organizations and concentrating on in-country capacity-building.

I can sympathize with the need to tell a manageable and coherent story, but it is frustrating to have such a narrow view of the roots of conservation perpetuated, particularly by someone who is well aware of this view's limitations. To take just one example, the Mongolians pride themselves on having set up the world's first National Park in 1778 — as do the Americans in 1872. Clearly there are issues surrounding the definition, but it is a shame that the latter view of history is ubiquitously and uncritically repeated in conservation texts.

One of the pleasures of the book is Adams' explanation of the complex intertwining over the past century of the concepts of sustainable use, hunting and wildlife preservation. Some concepts, such as biodiversity and sustainable development, are recent additions; others have shifted in and out of fashion, metamorphosing as they went. Although the early conservationists tended to be exclusionary in their outlook, they were well aware of the potential of sustainable use as a conservation tool. We can be sure that most of the 'new ideas' of conservation were actually reawakened as the dynamic culture of conservation shifted again.

Most of the book is determinedly factual and full of detail, with many interesting examples and case studies — although readers will be hard-pressed to find them again, as the book has no bibliography or visual aids such as chronologies, relying instead on chapter-based endnotes and an inadequate index. The book will also be frustrating for those who wish to find scientifically based analyses of the pros and cons of different conservation approaches; that is not the book's aim. The final chapter, in which Adams outlines his vision for conservation, seems to belong to a different book. The ideas in it are challenging and raise fascinating questions, but seem strangely disengaged from his previous careful historical analysis.

One of the things that makes conservation interesting and challenging is that its practitioners have many perspectives and disciplinary backgrounds. This cultural diversity is growing as social scientists become more fully engaged. One of the great hopes for conservation in the future is this need to look at issues through others' eyes. Just as ecologists now need to be able to perform quantitative analyses, so recently trained conservationists cannot get by without learning social science. This book is a major contribution towards opening conservationists' eyes to another world of historical and cultural understanding, which I welcome wholeheartedly. ■

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TWENTIETH CENTURY FOX/PA

All at sea: climate change is looming over us, but will it really leave New York under water?

Film

Making heavy weather

The Day After Tomorrow
Directed by Roland Emmerich
20th Century Fox
Worldwide release on 28 May 2004

Myles Allen

I have yet to meet a doctor who doesn't dismiss the TV drama *ER* as hopelessly unrealistic, and yet who doesn't tape it religiously if they happen to be on call. I've also yet to meet a doctor who doesn't regard meteorologists and oceanographers as spotty geeks who couldn't possibly be doing anything glamorous enough to be worth a TV series, never mind a blockbuster Hollywood film. So, with the release of *The Day After Tomorrow*, a blockbuster-and-a-half inspired by the issue of human-induced sudden climate change, we must be careful not to confirm the medics' worst suspicions by pedantically carping on about the film's portrayal of geophysical fluid dynamics.

A medic watching this film would learn as much about climate as I would learn about cardiology watching *ER* — not nothing, but I would prefer the surgeon standing over me with a scalpel, or the politician pondering my petrol taxes, to have had some additional training. So I find the fuss about the film's possible impact on climate policy rather disturbing. Bjørn Lomborg vehemently attacked the film recently in the *Independent on Sunday* for bouncing politicians into signing the Kyoto Protocol. It's a film, lighten up. I'm sure the world's teenagers can work out that this is hardly exam revision material, and if it inspires a few of them to stick with physics for a couple more years and perhaps consider a university course in the geosciences, then it will have more than justified its special-effects budget.

Could *The Day After Tomorrow* do for meteorology and oceanography what *Top Gun* did for US Air Force recruitment? The special effects are stunning and the filmmakers have clearly gone to some lengths to base them all on natural phenomena, although the connections between them are more tenuous. A tidal wave could indeed hit New York, albeit one more likely induced by a submarine landslip than a gigantic storm surge. Strange things do happen in the eyes of hurricanes, although to get stratospheric temperatures at sea level you have to be fairly creative with your thermodynamics. I draw the line at someone embedding a hurricane model into a global weather model in 48 hours, but perhaps it is wise not to tell the teenagers what climate modelling actually involves until after they have signed up.

I believe that the public takes a much more sophisticated line than Lomborg fears. I am involved in a public-participation experiment (www.climateprediction.net) that is looking, among other things, at how the atmosphere might reinforce a thermohaline slow-down. Contributions from the public on the discussion boards have generally been level-headed. Everyone understands that there's a link to issues raised by the film without mistaking the film for a forecast.

So, the film is well worth a lab night out, particularly if your model is giving trouble. Perhaps the hardest part will be judging how to respond to questions in the pub afterwards about whether this has anything to do with our actual projections for human-induced climate change. We have to be clear that the film is science fiction, but we also have to make sure we don't belittle what is actually going on. A prescient dinosaur, gazing future-wards over the millennial undulations of global temperatures, would probably just about make out the warming spike representing our humble contribution to the twenty-first century. It's quite an ego-boost, isn't it? The last species to have this much influence on the climate was almost certainly green, slimy and inarticulate. A teenager signing up for the geosciences today

is guaranteed an interesting career, for while unfettered anthropogenic climate change will certainly not turn out exactly like *The Day After Tomorrow*, it should still be a show worth watching — after *ER*, of course. ■

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The second creation

Human-built World: How to Think about Technology and Culture
by Thomas P. Hughes
University of Chicago Press: 2004. 224 pp. $22.50, £16

Graham Farmelo

Five years ago, the US Army awarded a $45-million contract to the University of Southern California to establish the Institute for Creative Technologies. The funding of this organization — a confluence of the interests of the military, academia and Hollywood — was a significant step in the history of American technology, from President Eisenhower's 'military–industrial complex' towards something quintessentially modern, a military–entertainment complex.

This development has not evoked much comment, probably because, as the distinguished historian Thomas Hughes laments, most people in the industrialized world have a simplistic view of technology. They think of it as merely being about computers and other gadgets, and as "a handmaiden of commercial capitalism and the military". Hughes seeks to put this right in *Human-built World*, in which he presents an accessible, multidisciplinary review of modern technology.

Hughes concentrates on the development of technology in the United States, nodding only occasionally to Germany. In the first and best chapter, he describes how the European settlers viewed their transformation of the wilderness into a purpose-built environment as "a second creation". Technology was a gift from God. This religious perspective led the historian Lynn White Jr to note that the book of Genesis in the Bible has persuaded many Americans that God gave them a privileged dominion over nature, an observation that sheds a good deal of light on the environmental policies of the present US administration.

The deployment of new technology in the United States has not been without its critics. After generations of industrialists had enthusiastically followed Henry Ford's precepts for mass production ("system, system and more system"), a backlash was inevitable. Hughes vividly reports the opposition (which reached a peak during the Vietnam War) to the systems approach by humanists, public intellectuals and artists, who pointed to what they saw as the consequent erosions of personal freedom and deterioration of the environment.

In the light of this history of opposition, Hughes seems surprised by the wide-eyed reception that the public has given over the past two decades to the burgeoning of digital information technology. Even this technology has religious connections, he points out: George Gilder, the high-profile celebrant of the information age, has long highlighted the emerging 'revolution' in information technology as a kind of new religion.

We do not need to share Gilder's prophetic zeal to agree that information technology is the nearest thing we have seen in contemporary life to a technological revolution. For good or ill, it has substantially changed the way that huge numbers of people live in the industrialized world. Yet Hughes is sceptical about this, and dismisses the claims of its most passionate advocates, notably Nicholas Negroponte. The visionary contributions of Marshall McLuhan go unremarked.

Hughes' passion obviously lies elsewhere, in projects that seek to harmonize technological developments with the environment — the field of ecotechnological environmentalism (never has a human endeavour been in greater need of a new name). His conclusion, a lengthy panegyric to Florida's project to restore its Kissimmee River system, underlines his optimism. But one wonders what impact this project will have, compared with the environmental destruction that developers are currently inflicting on other parts of the state.

Human-built World is a rewarding if unsatisfying book, too dense to appeal to lay readers but too light to be of much use to scholars. It is, however, a virtuoso overview of the various relationships between technology, commerce, society, art and the military. To anyone who has read it, the emergence of a military–entertainment complex will appear as natural as it did to Milo Minderbinder in *Catch 22*: "Frankly, I'd like to see the government get out of war altogether and leave the whole field to private industry." One wonders whether similar thoughts have crossed the mind of Donald Rumsfeld in the past few weeks ■

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Exhibition

Scientific expressionism

SAMMLUNG DIETMAR SIEGERT

In the mid-nineteenth century, Guillaume Duchenne, who described the form of muscular dystrophy that bears his name, documented in detail all the muscles of the human face and the facial expressions that they could convey.

Fear, joy, horror, disdain and disgust — Duchenne could reproduce any expression of emotion by direct electrical stimulation of the appropriate group of muscles. In doing so, and in recording his experiments photographically, he caused a sensation. At the time, our ability to convey subtle emotions on our faces was considered a divine manifestation of the inner consciousness that separated us from the beasts — not merely a matter of simple physiology.

An introverted man and an unconventional scientist, Duchenne was not shy of challenging the world. Using this series of facial shots, he argued that the ancient Greeks often got it wrong. The facial expressions on their sculptures did not always accurately reflect the anatomy of the emotions that the artists intended to convey, he claimed.

Duchenne was one of the first scientists to use the new technology of photography as part of the scientific process. The image shown here is included in the exhibition "Photography and Painting in the Nineteenth Century", which runs until 18 July at the Kunsthalle der Hypo-Kulturstiftung in Munich, Germany.

The extensive exhibition describes how painters were influenced by the new way of seeing, and how scientists, engineers and architects used photography as a means of record-keeping — which also allowed them to see their own worlds differently. It emphasizes the unexpected dialogue between science and art, which were both confronted with this revolutionary new tool at the same time. **Alison Abbott**

http://www.hypokunsthalle.de/newweb/eindex.html