21 Policy, Politics and the Impact of Transition Studies

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Abstract

Transition studies are undertaken in a variety of contexts and at various levels of society. Virtually all of them entertain the hope and in some cases the expectation of being used to address challenges to the sustainability transition. The relationship between research and effective action poses a challenge that transition studies must address. As part of an effort to study the different contexts in which sustainability transition studies have developed, the author will discuss a 1999 report by the US National Research Council (NRC) entitled *Our Common Journey: A Transition Toward Sustainability* (NRC 1999). The study began in 1996 during the Clinton/Gore administration. Sustainable development and environment were high on the list of priorities again. The time seemed ripe for looking at ways in which science could better support US policy efforts to transition to sustainability. It was the best of times. Shortly after publication (December 1999) a contested election was held and the political climate changed radically. Then there were the 9/11 terrorist attacks. It was the worst of times. The author will look at this study and related efforts to address the sustainability transition challenge in the fifteen years since publication.

Keywords: Sustainability science, social science, politics (US), sustainable development, Earth Summits, Bush, Gore, Obama, sustainability transition, political gridlock and policy impact of transition studies, global climate change.

21.1 Introduction

As part of an effort to study the different contexts in which sustainability transition studies have developed, this chapter discusses a December 1999 report by the US National Research Council (NRC) entitled *Our Common Journey: A Transition Toward Sustainability* (NRC 1999). Why was such a study undertaken during the Clinton administration? What did it seek to do? What impact did it have on scientific and policy debates? Why did this discussion have so little impact during the Bush administration? Given the polarized, gridlocked and much reported paralysis in Washington, what are the prospects for the US regaining some of its lost leadership in addressing, for example, global climate change?

Addressing these questions will include observations and understandings based on decades of experience working at the interface between research and action in many of the institutions and on many of the issues central to US and global efforts to transition to equitable and sustainable development.[2] My training and fieldwork as a cultural anthropologist, while including tools from many disciplines, emphasized participant observation above all. Margaret Mead, one of my professors, in answering a question on a

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2 Including my efforts to develop the Science and Technology for Sustainability programme in the Policy and Global Affairs Division of the US *National Research Council* (NRC). Though trained as a cultural anthropologist specializing in ecological and applied anthropology, most of my career and participant observations have been spent in government (Peace Corps, *US Agency for International Development* (USAID), private non-profit organizations (*World Wildlife Fund* (WWF), *International Institute for Environment and Development* (IISD)) and international organizations (United Nations Children's Fund (UNICEF), and the donor's *Forest Advisory Group* (FAG).

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particular methodology, told me to "never forget that you are your most important methodology". I hope in this essay to be a useful "key informant".

21.2 Background of the Study

Well before the Clinton administration, interest in the US and global scientific community in supporting environmentally sustainable development efforts had grown. The 1980s had seen a steady growth in the number, strength, technical capacity and political sophistication of *non-governmental organizations* (NGOs) and civil society in general. Many countries had created or strengthened Ministries of the Environment in response to growing problems of transboundary air and water pollution, acid rain, drought and massive fires in remaining tropical forests and increases in cancer-causing UV radiation due to the weakening of the atmospheric ozone layer.

The 1990s in Washington DC continued to be an exciting time for those working on global issues of sustainable development.[3] Preparing for, attending and following up on the 'Earth Summit' [the 1992 United Nations Conference on Environment and Development (UNCED)] held in Rio had generated additional momentum, thanks, I observed, in large part, to non-governmental organizations, many of which had been preparing for a decade. Senator Al Gore was also on the very large US Delegation. His book *Earth in the Balance* (Gore 1992) had recently been published and he was a hero to many, especially to members of the large number of NGOs in attendance, some serving on governmental delegations, others participating in the Global NGO Forum.

Gore had long been intellectually engaged in the science and technology dimensions of global climate change and had been, along with Senators Tim Wirth of Colorado (Democrat) and John Chafee of Rhode Island (Republican), a knowledgeable and enthusiastic advocate on environmental issues. In January of 1993 he was sworn in as Vice President and wrote an introduction to the 1994 edition of Rachel Carson's *Silent Spring* (Carson 1994). There was reason to be optimistic that sustainable development would be high on the government's list of priorities. Early on, the State Department was reorganized with the creation of a Global Bureau and Tim Wirth was appointed as Under Secretary of State for Global Affairs.

In addition to the improved political climate, an activist civil society and increases in the scientific understanding of international environmental threats and opportunities, there was the upcoming end of the century, for which institutions were preparing. The *National Research Council* (NRC), the operating arm of the *National Academy of Sciences* (NAS),[4] had created a *Board on Sustainable Development* (BSD) to consider how science and engineering could best support efforts to achieve sustainable development. A consensus had formed among the leadership of the Academies that the transition to sustainability would be the defining challenge of the upcoming twenty-first century.

21.3 The Study

In this context, the Board on Sustainable Development began a study[5] aimed at strengthening and energizing the connections between science and efforts to achieve the goals of sustainable development. Unlike most NRC studies, this one was not in response to a request by government, but rather a product of the interest and support of the philanthropist George Mitchel and the NRC leadership.

The study *Our Common Journey: Toward a Transition to Sustainability* set out to "reinvigorate the essential strategic connections between scientific research, technological development, and societies' efforts to achieve environmentally sustainable improvements in human well-being" (NRC 1999: 2). Throughout the preparations for the 1992 Earth Summit, support from science had been included as important, but was treated as one of many major groups, including women, children and youth, indigenous people, non-governmental organizations, local authorities, workers and trade unions, business and industry, and

3 During this period I served as Director of the Office of Forestry, Environment and Natural Resources, in the Science and Technology Bureau, at *the US Agency for International Development* (USAID).

4 The National Academy of Sciences is a "private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. Upon the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters" (NRC 1999: iii).

5 NRC reports are produced by the unpaid efforts of scientists who volunteer significant amounts of their time over several years to participate in a study group or task force. A small staff supports their work.

farmers needing support.[6] In the enthusiastic spread of the sustainable development concept in the aftermath of the Earth Summit and many subsequent international conferences, 'science', along with other 'major groups', was marginalized. What, then, the Board asked, would a serious effort by science and technology to achieve the goals of sustainable development look like?

The study began by reviewing the internationally agreed goals, objectives and indicators for sustainable development. "To meet the needs of a much larger but stabilizing human population, to sustain the life support systems of the planet, and to substantially reduce hunger and poverty." While there had developed "a broad consensus about minimal goals and targets, ... there is seldom analysis of these goals' implications, their potential interactions with one another, or their competing claims on scarce resources" (NRC 1999: 14).

Progress in achieving results had been both weak and uneven, as had many of the efforts to effectively link science and decision-making. Robust support from science would need to deal with the inevitable tensions that emerge "between broadly based and highly focused research strategies; between integrative, problem-driven research and research firmly grounded in particular disciplines; and between the quest for generalizable scientific understanding of sustainability issues and the localized knowledge of environment–society interactions that give rise to those issues and generate the options for dealing with them" (NRC 1999: 10).

Three priority actions were proposed to advance the research agenda of "what might be called sustainability science": an integrated place-based framework to understand society–environment interactions; focused research on a small set of questions needed to better understand these interactions; and better utilization of existing approaches to link knowledge and action. In addition, new ways of learning from large-scale, long-term efforts to meet major challenges were required (NRC 1999: 10–14, 279–288).

Our Common Journey was uncommon, not only in terms of its non-governmental origin, but also in the depth and breadth of its exploration of what a science in support of the sustainability transition would require. To those interested in the transition to sustainability, sustainable development,[7] and the quality of sound, scientific information to help guide advocacy and action, the release of this study was a welcome event. Here was a serious effort to link separate academic disciplines in order to solve urgent global problems. In December of 1999 *Our Common Journey* was published.

21.4 What Was the Impact on Scientific Debates?

As *Our Common Journey* was not a typical NRC demand-driven study requested by government there was little precedent for following up. Also, as expected, not everyone agreed that a new independent "sustainability science" was necessary. Following its 1999 release, a series of seminal articles were published over the next few years.[8] These were central to the development of sustainability science and its gradual acceptance in the US and wider scientific community. In addition, the co-chairs of the Study Group, Robert Kates and William C. Clark, and many of the group members participated in the various international scientific conferences linked to preparations for the 2002 *World Conference for Sustainable Development* (WCSD).[9] The *International Conference of Scientific Unions* (ICSU), the *Third World Academy of Science* (TWAS), and the *World Federation of Engineering Organizations* played key roles in providing science and technology input into WCSD preparations leading to a parallel Side Event.

The National Research Council followed up creating a Science and Technology for Sustainability Program and using its convening power to establish a Roundtable on Science and Sustainability in order to engage leaders of government, science, business and civil society on priority topics.[10]

The most important impact of this report and the journal articles published in the next few years has

6 See Section III on Major Groups, chapter 31 Scientific and technological community. 31.1–31.12 of Agenda 21 at: <http://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>.

7 "... to ensure that [sustainable development] meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987); at: <http://upload.wikimedia.org/wikisource/en/d/d7/Our-common-future.pdf> and <http://www.un-documents.net/wced-ocf.htm>.

8 See especially: Kates, Clark, Corell et al. (2001); Clark and Dickson (2003); Clark (2007).

9 See for example the Freiburg Workshop report; at: <http://sustainabilityscience.org/content;html?contentid=774>

10 See at: <http://sites.nationalacademies.org/PGA/sustainability/PGA_048724>.

been the further development and rapid spread of a new sustainability science. Over the last fifteen years it has moved from being an interdisciplinary scientific approach to become a recognized scientific programme institutionalized in academic journals, undergraduate and graduate courses, advanced degree programmes and research centres at major universities.[11] Robert Kates (2010, 2011) has produced a freely available, carefully edited online source[12] that provides an excellent introduction to further development of sustainability science in the context of sustainable development. A recent textbook, *Sustainability Science* (Bert de Vries, 2013) builds a framework for his students at Utrecht University to use to both understand and act in relation to (un)sustainable development.[13]

21.5 Impact on Policy Debates: The Case of Climate Change

Looking at US Climate change policy is instructive. Of the sustainability challenges highlighted in *Our Common Journey*, global climate change stands out as one of the most serious for a number of reasons. It affects multiple sectors of society to move ahead toward the transition and it has cumulative or delayed consequences that are felt over a long time. In addition, its impacts are irreversible or difficult to change, and they interact with each other to damage earth's life support systems. It also provides an opportunity to learn from a uniquely large-scale, long-term effort to solve a global problem that requires new forms of linkage between the natural and social sciences. New approaches to providing policy-relevant research are necessary, as are the means of communicating them effectively. There are also lessons to be learned from various policy and programme choices made around the world.

Some background on this issue in the United States is necessary. The year 1988 was when many woke up to the fact that the climate was changing because of our actions. Forty-five per cent of the US experienced the worst drought since the 'dust bowl years' of the 1930s. Media coverage of the 'ozone hole' caused by our use of chlorofluorocarbons (CFCs) was widespread and was now linked scientifically to cancer. Televised satellite photographs of the massive burning of tropical forests in the Amazon and South East Asia fed concerns that we were damaging the life-support systems of 'spaceship Earth'. Tropical forest burning in Central America darkened the skies of Texas if the wind was right. Dust storms following massive deforestation in China were making it impossible for Los Angeles to meet its mandated air quality targets. In Florida, insects blown in from Africa were discovered, and they had survived the trip. *Time* Magazine designated "Endangered Earth" as "Planet of the Year" (Dressler/Parson 2011: 22-30).

Global concern about what was happening to the climate led to the creation in that year of the *Intergovernmental Panel on Climate Change* (IPCC), established by the *United Nations Environment Programme* (UNEP) and the *World Meteorological Organization* (WMO) and subsequently endorsed by the UN General Assembly. It regularly produces consensus reports on the status of scientific understanding of the causes, consequences, and possible responses to global climate change caused by increasing concentrations of greenhouse gases in the atmosphere. Based on the work of thousands of volunteer scientists from around the world, it continues to be the most creditable source of information for policy-makers and policy-shapers on the current state of scientific knowledge on global climate change and its potential environmental and socio-economic impacts.[14]

National and international organizations increased their capacity to deal with environmental challenges, though often starting from a low base. Non-governmental environmental organizations sprang up alongside proliferating Ministries of the Environment (and environmental units in most other government ministries). NGOs had been negotiating among themselves and by the time diplomatic negotiations about a framework convention began they were in place and prepared.

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11 For a general overview see "Sustainability science" (31 December 2013), in: *Wikipedia, The Free Encyclopedia*; at: <http://en.wikipedia.org/w/index.php?title=Sustainability_science&oldid=588503013>. See also <https://en.wikipedia.org/w/index.php?title=Sustainability_science&oldid=588503013> for an overview of various approaches to sustainability science (5 February 2014).

12 Available at: <http://www.hks.harvard.edu/centers/cid/publications/faculty-working-papers/cid-working- paperno.-213>.

13 Bert J. M. de Vries has taught a course on sustainability science at Utrecht University for many years, in connection with his research at the *Netherlands Environmental Assessment Agency* (PBL). This textbook is based on that course. The book provides a historical introduction into patterns of past (un-)sustainable development and into the emergence of the notion of sustainable development (de Vries 2012: 11–30).

The involvement of civil society and especially the part played by NGOs was historic. In her award-winning *Foreign Affairs* article "Power Shift", Jessica Tuchman Mathews put it this way:

> Whether from developing or developed countries, NGOs were tightly organized in a global and half a dozen regional Climate Action Networks, which were able to bridge North–South differences among governments that many had expected would prevent an agreement. United in their passionate pursuit of a treaty, NGOs would fight out contentious issues among themselves, and then take an agreed position to their respective delegations. When they could not agree, NGOs served as invaluable back channels, letting both sides know where the other's problems lay or where a compromise might be found.
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> As a result, delegates completed the framework of a global climate accord in the blink of a diplomat's eye—16 months—over the opposition of the three energy superpowers, the United States, Russia, and Saudi Arabia. The treaty entered into force in record time just two years later. Although only a framework accord whose binding requirements are still to be negotiated, the treaty could force sweeping changes in energy use, with potentially enormous implications for every economy (Mathews 1997).

The result was the first international agreement on climate change, *the UN Framework Convention on Climate Change* (UNFCCC). Under the Framework Convention, countries agreed on a goal of stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The Framework Convention was signed by US President George H. W. Bush and ratified unanimously by the US Senate. In the two decades since the signing of the Framework Convention, earth scientists have confirmed the basic climate science through both modelling and observations. Warming and other changes to the earth system are under way, and the dangers look even graver than they did two decades ago.

The UNFCCC was, however, only a framework for further negotiations. By 1995, countries realized that the provisions for emission reductions in the Convention were inadequate. They launched negotiations to strengthen the global response to climate change, and, two years later, adopted the Kyoto Protocol that legally commits developed countries to emission reduction targets.

The Clinton administration had signed the treaty over the written objections of the Senate, but had not proceeded to seek the advice and consent of the Senate necessary to ratify the treaty, knowing it would be defeated. In the foreign policy arena, the Senate has the authority of "advice and consent" regarding treaty-making. Given the difficulty of winning the two-thirds vote necessary for treaty ratification in the US, the Clinton administration, as others have done in the past, was considering ways of achieving some of the goals of the treaty without formal ratification.

Yet preliminary progress had been made on this major threat to planetary sustainability and through the IPCC, scientists from around the world were playing a critically important role. *Our Common Journey* was published in October of 1999. The time seemed ripe for an important contribution from sustainability science to US policy. *Then the political climate changed radically.*

21.6 Bush: A Radical Change in Context

In 2000, shortly after publication of *Our Common Journey*, there was the disputed election of George Bush, ultimately decided by a conservative US Supreme Court. Two months after taking office in January 2001, the Bush administration announced that the US would not ratify the Kyoto Protocol for reducing greenhouse gas emissions, claiming scientific uncertainty in addition to negative effects on the US economy as two of the reasons. The "lack of scientific knowledge" argument was retracted later in the face of several NRC reports and criticisms from the larger scientific community, including many scientists working in the federal government.

Then came the September 11, 2001 attacks on the World Trade Center, the Pentagon, and the attempted

14 The Fifth Assessment Report (AR5) of the IPCC released in 2013 and 2014 provides a clear view of the current state of scientific knowledge relevant to climate change; see <http://www.ipcc.ch/The Fifth Assessment Report>. It comprises three *Working Group* (WG) reports and a *Synthesis Report* (SYR). The IPCC *Working Group I* (WG I) assesses the physical scientific aspects of the climate system and climate change. *Working Group II* (WG II) assesses the vulnerability of socio-economic and natural systems to climate change, negative and positive consequences of climate change, and options for adapting to it. It also takes into consideration the interrelationship between vulnerability, adaptation and sustainable development. *Working Group III* (WG III) assesses options for mitigating climate change through limiting or preventing greenhouse gas emissions and enhancing activities that remove them from the atmosphere.

attack on the White House [foiled by the heroic passengers crashing their own plane]. All was televised, recorded in heartbreaking detail, and replayed over and over. Shock, anger, and fear rocketed through modern communications media and triggered an angry patriotism not seen since the attack on Pearl Harbor that launched a previously reluctant America into World War II. When an aide whispered into the ear of President George Bush that the United States was under attack, he sat frozen in a tiny chair in a classroom where he had been reading a story to the children. He looked stunned, 'gobsmacked', momentarily paralyzed, as were millions of others around the globe, by this unexplained, horrendous event. There followed a great deal of understandable confusion. After Pearl Harbor it had been clear what America needed to do. President Roosevelt had seen the necessity for some time. In addition to his thoughts on the matter, he had a large number of ideas brilliantly and frequently articulated by the British prime minister Winston Churchill. President Bush did not know what to do. It was not clear what was happening and why. The who-what-when-where-why-and-how questions had no answers. And Bush was no Roosevelt nor was he a Churchill.

A large new bureaucracy, Homeland Security, was created and an ill-defined 'War on Terror' was launched. As the administration prepared to invade Iraq (never linked to the 9/11 attacks), the style, tone and rhetoric of US foreign policy seemed to come out of a sort of Clint Eastwood 'spaghetti western'. In the process, the G. W. Bush administration not only failed in its ill-conceived objectives, it also undermined US credibility, squandering the immense global sympathy and goodwill that followed the 9/11 attacks. The follies of the occupation of Iraq and 'nation-building' in Afghanistan followed, with an agenda dominated by claims of keeping America safe from real or suspected enemies, foreign and domestic. Having inherited a rare balanced budget from the Clinton administration, failing to pay for the immense costs of his policies G. W. Bush plunged the country into debt.

In her 10 October 2007 Congressional Testimony before the House National Security and Foreign Affairs Subcommittee, Jessica Tuchman Mathews stated that:

> The events of 9/11 have had far less of an effect on the real world than that day had on the American psyche. Iraq is a very different matter. The war's monopoly on our political energy has now stretched to 5 years—an eon in a time of fast-moving global change. One of its greatest—as yet uncounted—costs is the degree to which it has sucked the oxygen from almost every other issue. A dramatically changing global climate might as well not be happening. The reappearance of huge federal budget deficits is hardly noticed. The need for change in an unsustainable energy policy has barely surfaced. And, in these five years a number of international security problems have grown, from neglect, into full-blown crises (Mathews 2007: 2).

After the mess made during the first term by going to war and not paying for it, and after the failure of promised results was revealed to be based on (wilful?) ignorance, avoiding available information by knowledgeable people, and after his actions were executed with all the bravado, arrogance and sensitivity of a Hollywood gunslinger, George W. Bush was re-elected.

The electorate does not pay attention to many details. Many in the Washington foreign affairs community working on a wide range of global issues, including some colleagues working on security and terrorism issues, were shocked. Friends in the foreign press and diplomatic services expressed incredulity. I recall a social scientist talking about an analysis of voting patterns reporting that the pattern in this election was largely unchanged, with the exception of young mothers in the South, who had changed their former vote to support Bush this time. The reason most given for the switch was to "avoid changing Commanders-in-Chief in time of war". So it went.

The negative results of the Bush administration environment policies have been well documented. For example, on 16 January 2009, four days before he left office the White House released a bulletin describing Bush as a careful steward of the environment. The same day the *Natural Resources Defense Council* (NRDC), the Sierra Club and many others took vigorous exception. Suzanne Goldenberg's article "The worst of times: Bush's environmental legacy examined" in *The Guardian* of 16 January 2009 details their near universal outrage. They saw the Bush years as a concerted assault on environmental progress, from the administration's undermining of the science of climate change to its dismantling of environmental safeguards and its uncritical support for mining and oil interests. Frequently mentioned was not only his failure to act on global climate change but his administration's covert attempt to silence the science alerting us to the urgency of the problem.[15]

In terms of the very real but less immediately salient threat of global climate change and the more gen-

15 See at: <theguardian.com>, Friday 16 January 2009, 10.45 EST.

eral challenge of the transition to sustainability, the administration seemed happy to abdicate both domestic and global environmental leadership, minimize the problem, and roll back much hard-won progress (see for example Kennedy 2005).

Following the Kyoto announcement, the group responsible for coordinating and integrating US government research on climate, the *Global Change Research Program* (GCRP) was renamed with the weaker title of the *Climate Change Science Program* (CCSP). The Bush administration was to be regularly charged with suppressing scientific information and its implications for society.

21.7 Challenges of the UNFCCC Framework

Independently of the actions of the Bush administration, criticism of the UNFCCC process had been growing. In the winter of 2000, international talks on the implementation of planned emissions standards again faltered, a resolution again postponed (Victor 2011, 2011a). Outside the environmental community, and even within it, support for Kyoto weakened. Indeed Earth Summit agreements on climate, biodiversity and desertification had not produced any concrete results on climate, biodiversity or desertification.

Many reasons for the repeated failure of these attempts to forge global environmental agreements were offered (Victor 2011; Bell 2011). The most persuasive related to the architecture of negotiations under UN auspices—an inclusive process, involving 194 countries—polluters, victims and everyone in between—all of whom officially have equal weight in the proceedings and any single nation might block the will of all the others. Goals and objectives produced this way will be too broad and vague because governments in that setting are unwilling to do anything more concrete. Negotiations now include a bigger basket of issues than most multinational talks—including weaning whole economies off coal and oil, protecting disappearing forests, saving the small island states that are likely to be underwater within a few decades, and managing all the related costs.

Suggestions for improvements have included encouraging bottom-up initiatives at national, regional, and global levels and leveraging national self-interest rather than wishful thinking (Bell 2011).

> Moving to a variety of nimbler negotiating vehicles supplementing the UNFCCC is worth a try, as is disentangling goals for emissions reductions from debates about legal structures and venues. The large docket of issues could be broken up, narrowing specific negotiations by issue or region, by greenhouse gas emissions contribution, or by tools and methods to achieve greenhouse gas reductions. Finally, climate change talks, which involve a problem with the potential to disrupt the life of every human on earth, must graduate into the elite arena. They should be directly guided by powerful ministries, which can make commitments and sell them at home in ways most environmental authorities cannot.
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> Controlling greenhouse gas emissions is a messy real-world challenge that will most likely require an ... evolving progression of messy real-world solutions. But if the climate establishment can acknowledge more variation of approaches and entry points, it increases its chances of realizing its most important goals, even if it does not tie a nice, neat bow on them (Bell/Blechman/Zigler 2011: 4).

However, giving talks top-level attention, segmenting issues, and diversifying negotiating arenas all seem promising. It is precisely because climate disaster is impending that the world should get creative about addressing the problem. Within the UN negotiating framework, however, it will be hard to get them to consider approaches that might challenge the rule of consensus, which many equate with equity (Bell/Blechman/Zigler 2011: 3).

In fact, a number of countries, including the US, have been diversifying their approaches for some time. And there are some bright spots. In the absence of federal leadership, and in some cases because of it, much progressive action was led by states and cities. California, the sixteenth largest emitter of carbon dioxide worldwide, for example, is among several US states that have entered into partnerships or passed laws for controlling greenhouse gases ahead of, even in spite of, the federal government.

In August 2006, not long after the publication of the 2006 Stern report on global warming that he had requested, Prime Minister Tony Blair made history by travelling to and signing, with Republican Governor Arnold Schwarzenegger, an agreement with the state of California to cooperate on a range of global environmental issues. "California will not wait for our federal government to take strong action on global warming", said Governor Schwarzenegger, a Republican, who would also send a wake-up call to US automakers by creating emissions standards for automobiles.[16] The Bush administration attempted to halt this action, claiming federal responsibility. They were overruled by the Supreme Court on the grounds of States' Rights.

16 See at: <http://gov.ca.gov/news.php?id=2770>.

In August 2008, Massachusetts moved forward with a comprehensive regulatory program to address climate change. The *Global Warming Solutions Act* (GWSA) requires Massachusetts to set economy-wide *greenhouse gas* (GHG) emission reduction goals to achieve reductions of as much as twenty-five per cent below 1990 state-wide levels by 2020, and eighty per-cent below those levels by 2050.[17]

A month before the *19th Conference of Parties* (COP19) in November 2013 in Warsaw, California launched a regional pact to harmonize and intensify the efforts of California, Oregon, Washington, and British Columbia to reduce greenhouse gases. "California isn't waiting for the rest of the world before it takes action on climate change", said Governor Brown. "Today, California, Oregon, Washington and British Columbia are all joining together to reduce greenhouse gases". Recently the California Air Resources Board announced an agreement with Quebec outlining steps and procedures to fully harmonize and integrate their cap and trade programmes. In September 2013, Governor Brown joined China's top climate official, National Development and Reform Commission Vice Chairman Xie Zhenhua, to sign a first-of-its-kind agreement on climate change between the commission and a subnational entity. This followed landmark partnerships established earlier this year on the governor's Trade and Investment Mission to China, including agreements signed with China's Minister of Environmental Protection Zhou Shengxian to improve air quality and with Jiangsu province to promote renewable energy.[18]

These actions by California and New England are meant as examples of the large number of actions taken by states, municipalities, businesses, voluntary organizations, schools and churches, homeowners, and consumers of automobiles and appliances.

21.8 Obama—Beginning the Turnaround?

On 20 January 2009, Barack Hussein Obama became the forty-fourth president of the United States. Within the week he issued two presidential memoranda on energy. One directed the Department of Transportation to increase fuel efficiency standards to 35 miles to the gallon (15 km/l) and the other directed the *Environmental Protection Agency* (EPA) to allow individual states to set stricter tailpipe emissions regulations than the federal standard. In February he provided $54 billion in funds to encourage domestic renewable energy production, make federal buildings more energy-efficient, improve the electricity grid, repair public housing, and weatherize modest-income homes.

Presidential memoranda and proclamations do not require Congressional approval. This is critically important. The US government was designed, quite deliberately, not to work very well. The design works, perhaps too well. Separations of powers, checks and balances, make it very difficult to do much in many areas. It is extremely easy to halt actions. There is a long list of actions requiring Senate confirmation, but the presidential ability to negotiate an international agreement stands out. Any agreement must receive the advice and consent of the Senate by a two-thirds majority. This is why the Clinton/Gore administration never sent the Kyoto Protocol they had signed forward to the Senate. It had no chance of passage.

In 2010 the EPA issued rules restricting greenhouse gas emissions from cars and trucks by 2012. This was based on the Agency's finding that greenhouse gasses harm human health. As in the case with CFCs, the scientific link to a threat to health created motivation and powerful justifications for action.

Obama re-engaged positively in international climate negotiations, attending the December 2009 Copenhagen COP, which left many with very reduced expectations of what was possible through the UNFCCC process.

In April of that year he launched the Major Economies Forum on Energy and Climate, to facilitate a candid dialogue among major developed and developing economies on climate change and the challenge of clean energy. The seventeen member economies are: Australia, Brazil, Canada, China, the European Union, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Russia, South Africa, the United Kingdom, and the United States. Their Forum on Energy and Climate works to drive transformational low-carbon technologies in the energy sector. The Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollution focused on such short-lived pollutants as methane, black carbon, and *hydrofluorocarbons* (HFCs). Together these account for one-third of current global warming, and addressing them can prevent more than two million premature deaths a year, and avoid the annual loss of over thirty million tons of

17 See at: <http://www.mass.gov/eea/pr-pre-p2/pr-2010/press-release-re-clean-energy-and-climate-plan.html> and <http://www.mass.gov/eea/agencies/massdep/air/climate>.

18 See at: <http://gov.ca.gov/news.php?id=18205>.

crops. Partnership has expanded beyond the founding partners (Bangladesh, Canada, Ghana, Mexico, Sweden, and the UN Environment Programme) to include over thirty countries and the European Commission.

At the 2011 *Asia–Pacific Economic Cooperation* (APEC) Summit, leaders agreed to eliminate non-tariff barriers to environmental goods and services, thus lowering costs and increasing the dissemination of clean technologies. Leaders further committed to phasing out inefficient fossil fuel subsidies and aimed to reduce the energy intensity of APEC economies by forty-five per cent by 2035. In June 2013, President Obama and Chinese President Xi agreed to work together and with other countries to use the Montreal Protocol to phase down HFCs, a critical step forward towards a global agreement. In June 2013 President Obama launched a comprehensive Climate Action Plan.[19]

His Climate Action Plan, his 25 June 2013 speech on climate change[20] and his 2014 State of the Union Speech to Congress[21] leave no doubt as to the seriousness of his intentions and the effort he has made to do what he can using the powers of the Presidency. However, a polarized, gridlocked Congress dominated by right-wing extremists hampers him.

While Obama certainly represents a turnaround in the Presidency, he is in many areas limited to actions that do not require Congressional action. He must deal with a Congress that demonstrates little capacity or interest in solving problems and has dedicated much of its time to defeating anything he proposes.

21.9 Polarization, Gridlock and a Trickle of Contrarians

> The evidence from hundreds of scientific and economic studies finds serious to grave impacts on agriculture, coastlines and associated settlements, and ecosystems, as well as increasing acidification of the oceans and threats to many species around the world. Science progresses, the earth warms, glaciers melt, the oceans become increasingly acidic, but the climate contrarians change not (Nordhaus 2012: 85).

Contrarians are becoming fewer in number, less and less credible, and not nearly as well funded as in the past. People look around at storm damage, floods, and droughts and know the climate is changing. The process had been similar in the case of regulating tobacco and controlling chlorofluorocarbons.

The insurance industries in the US as in Europe were early believers in the problem of climate change as they saw the effects of the increases in the frequency and severity of storms consistently predicted by the scientists. This cost them money so they paid attention. The support funds from industries threatened by efforts to reduce greenhouse gas emissions are much reduced. Even the US Chamber of Commerce, with much of industry, has now accepted the reality of climate change caused by greenhouse gas emissions. The press has belatedly become more responsible in looking at the credibility of its sources.

The political gridlock in Washington these days is, however, different. Two of Washington's most respected and even-handed analysts[22] wrote *It's Even Worse than It Looks: How the American Constitutional System Collided with the New Politics of Extremism* which became a *New York Times* best-seller. The Republican Party today, they report, has little in common even with Ronald Reagan's GOP, or with earlier versions that believed in government. It has become "an insurgent outlier—ideologically extreme; contemptuous of the inherited social and economic policy regime; scornful of compromise; unpersuaded by conventional understanding of facts, evidence and science; and dismissive of the legitimacy of its political opposition" (Mann/Ornstein 2013: [Kindle Edition] 178).

They also charge the press with using false equivalence to explain outcomes, when Republican obstructionism and Republican rejection of science and basic facts have no Democratic equivalents. It's much easier to write stories that convey a false impression that the two sides are equally implicated.

Obama's re-election in 2012 was a setback for Republicans and a number of Republicans interested in solving problems are beginning to speak out. But too many remain worried about having to face well-funded right-wing challengers. Recent polls show a declining popularity of the Republicans, seen as too

19 See at: <http://www.whitehouse.gov/share/climate-action-plan>.

20 See at: <http://www.whitehouse.gov/the-press-office/2013/06/25/remarks-president-climate-change>.

21 See at: <http://www.whitehouse.gov/the-press-office/remarks-president-state-union-address>.

22 Norman Ornstein of the American Enterprise Institute and Thomas Mann of the Brookings Institution are political scientists with decades of providing even-handed analysis of Washington politics, and especially of Congress. Their 2006 volume *The Broken Branch* focused on the institutional shortcomings of Congress while this volume examines the broader current political dysfunction.

extreme and out of touch. The polls also revealed new lows for the federal government but record highs for State and municipal government.[23]

21.10 Conclusions

The NRC Study *Our Common Journey: Toward The Transition to Sustainability* contributed to the process of strengthening and energizing the connections between science, technology and engineering and their efforts to support the transition to sustainability. It did this through the normal scientific channels of publishing to a largely scientific audience, and in addition through the vigorous and determined international outreach efforts of co-chairs Kates and Clark and the extraordinary scientists in the Study Group as well as Sherburne Abbott, the lead NRC staff person responsible for organizing, editing and frequently in some cases writing. They are themselves movers and shakers in influential institutions and one could track the marks they have left in intellectual contributions, institutional capacities, and undergraduate and graduate programmes. They participated in many of the preparations for the 1992 *World Conference for Sustainable Development* (UNCED) in Johannesburg, South Africa, which provided rare opportunities for strengthening international scientific cooperation in developing sustainability science. The World Conference failed to meet expectations.

Efforts aimed at global and national policy-making mostly failed not for want of trying but because of the collapse of global environmental summitry and the Bush administration's disinterest in, ignorance of, and animosity toward what many regard as the greatest strategic threat to our security we have yet faced. The high level governmental demand for support and cooperation from scientists working on sustainability issues that one could expect from the Clinton/Gore administration had been replaced with outright hostility and suppression of research results.

Fortunately, failure is mostly confined to the federal government in Washington. The front line of problem-solving has shifted to states and municipalities, to educational institutions and research centres, to the many partnerships between NGOs, scientists, engineers and corporations who see a decarbonizing future as an opportunity.

The feedbacks keep on coming. Storms, wind, drought, and crazy weather are, as predicted, becoming stronger and more frequent. Dramatic and sometimes disastrous events can influence policymakers by demanding their attention. The global science assessment of the IPCC becomes ever more solid and sensitive and can now give better information on actions that work.

In an interview on 26 January 2013 during the World Economic Forum, Lord Nicholas Stern reflecting on his 2006 Stern Report said he actually underestimated the risks posed by global climate change. At the same meeting *International Monetary Fund* (IMF) Director Christine Lagarde, former Conservative Finance Minister of France, noted the "Increasing vulnerability from resource scarcity and climate change, with the potential for major social and economic disruption". She called climate change "the greatest economic challenge of the twenty-first century".[24]

Global climate change is just one of the many threats to a sustainability transition along with extreme poverty, the growing gap between rich and poor within as well as between countries, terrorism, crime, pollution, disease, weapons of mass destruction, environmental protection, non-tariff trade barriers, intellectual property, and the challenge of cooperative governance where states are challenged by an ever growing number of non-state single-interest actors. Overall there is a rapidly expanding poorly-regulated market economy that continues on a collision course with our planet. These problems are all global. They must be solved and managed globally. This will require institutional capacities and systems of governance that are currently lacking. Sustainability transition studies have begun to address this need.

23 See Pew Research Center; at: <http://www.people-press.org/2013/02/26/gop-seen-as-principled-but-out-of-touch-and-too-extreme/2/> and at: <http://www.people-press.org/2013/04/15/state-governments-viewed-favorably-as-federal-rating-hits-new-low/2/>.

24 Nicholas Stern: "I got it wrong on climate change—it's far, far worse"; at: <http://www.theguardian.com/environment/2013/jan/27/Nicholas-stern-climate-change-davos/print>.

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