Hong Kong in 2008. For many years, he has worked on disaster management and public governance, environmental policy and civil society, and on the comparative analysis of public policy-making and public management of Taiwan and Mainland China. He published several books and articles focusing upon public policy and management issues. In 2000, he published a book, *Disaster Management*, on the basis of his long-term studies of natural disasters in Taiwan and the USA. Recently he is conducting a three-year research project (2011-2013): *INGOs, government, and natural disasters in Taiwan and mainland China*: A Comparative Study of GiGi and Wenchuan Earthquakes, funded by the National Science Council, Executive Yuan of Taiwan.

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Hallam Stevens is a historian of science at Nanyang Technological University, Singapore. He received his PhD. from the Department of History of Science at Harvard University in 2010 with his dissertation investigating the impact of computers and information technologies on the life sciences since the 1980s. This is also the subject of his forthcoming book *Life out of sequence* (to be published by University of Chicago Press). Aspects of this work address the role of communications technologies, attempting to understand how the Internet is increasingly making biology a 'globalized' science. As such, he is interested in how the 'spread' or 'travel' of scientific knowledge (especially between Asia and the West) is influenced or determined by particular technologies.

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Jan van der Ploeg is an environmental anthropologist. From 2001 to 2007 he was based in the Philippines as program coordinator of the Cagayan Valley Program on Environment and Development (CVPED), the academic partnership of Leiden University and Isabela State University. He initiated a community-based conservation program for the critically endangered Philippine crocodile, and founded the Mabuwaya Foundation in 2003. Currently he is teaching at the department of cultural anthropology and development sociology at Leiden University.

References

Allum, N. P. Sturgis, D. Tabourazi & I. Brunton-Smith. 2008. Science knowledge and attitudes across cultures: a meta-analysis. *Public Understanding of Science* 17: 35-54.

Bankoff, G. 2001. Rendering the world unsafe: 'vulnerability' as Western discourse. *Disasters*. 25(1): 19-35.

Beck, U. 1992. *Risk society: towards a new modernity*. New Delhi: Sage.

Bruijnzeel, L.A. 2004. Hydrological functions of tropical forests: not seeing the soil for the trees? *Agriculture, Ecosystems & Environment* 104(1): 185-228.

Bryant, R.L. 2009. Peering into the abyss: environment, research and absurdity in the 'age of stupid'. In: *The International Handbook of Environmental Sociology, 2nd edition* edited by M. Redclift & G. Woodgate, pp. 179-188. Cheltenham: Edward Elgar.

Carson, R. 1962. *Silent spring*. London: Penguin.

Cook, H.J. 2007. *Matters of exchange; commerce, medicine, and science in the Dutch Golden Age*. New Haven: Yale University Press.

Eurobarometer. 2010. *Science and Technology*. Brussels: European Commission.

Frewer L. & B. Salter. 2002. Public attitudes, scientific advice and the politics of regulatory policy: the case of BSE. *Science and Public Policy* 29 (2): 137-145.

Hecht, L. 2003. Editorial: Science and the new Silk Road. *21st Century Science & Technology Magazine* 15(4): 3-4.

Huff, T. 2011. *Intellectual curiosity and the scientific revolution*. Cambridge: Cambridge University Press.

Jackson, M. 2009. Networks and economic behavior. *Annual Review of Economics* 1: 489-511.

Jasanoff, S. 2007. *Designs on nature: science and democracy in Europe and the United States*. Princeton: Princeton University Press.

Levang, P., S. Sitorus & E. Dounias. 2007. City life in the midst of the forest: a Punan hunter-gatherer's vision of conservation and development. *Ecology & Society* 12(1): 18.

Neumann, R.P. 2002. *Imposing wilderness: struggles over livelihood and nature Preservation in Africa*. Berkeley: University of California Press.

Nosenga, N. 2011. Scientists on trial over L'Aquila deaths. *Nature* 474: 15.

Oreskes, N. & E.M.Conway. 2010. *Merchants of doubt: how a handful of scientists obscured the truth on issues from tobacco smoke to global warming*. New York: Bloomsbury Press.

Peluso, N.L. 1993. Coercing conservation? The politics of state resource control. *Global Environmental Change* 3(2): 199-217.

Pingali, P.L., C.B. Marquez & F.G. Palis. 1994. Pesticides and Philippine rice farmer health: a medical and economic analysis. *American Journal of Agricultural Economics* 76: 587-592.

Rivera, M., S. Soderstrom & B. Uzzi. 2010. Dynamics of dyads in social networks:

assortative, relational, and proximity Mechanisms. *Annual Review of Sociology* 36: 91-115.

Schiefenhövel, W. 1989. Reproduction and sex-ratio manipulation through preferential female infanticide among the Eipo, in the highlands of New Guinea. In: *The sociobiology of sexual and reproductive strategies* edited by A.F. Rasa, C. Vogel & E. Voland, pp. 170-193. London: Chapman and Hall.

Secord, J.A. 2004. Knowledge in transit. *Isis* 95(4): 654-672.

Shapin, S. 1991. A scholar and a gentleman: the problematic identity of the scientific practitioner in early modem England. *History of Science* 29: 279-327.

Shapin, S. 2008. *The scientific life: a moral history of a late modern vocation*. Chicago: Chicago University Press.

Shimizu, H. 2001. *The orphans of Pinatubo: the Ayta struggle for existence*. Manila: Solidaridad Publishing House.

Simpfendorfer, B. 2009. *The new Silk Road: how a rising Arab World is turning away from the West and rediscovering China*. London: Palgrave Macmillan.

Steffen, W. A. Sanderson, P.D. Tyson, J. Jäger, P.A. Matson, B. Moore III, F. Oldfield, K. Richardson, H.J. Schellnhuber, B.L. Turner & R.J. Wasson. 2004. *Global change and the Earth system: a planet under pressure*. Berlin: Springer-Verlag.

Topham, J.R. 2009. Focus: historicizing popular science. *Isis* 100(2): 310-318.

van der Ploeg, J. & G.A. Persoon. 2011. *Science and Nature in Europe and Asia: Scientific Traditions and New Technologies*. Background document for the roundtable in Science and Nature in Europe and Asia. Leiden: IIAS.

Wynne, B. 2006. Public engagement as a means of restoring public trust in science; hitting the notes, but missing the music? *Community Genetics* 9: 211–220.