

## International Year of Deltas mooted

IGBP CHAIR James Syvitski and other researchers from the IGBP community are among those who have called for 2013 to be declared as an International Year of Deltas in an article published in *Eos*. Deltas support large populations, rich biodiversity and important ecosystems, but are severely threatened by human activities. Nothing short of a truly interdisciplinary and international effort will suffice to find sustainable solutions, the authors say. IGBP has endorsed the initiative. Foufoula-Georgiou *E et al.* (2011) *Eos* 92: 340-341.

## Exploring Planetary Stewardship

THE IGBP secretariat in Stockholm organised an international workshop entitled Planetary Stewardship: Solutions for Responsible Development, which was hosted at the Royal Swedish Academy of Sciences, 13-15 June 2011.

The workshop brought together 30 leading experts from diverse disciplines to discuss an optimal approach to stewardship. Also present was a representative from the High Level Panel on Global

Sustainability, set up by UN Secretary-General Ban Ki-moon. Breakout groups focused on three themes: sustainable cities, sustainable resource chains and the sustainable planet.

Participants explored the links between global change, health, climate and resource security. There was broad agreement that equity and governance were important issues, and that urban regions – the source of several problems – can also contribute to solutions if managed carefully.

Data visualisation and the concept of planetary boundaries were discussed, as were several cases elucidating resource flows in space and time.

## IGBP inputs to SBSTA

PROFESSOR Mary Scholes of the University of Witwatersrand participated on behalf of IGBP in a side event organised by the Subsidiary Body for Scientific and Technical Advice (SBSTA). The side event, entitled Updates from Climate Change Science – Special Focus: Africa, was held during the 17th Conference of the Parties (COP17) in Durban, South Africa, in December 2011. IGBP has been invited to provide research updates to this body – a permanent body to the United Nations Framework

Convention on Climate Change – for the past several years.

## Future Earth initiative

THE VISIONING process initiated by the International Council for Science (ICSU), IGBP's sponsor, calls for the establishment of a new ten-year initiative entitled Future Earth – Research for Global Sustainability.

The initiative is being developed along with the Belmont Forum, a group of major funders of global-environmental-change research, and other international organisations. It aims to deliver knowledge for societies to meet their sustainable-development goals in the coming decades.

Future Earth will build on the existing global-change research programmes and their projects, and will develop new projects while coordinating and focusing international scientific research on global sustainability.

A new governing body is expected to be appointed by the end of 2012. The initiative will be announced in two stages in 2012 – at the Planet Under Pressure conference in March and the UN Conference on Sustainable Development (Rio+20) in June.

## IGBP SCIENCE FEATURES PROMINENTLY IN PRESENTATION TO THE DALAI LAMA

THE GREAT Acceleration graphs from IGBP's first synthesis were among the programme's science that featured in a presentation made to the Dalai Lama recently by Diana Liverman. Liverman is the former chair of the Global Environmental Change and Food Systems (GECAFS) project and co-chair of the team guiding the transition to the new Future Earth initiative.

The presentation was made at "Ecology, Ethics and Interdependence", the Mind and Life XXIII conference with the Dalai Lama in dialogue with contemplative scholars, activists and ecological scientists.

The conference was held in Dharamsala, India, 17-21 October 2011. See IGBP website for more information: [www.igbp.net](http://www.igbp.net).



The Office of His Holiness the Dalai Lama

## IGBP DIARY

### 2012

#### March

24-25. PAGES Scientific Steering Committee meeting. London, United Kingdom.

25. AIMS Scientific Steering Committee meeting. London, United Kingdom.

30. March-1 April. LOICZ Scientific Steering Committee meeting. London, United Kingdom.

#### May

7-10. SOLAS Open Science Conference. Cle Elum, Washington State, USA.

11-13. SOLAS Scientific Steering Committee meeting. Cle Elum, Washington State, USA.

14-16. GLP Scientific Steering Committee meeting. Amsterdam, The Netherlands.

21-23. 27th IGBP Scientific Committee meeting. Bergen, Norway.

24. One-day symposium in conjunction with the IGBP Scientific Committee meeting. Norwegian science highlights: Bio-geochemical Cycles and Sustainable Pathways in the Ocean, Atmosphere and Land. Bergen, Norway.

#### June

12-14. IMBER Scientific Steering Committee meeting 2012. La Paz, Mexico.

#### September

17-21. 12th IGAC Open Science Conference: Atmospheric Chemistry in the Anthropocene. Beijing, China.

15-16. IGAC Scientific Steering Committee meeting. Beijing, China.

24-27. The Ocean in a High-CO<sub>2</sub> World. Monterey, California, USA.

# THE FUTURE OF EXTREME EVENTS

HEAT WAVES and the frequency of heavy precipitation are likely to increase in the 21st century, according to a report recently published by the Intergovernmental Panel on Climate Change. Although we may expect climate-related extremes to increase in a warmer world, a comprehensive assessment of the role of climate change in altering the characteristics of extreme events was lacking. This is now provided by the *Special*

*Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX).*

The projected precipitation and temperature changes imply changes in floods. However, the report states that there is low confidence at the global scale regarding climate-driven changes in the magnitude or frequency of river-related flooding due to limited evidence and because the causes of regional changes are complex. The assessment

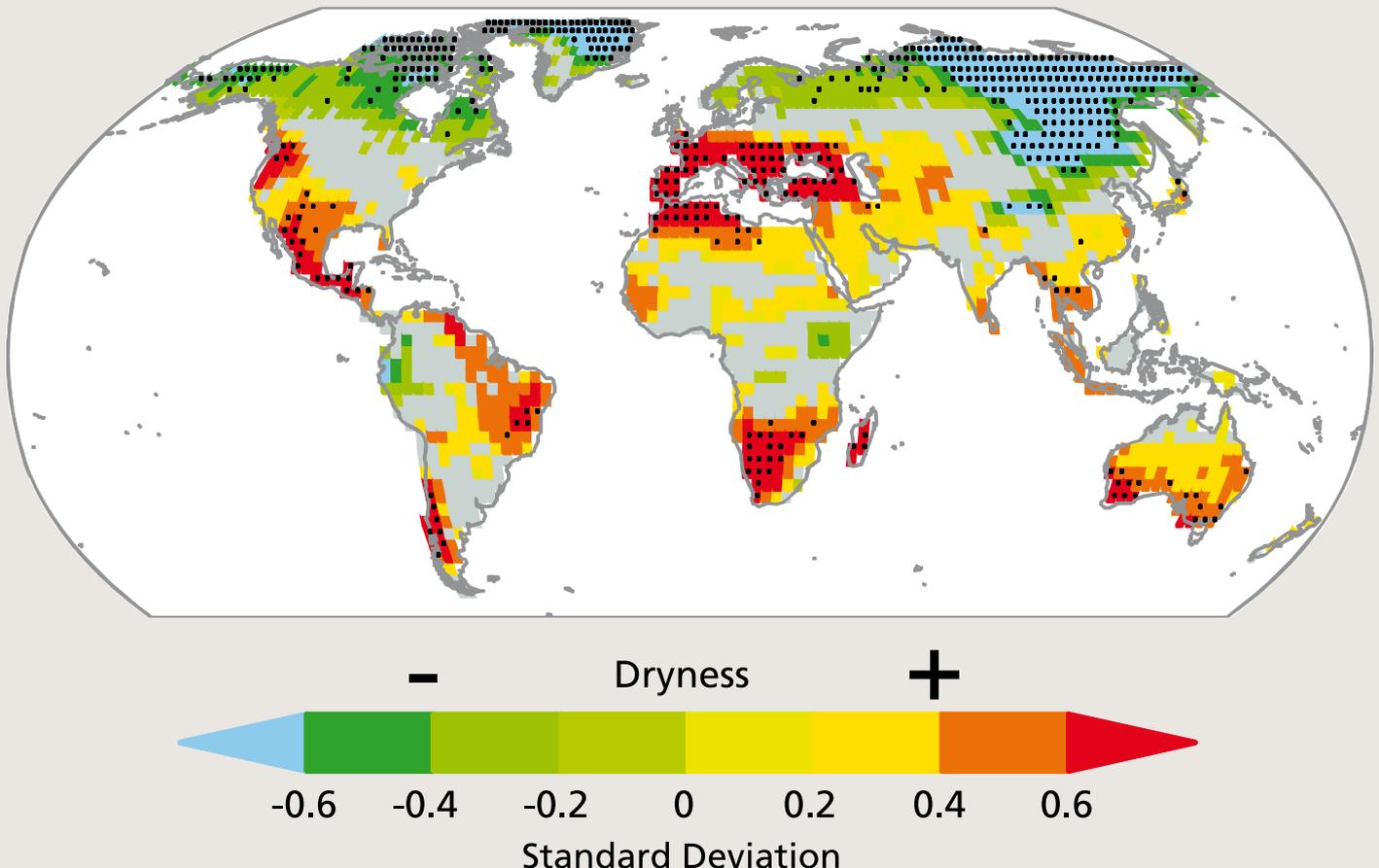
suggests with medium confidence that droughts in several parts of the world will also increase in the 21st century. And, echoing recent reviews, the report finds that the frequency of tropical cyclones will either decrease or stay the same.

The report also explores how the combined expertise from the fields of climate science, disaster risk management and adaptation can help manage risks related to extreme climate events. It incorporates case

studies that illustrate specific extreme events and their impacts in different parts of the world, as well as a range of risk-management activities. It states that both incremental steps as well as transformational change are essential for reducing risk from climate extremes.

IGBP researchers Qin Dahe (co-chair of IPCC's Working Group I), Pauline Dube, Sonia Seneviratne and Mark Pelling were among the authors of the summary for policymakers.

2081–2100



The figure shows the change in annual maximum number of consecutive dry days (precipitation <1 mm) for the period 2081-2100 based on model projections. Increased dryness is indicated with yellow to red colours; decreased dryness with green to blue. From IPCC (2011) Summary for Policymakers, in Intergovernmental Panel on Climate Change *Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, edited by Field C B *et al.* Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

## ICONIC UN INDEX REWARDING POLLUTERS?



CHULUUN TOGTOKH, vice-chair of IGBP's Global Change National Committee in Mongolia, has called for the United Nations to overhaul its flagship development index, which he says wrongly promotes polluting countries as role models. "If the UN continues to encourage countries such as Mongolia to aspire to the US lifestyle, we will all be in serious trouble," he says, in a World View column in the journal *Nature*.

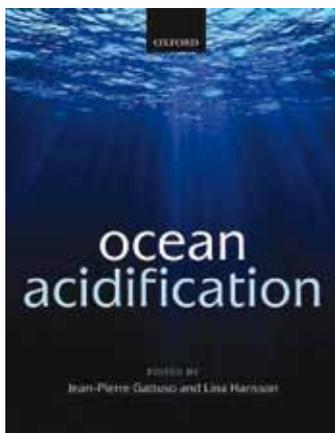
Togtokh says that the UN's annual Human Development Index (HDI),

released in 2011, is flawed because it fails to take into account sustainability. "Worse still, the index celebrates gas-guzzling developed nations. It is time this failure – hidden in plain sight – was exposed and corrected," he says.

Togtokh has recalculated the index to take account of *per capita* carbon emissions from each nation, alongside the UN's traditional measures of health, education and income levels. He names his new metric the Human Sustainable Development Index (HSDI).

The results are striking: Australia slides from 2nd place to 26th, the United States drops from 4th to 28th, and Canada falls from 6th to 24th.

"The HDI has shifted the target of development beyond the almighty dollar; the proposed HSDI would go one step further and change the role models for development," he says. "My country is likely to become one of the fastest growing economies in the world, but the current HDI offers no encouragement for it to grow sustainably."



### Synthesis book on ocean acidification

THE EUROPEAN Project on Ocean Acidification (EPOCA) has published a book that synthesises the most

recent information about the consequences of ocean acidification so as to inform both future research agendas and marine-management policy. The book, entitled *Ocean Acidification*, is edited by Jean-Pierre Gattuso and Lina Hansson, and is published by Oxford University Press.

### Land-use transitions in South America

LAND-USE transitions will continue to be important in South America as the region seeks to balance economic growth with environmental sustainability. Against this background, a group

of scientists met in November 2011 in Ilhabela, Brazil, for a workshop sponsored by IGBP's Global Land Project and Brazil's National Institute for Space Research (INPE). The scientists discussed four main topics dealing with the future sustainability of the region: governance and institutions, vulnerability, environmental services, and modelling and data provision and analysis. The participants agreed that one of the key challenges is to better understand global processes (social, economic and political) affecting land-use transitions across the region. <http://www.inpe.br/wsglp2011/>.

## 2012

### March

22-24. DIVERSITAS Scientific Committee meeting. London, United Kingdom.

24-25. IHDP Scientific Committee Meeting. London, United Kingdom.

26-29. Planet Under Pressure: New Knowledge Towards Solutions. London, United Kingdom.

30. National Global Change Research Committees' Day. London, United Kingdom.

### April

17-20. Dynamic Deltas International Conference. Vlissingen, The Netherlands.

19-22. Arctic Science Summit Week (ASSW) 2012. Montreal, Canada.

22-27. International Polar Year (IPY) "From Knowledge to Action". Montreal, Canada.

### June

20-22. Rio+20: United Nations Conference on Sustainable Development. Rio de Janeiro, Brazil.

27-29. IASA 40th Anniversary Conference. Vienna and Laxenburg, Austria.

### July

14-22. COSPAR 2012 – 39th Scientific Assembly of the Committee on Space Research (COSPAR) and Associated Events. Mysore, India.

16-19. The XXXII SCAR Open Science Conference: Antarctic Science and Policy Advice in a Changing World. Portland, Oregon, USA.

### October

13-20. ISCCRS VII: Interdisciplinary Climate Change Research Symposium. Colorado Springs, CO, USA.

21-24. SCOR General Meeting. Halifax, Nova Scotia, Canada.

## Ho Chi Minh City highly susceptible to flooding

THE SERIOUS flooding that hit Thailand in 2011, inundating large areas of its capital Bangkok, has raised concerns about similar risks faced by Vietnam.

Located on the lower reach of the Saigon River, Vietnam's capital Ho Chi Minh City is nearly at sea level and thus very sensitive to rising sea levels.

In the coming 10-15 years this city could also witness the type of flooding that deluged Bangkok some

months ago, according to Dr Nguyen Huu Ninh, vice-chair of IGBP's Vietnamese national committee.

Speaking to *Thanh Nien Weekly*, Ninh cited poor drainage in the city as the most important factor contributing to the risk of flooding. He pointed out that new buildings and industries have come up in the south of the city at the expense of reservoirs. And the drainage system of the city hasn't seen the sort of improvement that is critically needed to reduce the risk of flooding.

Ninh told the *Weekly* that Ho

Chi Minh City should heed the experience of Bangkok and take timely action to improve drainage and implement adaptation strategies.

## IGBP second synthesis update

AT THE 2009 Scientific Committee (SC) meeting, IGBP decided to synthesise available knowledge about several policy-relevant topics with a view to providing a snapshot of the state of the planet. The past year or so witnessed several workshops relating to nitrogen and climate, air pollution

and climate, geoengineering and megacities in the coastal zone. The policy community participated actively in these workshops, which received funding from several agencies beyond IGBP. Outcomes will include peer-reviewed papers, commentaries and summaries for policymakers, and are expected to feed into the Planet Under Pressure conference and international assessments including the IPCC Fifth Assessment Report. For more information about the synthesis, see <http://www.igbp.net/4.1b8ae20512db692f2a680001259.html>



## A WIN-WIN SOLUTION?

THE MOST obvious way to tackle anthropogenic climate change is to reduce the emissions of carbon dioxide. Unfortunately, it is not the easiest way: there is apparently too little incentive, as years of tangled negotiations have shown. As a result, the search for less contentious solutions has gained momentum. The harmful health effects of black carbon and tropospheric ozone are well known, as is the adverse effect of the latter on crops. But their climate effects are complex and less well understood. A study published in *Science*

now suggests that cutting down on black carbon and methane – a precursor of tropospheric ozone – could prove to be a win-win solution. Besides leading to obvious health benefits, it could reduce global mean warming by around 0.5°C by the middle of this century.

The study emerged from the UNEP/WMO Integrated Assessment of Black Carbon and Tropospheric Ozone. The research team, led by Drew Shindell and including some researchers associated with IGBP's IGAC project, first used a model to test the effectiveness of hundreds of pollution

control measures. Based on the climate impact of the measures, they came up with a list of measures that both improve air quality as well as reduce warming. Of the top 14 measures that together achieve most of the reduction in warming, 7 address black carbon and 7 address methane. The team's analysis suggests that if implemented simultaneously with substantial reductions in carbon-dioxide emissions, it might be possible to limit global warming to <2°C during the coming 60 years.

Whereas the benefits in terms of reduced warming would be spread more

or less evenly around the world, the benefits for health and improved crop productivity would be particularly marked in certain parts of the world. For example, hundreds of thousands of premature deaths could be avoided in India and China, and along with the United States, these countries could also witness large increases in crop yields. The study's authors state that the co-benefits of reducing black carbon and methane emissions could provide strong incentives for appropriate policies.

Shindell D *et al.* (2012) *Science* 355: 183-189.

## Assessments of sustainability, state of the planet recommended

A COMPREHENSIVE international report on global sustainability is needed according to UN Secretary-General Ban Ki-moon's Global Sustainability Panel, which reported recently.

The panel, made up of heads of state and senior national ministers, argued that no single comprehensive report exists to bring together the assessments across sectors. Yet, issues as diverse as climate change, poverty, water security, energy, the global economy and biodiversity loss are all interconnected.

A new "sustainable development outlook report"

could join the dots, and reduce fragmentation of the science-policy interface, the panel argues. The panel recommends such a report should fall under the direct control of the Secretary-General.

The panel made 56 recommendations to be taken to Rio+20 including the appointment of a chief scientific adviser to the Secretary-General, or establishing a scientific advisory board.

Former IGBP vice-chair and co-chair of the Planet Under Pressure conference Mark Stafford Smith addressed the panel's advisers in 2011 outlining a series of recommendations to strengthen the science-policy interface. Also in 2011, IGBP director Sybil Seitzinger met the Global

Sustainability Panel secretariat in New York to discuss improving fragmentation of the science-policy interface by, for example, creating something like an assessment on global sustainability.

The first draft of the Rio+20 outcomes document, also published recently, contains similar recommendations: "We stress the need for a regular review of the state of the planet and the Earth's carrying capacity and request the Secretary-General to coordinate the preparation of such a review in consultation with relevant international organizations and the UN system."

The draft also called for the UN to consider appointing a High Commissioner for Future Generations.



## Planet Under Pressure

AT THE time of going to press, almost 2200 delegates had registered for the Planet Under Pressure conference. The conference timing, just two months before the UN Rio+20 Summit, has made it an attractive draw for policymakers, scientists, industry and NGOs.

The conference is designed along a Hollywood blockbuster thriller narrative. Day one will focus on the global crisis. Day two, the innovative solutions. Day three, the barriers to action. And day four – the high-level policy day – the path forward. A conference statement on behalf of the co-chairs, former IGBP vice-chair Mark Stafford Smith and UNESCO policy head Lidia Brito, will be published on the final day.

The conference will bring together new communities to discuss solutions and develop a new research agenda for the next decade. Organisations such as the World Trade Organization, the World Bank and Oxfam are involved.

As mentioned elsewhere, the new Future Earth initiative will be discussed during the conference and at Rio+20. Planet Under Pressure will also launch a new website "Welcome to the Anthropocene" ([www.anthropocene.edu](http://www.anthropocene.edu)).

The conference plenary and a one-hour news programme will be streamed live thanks to generous support from the US National Science Foundation.

## GLOBAL EMISSIONS ON THE REBOUND

GLOBAL emissions of carbon dioxide increased by a record 5.9 percent in 2010 following the dampening effect of the 2008-2009 Global Financial Crisis, according to the Global Carbon Project (GCP). The project, co-sponsored by IGBP, published a summary of its annual analysis in *Nature Climate Change*. The analysis finds that the impact of the financial crisis on emissions has been short-lived owing to strong emissions growth in emerging economies and a return to emissions growth in developed economies.

Contributions to global emissions growth in 2010 were largest from China, USA, India, the Russian Federation and the European Union, with a continuously growing

global share from emerging economies. Coal burning was at the heart of the growth in fossil-fuel and cement emissions, accounting for 52 percent of the total growth. The atmospheric concentration of carbon dioxide in 2010 rose to 389.6 parts per million, the highest recorded in at least the last 800,000 years.

"The global financial crisis was an opportunity to move the global economy away from a high emissions trajectory. This opportunity has not been realised but developed countries have moved some way closer to their emissions reduction commitments as promised in the Kyoto Protocol and the Copenhagen Accord," said GCP's Executive

Director Pep Canadell, a co-author of the paper and a scientist at Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO).

GCP produces an annual report card with the latest figures on all major carbon exchanges that result from human activities. Dr Mike Raupach of CSIRO and a co-author of the paper said the 2010 figures represent the highest annual growth recorded, and the highest annual growth rate since 2003.

Peters G P *et al.* (2012) *Nature Climate Change* 2: 2-4, doi: 10.1038/nclimate1332.

Carbon Budget 2010: <http://www.globalcarbonproject.org/>



## New Executive Director for the International Council for Science

DR STEVEN WILSON will take over from Professor Deliang Chen as the Executive Director of the International Council for Science (ICSU) from 1 April 2012.

Dr Wilson holds a doctorate in chemistry and has worked at the UK Natural Environment Research Council (NERC) for over a decade, most recently as Acting Chief Executive Officer.

## Is Africa REDDy?

SEVERAL challenges will need to be overcome to pave the way for effective implementation of the UN-sponsored Reducing Emissions from Deforestation and forest Degradation (REDD) initiative in Africa, according to a recent analysis. Among the challenges are the existence of a number of redundant and parallel initiatives, and weak technical and institutional capacities. The REDD initiative seeks to cut down on greenhouse-gas emissions while supporting alternative development pathways and increasing the adaptive capacity of local populations. The analysis was led by IGBP Scientific Committee member Cheikh Mbow and was funded by the START programme co-sponsored by IGBP.

Mbow C *et al.* (in press) *GLP Report 5*. GLP-IPO, Copenhagen.



## A VOLCANIC TRIGGER FOR THE LITTLE ICE AGE?

TODAY'S world of Arctic warming and disappearing sea ice was preceded by several centuries of unusually cold conditions – the Little Ice Age. Despite evidence of expanding glaciers and anomalously cold summers, we know little about what caused this cooling and when exactly it began. A new study argues for an abrupt onset of cold conditions in response to a series of large volcanic eruptions. Sustained expansion in Arctic sea ice helped maintain cool summer-air temperatures for hundreds of years following the eruptions.

Gifford H Miller and colleagues used radiocarbon dates and sediment records to constrain the timing of the expansion of small ice caps in Arctic Canada and Iceland. The data point to relatively sudden cooling

towards the end of the 13th century, coincident with four large, explosive volcanic eruptions. The eruptions spewed millions of tons of sulphur dioxide, which was converted in the atmosphere to sulphate aerosols: these fine droplets are known to reflect solar radiation and cause cooling. Of course, it did help that the eruptions occurred at a time when the solar radiation reaching the northern hemisphere had been declining. The study also found evidence for the volcanic triggering of an episode of ice-cap expansion during the mid-15th century, but it was less conclusive.

Volcanic cooling is short lived, however, for the aerosols stay in the atmosphere for only two to three years. So what explains the persistence of cold conditions for hundreds of years? The answer, the

researchers say, lies in a positive feedback involving sea ice and the ocean. Simulations showed that eruption-induced cooling led to an expansion of Arctic sea ice, causing changes in ocean circulation. These changes, in turn, prevented the sea ice from melting and ensured cool summer-air temperatures for the centuries that followed.

Low solar activity can lead to a decrease in solar radiation reaching the Earth. For example, there was a marked sunspot minimum during the mid-17th and early 18th centuries. Although the decreased radiation could have added to the impact of the volcanic eruptions, the results of this study do not point to a solar trigger for the cooling.

Miller G H *et al.* (2012) *Geophysical Research Letters* 39: L02708.

## Snow and rain

WHETHER land-cover change in a high-CO<sub>2</sub> world will warm or cool a region depends on how snow and rainfall will vary in that region, according to a recent study involving researchers from IGBP's iLEAPS project.

Land-cover change affects temperature in several ways, for example by changing the reflectivity of a landscape or altering evapotranspiration. Deforestation tends to cool mid- to high-latitude regions and warm tropical regions. But will this also be the case

in an even warmer future world when regional climate change is to be expected? Andy Pitman and colleagues used a climate model to investigate the impacts of land-cover change under high-CO<sub>2</sub> conditions. They focused on three different regions of the world. They found that the changes in temperature in these regions resulting from land-cover change are strongly dependent on the changes in snow cover or rainfall. For example, the Asian region – which warmed in response to increasing

cropland under relatively low atmospheric CO<sub>2</sub> concentrations – cooled instead under high-CO<sub>2</sub> conditions because of increases in rainfall linked with elevated carbon dioxide.

The authors recommend that models seeking to gauge the impact of future changes in land cover in a particular region accurately simulate changes in snow and/or rainfall in that region. This may be beyond the capacity of existing climate models.

Pitman A *et al.* (2012) *Nature Climate Change* 1: 472-475.

## GLP, IMBER project offices move

THE International Project Office (IPO) of the Global Land Project has moved to São José dos Campos, Brazil, and is hosted by the National Institute of Space Research (INPE). The IPO was previously based at the University of Copenhagen in Denmark for six years. Giovana de Espindola has taken over from Tobias Langanke as the Executive Officer.

The IPO of the Integrated Marine Biogeochemistry and Ecosystem Research (IMBER) project moves to the Institute of Marine Research (IMR) in Bergen, Norway, in April. The IPO is co-funded by the Research Council of Norway and IMR. The IPO has been located at the Institut Universitaire Européen de la Mer in Plouzané, France, since 2005, supported by a consortium of French funding agencies.



## Eugene Stoermer (1934-2012)

EUGENE F Stoermer, Professor Emeritus at the University of Michigan, passed away on

17 February 2012. Stoermer's research focused on the world's great lakes and he was a pioneer in research on various aspects of diatoms. Along with former IGBP vice-chair Paul Crutzen, Stoermer coined the term Anthropocene in an article published in IGBP's *Global Change* newsletter in the year 2000. Stoermer had been using the term in lectures since the 1980s to describe the current time in Earth's history. The Anthropocene has received renewed attention during the past year or so, and efforts are ongoing to declare it Earth's newest epoch. The IGBP community gratefully acknowledges Stoermer's contribution to elucidating what has become a powerful concept to signify humanity's impact on the planet.



## ANTHROPOCENE WEBSITE TO BE LAUNCHED THIS YEAR

IN 2012, IGBP and partners will launch a new website on the Anthropocene, a proposed new geological epoch driven by human activities.

The website, which will contain a wealth of images and data visualisations, will be aimed at a very broad audience to inspire, educate and engage the public in the concept of the Anthropocene. The concept was first officially proposed by former IGBP vice-chair Nobel laureate Paul Crutzen

and Eugene Stoermer (1934-2012) in the IGBP newsletter *Global Change* (March 2000).

IGBP's director of communications Owen Gaffney originally proposed the idea: "The concept of the Anthropocene gives people a new perspective of our place in the world. We can no longer consider ourselves at the mercy of great natural forces. We have an active role in global change, in many cases we are driving it."

"So it is odd, then," he adds, "that there is

no website for the public to bring all ideas about the concept together."

World-leading data visualisation expert Phelix Pharand is the project's creative director.

The project is being developed by Planet Under Pressure sponsors (IGBP, IHDP, DIVERSITAS, WCRP and ESSP), the Stockholm Resilience Centre, Stockholm Environment Institute, CSIRO and Globaia. A scientific advisory panel has been set up.

## New network for sub-Saharan Africa

THE Equatorial African Deposition Network (EADN) was formally launched at an inaugural workshop held 5-9 December in Kisumu, Kenya. The workshop participants discussed several aspects, including the location of monitoring sites and the links to policy.

The network will monitor dry and wet atmospheric deposition rates of phosphorus, nitrogen and other chemical constituents at a number of sites throughout the region, with an emphasis on the African Great Lakes. Data collected by the network will be used, along with remote-sensing data and modelling tools, to determine the spatial and temporal patterns of atmospheric nutrient transport and their relationship to land-use patterns.

The network's lead coordinator is Professor Eric Odada (eodada@uonbi.ac.ke), a founding member and former vice-chair of IGBP.

# CLIMATE-CHANGE INDEX 2011: RISING TREND CONTINUES

THE 2011 edition of the climate-change index published by IGBP continues to show an unequivocal rising trend. The index rose for the 15th year running. The latest update includes values for the four years from 2008 through 2011.

Released March 2012 to coincide with the London Planet Under Pressure conference, the index was designed to give policymakers and public a simple visualisation of the climate trend. The index, made up of four Earth-system parameters, helps create a snapshot of the state of the planet as human pressures mount.

“Economic indices like the Dow Jones Index are extremely powerful communications tools,” said IGBP Executive Director Professor Sybil Seitzinger.

“Given the complexity of the climate system, we felt there was a strong need to create a tool that exposes the trend underlying natural variability. The

IGBP climate-change index provides an unequivocal signal,” she added.

The four parameters used to generate the index are: sea level, atmospheric carbon dioxide, global average land-surface temperature and Arctic sea-ice extent (summer sea-ice minimum). These represent four components of the Earth system: oceans, atmosphere, land and ice sheets. The index gives equal weight to each parameter.

IGBP first published the index in 2009 and ran an explanatory article in the December 2009 issue of this magazine. The index begins in 1980, a year after satellite sea-ice data first became available. The 30 or so years since then are dominated by

a rising trend. The climate-change index was first proposed by a group of IGBP scientists including Steven Running, Kathy Hibbard, Kevin Noone, Mark Stafford Smith, Peter Cox, Suzi Kerr, Pierre Friedlingstein and Sybil Seitzinger.

