



United Nations
Educational, Scientific and
Cultural Organization

"...International environmental institutions can't make states do what they don't want to do, but citizens can. It is increasingly clear that treaties rely not only on states for implementation but on citizen activism and national environmental leadership. ... If citizens don't demand strong environmental policy from their own governments, no number of treaties and summits will save the Earth."

*Prof. Stacy VanDeveer **

The UNESCO STRATEGY FOR **ACTION** ON CLIMATE CHANGE

The UNESCO Enhanced Plan of Action for the Strategy for Action on Climate Change (through 2011) is structured around three main strategic objectives:

- 1 building, making available and maintaining the climate change knowledge base: science, assessment, monitoring and early warning;
- 2 promoting mitigation of and adaptation to climate change, including through enhanced education and public awareness; and
- 3 moving towards a climate-neutral UNESCO.

UNESCO and the World Meteorological Organisation are the co-conveners for the cross-cutting area within the United Nations System for climate knowledge: science, assessment, monitoring and early warning.





UNFCCC Negotiations in Bonn 2009

The United Nations System determined that the overwhelming importance of addressing global climate change requires the concerted efforts of the entire System because there is increasing concern that climate change and climate variability could undermine the attainment of the Millennium Development Goals. It therefore worked through the Chief Executives Board to determine a course of action outlined in The UN System Delivering as One on Climate Change. Here, five focus areas and four cross-cutting areas were established, to be led by co-convening agencies:

Focus Area / Cross-cutting Area	Co-conveners
Adaptation	High Level Committee on Programmes' Working Group on Climate Change*
Technology transfer	UNIDO, UN-DESA
Reduction of emissions from deforestation and degradation (REDD)	UNDP, FAO, UNEP
Financing mitigation and adaptation action	UNDP, World Bank Group
Capacity-building	UNDP, UNEP
Climate knowledge: science, assessment, monitoring and early warning	WMO, UNESCO
Supporting global, regional and national action	UN-DESA, UN Regional Commissions, UNDP
Public awareness	UN Communications Group*, UNEP
Climate-neutral UN	UNEP

* UNESCO belongs to these

UNESCO and WMO have contributed to the science of climate change for decades, and this is where UNESCO's largest contribution on climate change will continue. UNESCO's specific contribution has been primarily based on the work of its Intergovernmental Oceanographic Commission. To explain why this is so, let us briefly review the climate system.

The interactive climate system of planet Earth has five main components:

- the atmosphere (WMO's expertise);
- the hydrosphere, primarily the oceans (IOC's expertise) which comprise 96.5% of all water on Earth but also including liquid freshwater;
- the cryosphere (sea ice, glaciers, snow and ice comprise 1.76% of water on Earth);
- the land surfaces; and
- the biosphere.

These components are acted upon by external forces, primarily the Sun (solar energy).

Changes that can affect the interactions between these five components include:

- changes in solar input;
- changes in atmospheric composition and circulation;
- changes in ocean circulation, biogeochemistry and sea level;
- changes in the hydrological cycle; and
- changes in the land surfaces including topography (which affects atmospheric circulation and rainfall patterns), land use, vegetation and ecosystems.

Scientists study each of these components and their interactions, as well as build models to predict their interactions under various perturbations. Much of this research on the knowledge base has been organized through coordination mechanisms at the international level, with UNESCO having played a role from their inception.

Addressing global climate change takes more than science alone, however. To stabilize the increasing concentration of greenhouse gases in the atmosphere, and thus to prevent excessive global warming which could jeopardize the continuation of human societies and the living Earth upon which they depend, will take the concerted action of everyone and all parts of society. This is why UNESCO, through its Intersectoral Platform, UNESCO Action to Address Climate Change, works in all its domains—education, culture, the sciences and communications—to address climate change holistically. Specifically, UNESCO is undertaking the following as part of its Strategy for Action on Climate Change, which is facilitated by the Intersectoral Platform.

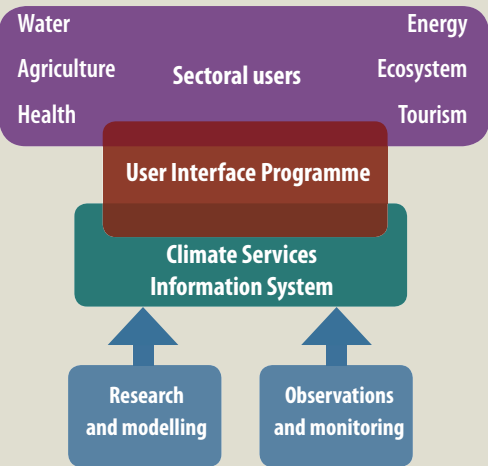
Strategic objective 1

BUILDING AND MAINTAINING THE CLIMATE CHANGE KNOWLEDGE BASE: science, assessment, monitoring and early warning

Develop the role of UNESCO as co-convenor for the climate change knowledge base and guide UNESCO’s adaptation work at the country level

The World Climate Conference-3 (31 August to 4 September 2009) produced a major outcome: a decision to establish a Global Framework for Climate Services. UNESCO together with WMO will cooperate for this purpose, including in their convening role for UN cooperation on the climate science knowledge base. It will be instrumental in achieving UN-wide collaboration on a framework for developing climate services, as a mean to systematically make the existing knowledge on climate available and to further improve climate forecasts at the regional and local level, and establish a Global Framework for Climate Services to guide and develop climate services to bridge the gap between the IPCC assessment reports and the services required to adapt to climate variability and change at regional and sectoral levels.

The Framework is an emerging key component of the climate change knowledge base requiring important collaboration efforts among a number of UN organizations. As a co-convenor for this area, UNESCO will help ensure the successful implementation of the Framework, and its Climate Services Information System component, drawing on its interdisciplinary competencies.



Fredensborg Castle, Copenhagen



© Hans Thulstrup

UNESCO will also actively participate in overall UN climate change efforts led by the Chief Executives Board leading up to UNFCCC COP 15 in Copenhagen in December 2009 and beyond, and will participate in further scoping exercises for the fifth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC). UNESCO will promote follow-up to the international experts’ meeting on “Climate Change and Arctic Sustainable Development: scientific, social, cultural and educational challenges”, that was financed by and held in Monaco (3-6 March 2009), including a publication with recommendations for future action.

Beyond its contribution to the international coordination of scientific input needed to study climate change, UNESCO will continue to foster and provide advanced educational training for the next generation of climate scientists, particularly those from Least Developed Countries. Such training currently is provided by both science-related category I centres/institutes, the UNESCO-IHE Institute for Water Education and the Abdus Salam International Centre for Theoretical Physics (ICTP), for water management and Earth science and meteorological modelling, respectively. The IOC’s capacity development will continue to organize at-sea training for young scientists, as well as training for the scientific leadership of developing country research institutions. Other capacity development opportunities will also be explored.



© L.A. Brooks

Mangrove forest where the Daintree meets the Great Barrier Reef.

Further develop the role of IOC as the United Nations focal point for the permanent observation of the ocean and coordination of the study of ocean and climate

IOC has committed to the UNFCCC to continue sea level monitoring and prediction through the Global Ocean Observing System (GOOS). The OceanObs'09 Symposium (September 2009) will strengthen and enhance the international framework under the Global Climate Observing System (GCOS), GOOS, World Climate Research Programme (WCRP) and the International Geosphere-Biosphere Programme (IGBP) and support regional and national frameworks for sustained world ocean observing and information systems supporting the needs of society about ocean weather, climate, ecosystems, carbon and chemistry. IOC also sponsors the WCRP itself, thus contributing to the scientific research that will go in to the next IPCC assessment report. IOC will also continue work on an international strategy for a decadal survey of large scale ocean circulation and carbon cycle processes in the oceans (2013-2023). This will be a major contribution to climate change research aiming at improve our understanding of ocean uptake of anthropogenic carbon dioxide (CO₂).



© Raja Barizan, Forest Research Institute, Malaysia

Mangrove seedlings planted to increase coastal resilience in Kuala Gula, Perak, Malaysia.

UNESCO WARNS OF OCEAN ACIDIFICATION—THE OTHER CO₂ PROBLEM

“Ocean acidification may threaten the food security of millions of the world’s poorest people,” warn sponsors (including UNESCO’s IOC) of the second symposium on the Ocean in a High-CO₂ World in a summary for policymakers.

The summary is one of several recent reports warning policymakers to the direct effect of CO₂ on the ocean. New reports are unanimous in stressing the importance of curbing CO₂ above all other greenhouse gases in any policy negotiations. “Negotiations aimed at reducing greenhouse gas emissions must take ocean acidification into account,” urge the symposium sponsors. “Reduction of global temperatures and the concentrations of other greenhouse gases will not reduce ocean acidification. Ocean acidification is not a peripheral climate issue – it is the other CO₂ problem”.

UNESCO’s IOC has been instrumental in highlighting the concern over increased ocean acidification due to CO₂ uptake, which is a real threat to the survival of some marine ecosystems and organisms which use calcium carbonate or aragonite to build their hard tissues or shells. We know that CO₂ or pH affects nutrients, bacterial processes and primary production in the oceans. Thus key biological and chemical cycles in the ocean may be disrupted. Acidification can reduce the ability of marine creatures to grow, feed and reproduce. Of particular concern are those animals that have planktonic larvae and are near the base of the food chain upon which all seafood depends. It is likely that changes in community structure will result and ecosystems will become less robust and even more vulnerable to changes in the future.



© Ani Mishra/UNESCO

Great Almaty Lake in Kazakhstan is glacier-fed, but for how much longer?



© Emma Achey/CSIR
Natural Resources &
the Environment

Women using a rain gauge in Venda,
Limpopo Province, South Africa.

Field trip to a site of coastal erosion in Maputo, Mozambique. This and other sites were modelled as part of the Modelling Awareness workshops held in Mozambique, Kenya and Tanzania.

Support assessment of and adaptation to impacts of climate change on water, including hazards

Most people will experience climate change through water. They will be affected by extremes such as floods, severe storms or drought, or their access to water will become more costly, calling for conservation or possibly for rationing.

UNESCO is providing coordinated assistance to Member States to assess critical water-related climate change risks in vulnerable ecosystems. This assistance ranges from training on glacier dynamics, monitoring, and mass balance in the Himalayas, to assessment of climate change impacts on sea-level rise, coastal zones and island aquifers in Viet Nam. The Mekong Delta is one area that is at risk due to sea level rise and salinization of the low-lying agricultural lands.

Climate change effects on water will differentially impact men and women, as well as posing special challenges for not only mountain and coastal ecosystems, but also for the Arctic, drylands, deltas, and other fragile zones. Recognizing the complexity of water-related climate change risks, UNESCO's assistance to Member States is multidisciplinary and intersectoral. With the combined expertise of the IOC, the International Hydrological Programme (IHP), the Man and the Biosphere Programme (MAB), and the Social and Human Sciences (SHS) Sector, water-related risks are understood from the perspective of hydrology, coastal zone impacts, ecological and development challenges, and social impacts. From assessing the impacts of global climate change on the eco-hydro-system in the Pandjari Biosphere Reserve in Benin to developing a gender-sensitive understanding of the social impacts of water scarcity, UNESCO activities strive to increase the capacities of Member States to prepare for, mitigate, and adapt to the water-related impacts of climate change.

Priority Gender Equality

UNESCO—and in particular its Division of Gender Equality—has been instrumental in mobilizing international recognition of the gender dimension of climate change. UNESCO serves, along with UNDP, as the co-convener of the Interagency Task Force on Gender Equality and Climate Change, with the goal of enhancing the integration of gender equality into the climate change efforts of the UN system. The Organization has collaborated in the production of the Training Manual on Gender and Climate Change, led by the International Union for Conservation of Nature, IUCN. UNESCO then ensured the French translation of the Manual. A major achievement was the organization of the Gender and Climate Forum at World Climate Conference-3. The Forum explored gender and climate issues in order to inform WCC-3 discussions and propose a gendered approach to the conference results and outcomes.



Working groups at the regional Bid Writing workshop held in Mombasa, Kenya began the development of the proposal at this meeting.

UNESCO ADG/SC speaking at World Climate Conference-3 on 31 August 2009.

Addressing the social consequences

The UNESCO World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) report on the ethical implications of climate change will be published in late 2009. The aim of the report is to serve as a point of departure for discussion among members of the scientific community, NGO partners and Member States of UNESCO on the ethical challenges posed by global climate change. The focus of the document falls on a clarification of i) the central ethical issues that are brought about by global climate change; ii) the general and specific principles that could be adopted to form a basis of responding to these issues, and iii) possible recommendations on different levels, contexts, and scales of intervention that follows from a sound ethics of climate change.

On the basis of the report, COMEST recommended that UNESCO considers developing an ethical framework of principles in relation to climate change. Of special note is the report's attention to the ethical dilemmas surrounding climate change migrants, a theme that is being further explored by SHS through a network of experts who are working on the relationships between migration and climate change, with the purpose of launching a multidisciplinary research project investigating the evidence and the policy options on the issue. A book on migration and climate change is expected to be published in 2010.

PRIORITY AFRICA

Africa remains a priority in all of UNESCO's domains, and climate change is no exception. A number of African biosphere reserves are targeted for experiments with innovative combinations of reforestation, rural energy and infrastructure development. Training is being provided on subjects ranging from the sustainable management of marginal drylands, renewable energy for schools in rural communities, to adaptation to climate and coastal change in West Africa. The African Earth Science Education Initiative has assessed continent-wide capacity in the Earth sciences, and is now building a network to increase it. Capacity building is gearing up for early career climate scientists, strengthening of scientific institutions in Africa and with the African Union Commission for technical advice and support to African Ministers of Environment and UNFCCC negotiators, for adaptation and mitigation strategies in coastal zones.

Develop geosciences for climate change assessment and monitoring

UNESCO fosters network and partnership activities related to climate assessment and monitoring, such as in the framework of the Global Earth Observation System of Systems (GEOSS), the Global Climate Observing System (GCOS) and the Global Terrestrial Observing System (GTOS). Planning is underway for a UNESCO workshop in 2010 to systematically review and critique proposed methods of geoengineering, or technological fixes to compensate for increasing CO₂ levels, such as carbon sequestration or solar radiation management.

The International Geoscience Programme (IGCP) supports projects on paleoclimate research because it is only through study of the "stone tape" – records from the geological past – that we can surmise what the future may hold in store. Geoscientists are looking in particular at the inferred climate variability over the past two glacial cycles to better understand how glacial conditions develop and decline; the frequency and causes of



Educators in the Bahamas learn to measure wave height using a wave pole (here and below).



Members of the Corporation for the Sustainable Development of San Andres, Old Providence and St. Catalina (CORALINA) in Colombia, an ambitious project that is part of Sandwatch.



Sandwatch students in Trinidad taking the lead in protecting their island environment.

abrupt events; improving the study of soils, biogeochemistry and biology to improve our understanding of the Carbon cycle; and the changes experienced over more recent history to look for associations between environmental and social or cultural changes. These are all areas of fundamental importance which require much further study.

Efforts will be made to increase collaboration with the ICTP on climate variability and impacts of climate change on human societies and natural ecosystems, such as through the ICTP Physics of Weather and Climate group and its research and training activities on climate models.

Strategic objective 2

PROMOTING MITIGATION AND ADAPTATION TO CLIMATE CHANGE, including through enhanced education and public awareness

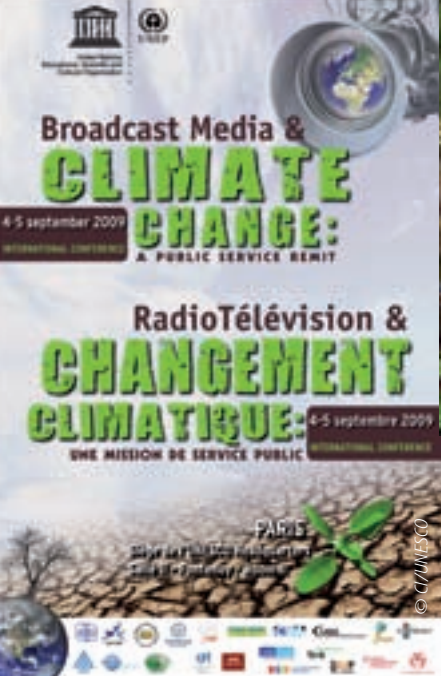
Promote climate change education

Climate change is an issue of education and public awareness, which needs to be part of ensuring that sustainable behaviours become daily habits. As lead agency for the UN Decade of Education for Sustainable Development, UNESCO will, in line with the Bonn Declaration adopted at the UNESCO World Conference on Education for Sustainable Development – Moving into the Second Half of the UN Decade (Bonn, spring 2009), intensify efforts and initiatives to put climate change education higher on the international agenda, in the framework of the DESD and as a component of UN-wide action in support of the New Delhi Work Plan around Article 6 of the UNFCCC.

The Organization will also actively follow-up the UNESCO International Seminar on Climate Change Education (27 to 29 July 2009) by supporting the development of guidelines for the effective integration of climate change education into educational programmes and school curricula; enhancing networking to share experiences and good practices in climate change education; and mobilizing support for teacher training on climate change education. A Clearing House function on climate change education will be established in cooperation with the UNFCCC Secretariat.



Local field-based education on climate change will be promoted through UNESCO's networks including the UNESCO Associated Schools Network, World Heritage sites, biosphere reserves, CarboSchools Europe and UNESCO Chairs/UNITWIN.



Biologists conducting the 2009 Mycoblizt in the Atherton Tablelands, Queensland.

Enhance public awareness

Fostering universal access to information and knowledge is a major UNESCO objective. This is why UNESCO supports programmes and projects to build the investigative capacities of journalists, so they can function as well-informed knowledge brokers on climate change issues. Environmental journalism courses were held in Central Asia, Southern Africa and in the Caribbean in 2009, following on similar courses held earlier in the Pacific region. UNESCO organized the International Conference on Broadcast Media and Climate Change: a Public Service Remit (4-5 September 2009), to facilitate the exchange of information and tools between journalists from the North and South.

The Internet forum, On the Frontlines of Climate Change, provides a platform for indigenous or rural communities in small islands, high altitudes, the Arctic, desert margins and other vulnerable environments to share observations, concerns and innovations related to climate change impacts, opportunities and adaptation strategies. This grassroots forum was launched in June 2008 by UNESCO, in partnership with the Secretariat of the Convention on Biological Diversity, the Secretariat of the UN Permanent Forum on Indigenous Issue and the Office of the High Commissioner on Human Rights.

Another programme supported by UNESCO, Sandwatch, is a volunteer network of schools, youth groups, non-governmental and community-based organizations working together to monitor and enhance their beach environments. Sandwatch was launched in the Caribbean in 1999 and now involves islands as far apart as the Cook Islands in the Pacific, the Seychelles in the Indian Ocean, and the Bahamas in the Caribbean; as well as countries in Europe, Africa, Asia and South America.

Support education, training, information exchange, best practices, and national strategies related to renewable energy

As a contribution to the mitigation of climate change, UNESCO, working with partners in UN-Energy, enhances the knowledge base for the rational use and application of renewable energy through institutional and human capacity building, sharing of scientific knowledge and best practices, and the promotion of national and regional renewable energy policies and management. Seminars on the proper management of solar photovoltaic (PV) systems are organized through the Global Renewable Energy Education and Training Programme, with special emphasis on Africa.



A rural solar installation powering a health centre and a school in Towé, Benin.



Green jobs and carbon sequestration –win-win forest restoration in the São Paulo City Greenbelt portion of Mata Atlântica Biosphere Reserve.

Mobilize UNESCO sites for field learning on climate change impacts and solutions

A UN Collaborative Programme for Community-Based Adaptation to Climate Change in Developing Countries (UN-CBA) has been established between UNESCO, UNDP, and UN Volunteers as an innovative global funding mechanism to support small-scale community-based adaptation projects in developing countries with a special focus on UNESCO sites. UN-CBA will identify local community-based projects to benefit from small grants, technical assistance from volunteers and support from UN-CBA partners. This programme especially targets least-developed countries, vulnerable ecosystems, women's groups, and indigenous communities. The UN-CBA will fund community-based organizations in and around biosphere reserves, indigenous and community-conserved areas and other important ecosystems to develop and implement climate change adaptation projects. The focus will be on national action, reinforced at the regional and global level. UN-CBA projects intend to consult, utilize, and acknowledge the immense indigenous knowledge and understanding of women in environment in developing countries.

World Heritage Sites in tropical forest landscapes are also piloting techniques of adaptive and carbon-financed forest management in Indonesia and Madagascar, and a toolkit is under development for the assessment of Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD) opportunities in World Heritage Sites.

In Asia, programmes such as Biosphere Reserves for Environmental and Economic Security and Shoring Up for Climate Change, a mangrove restoration and rehabilitation through carbon offsets programme, will provide on-the-ground support to governments and communities to seek sustainable natural resource use.



Adaptation by drip irrigation in Morocco



UNESCO-sponsored programme in the Réserve de Faune à Okapis, Democratic Republic of Congo, to teach ecology to park guards and students.



Camels browsing in southern Morocco.



The lemuroid ringtail possum, native to the Wet Tropics of Queensland UNESCO World Heritage Site, is particularly sensitive to rising temperatures and faces extinction if we cannot reverse these trends.

THE INTERNATIONAL YEAR OF BIODIVERSITY 2010

Climate change is leading to significant changes in air and sea surface temperatures, ocean acidity, the hydrological cycle and weather patterns. This will in turn lead to profound changes in ecosystems, including changes in the distribution, phenology and behaviour of species, reconfiguration of new species assemblages, changes in the distribution of biomes, and, depending upon the degree of warming that is experienced, the potential loss of a significant percentage of extant species as well as of some communities, such as ones dependent upon ice and permafrost in the extreme north. Adaptation by species will be hampered by their inability to evolve or migrate quickly enough, by physical impediments to their migration by human-impacted landscapes, and, in some cases, because there will simply be no place suitable left to go.

UNESCO is organizing several events during the International Year of Biodiversity, including a high-profile event that will include coverage of biodiversity, energy and climate change, and an international scientific conference, which will include a plenary session “Biogeography theory and related applications in an era of climate change” on climate change’s effects on biodiversity.



The King Fern resembles a palm tree, with fronds up to 5 m in length.



A new species of *Entoloma* discovered in the Atherton Tablelands during the 2009 Mycoblitiz. Will we lose species to climate change before they are even described?



UNESCO staff demonstrate the carbon-neutral way to commute, including with Paris' Velib rental bike programme.

Strategic objective 3

MOVING TOWARDS A CLIMATE-NEUTRAL UNESCO

Offices can have a large climate footprint, through their use of heating, electricity, water, the use of consumable supplies, even in landscaping, food services and staff entitlements. Ways must be found to reduce our use of energy and water, and to use less fossil fuel in our energy mix. We must source our supplies from sustainable, local enterprises and recycle to the extent possible. Mission travel can have even more of a climate footprint, and it is therefore incumbent upon UN staff to be parsimonious with travel, seek alternatives to it, and seek the travel mode with the smallest footprint. The United Nations must lead by example. It just takes a little thinking by each of us to make a change in our daily behaviour.

UNESCO, in line with other UN agencies, undertook a baseline survey of greenhouse gas emissions in all offices worldwide for 2008, in order to follow with proposals on common approaches to emissions reduction targets, best practice and purchase of offsets for the United Nations system, including changes to policies and administrative rules, and proposals for financing. This will be discussed in late 2009 and the entire UN system will likely have new guidelines in 2010.

In line with this future outcome UNESCO will undertake efforts to reduce greenhouse emissions, and analyze cost implications of purchasing carbon offsets and proposing UNESCO projects and sites for receipt of such offsets on the basis of ethical, economic and scientific validity. An Emissions Reduction Strategy will be based on a comprehensive Climate Neutral Policy including the implementation from 2010 of an Environmental Management System in line with UN requirements and as called for in UNESCO's own Green Audit.



The Carbon Exchange in London.

Pascal's wager had it that "if you gain, you gain all; if you lose, you lose nothing. Wager, then, without hesitation". In the case of climate change, to those who would say that we don't know if climate change is really caused by human activity, that we don't know enough about the climate system to really understand what the effects of increased CO₂ or global mean temperature might be, that we need more time to get organized, UNESCO says, act on what we do know—temperature is going up and is adversely affecting every aspect of our planet's life support system—no matter the reason for it. If we win, we win our very future, if we lose, we will still win because we'll have made changes leading to a more environmentally, economically and socially sustainable society. Our great-great-grandchildren would thank us in either case.

But, if we don't wager at all, and don't do so with utmost urgency, we risk our own extinction.

For more information on UNESCO's work on climate change,
please visit our website:

<http://www.unesco.org/en/climatechange>

We welcome your comments and suggestions for improvement

Gateway to the United Nations system's work on climate change
<http://www.un.org/climatechange/index.shtml>

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Researchers are using bioclimatic models for the Mazarine Blue butterfly, *Polymommatus semiargus*, to determine what locations within its historic British range will be suitable for its reintroduction.



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