| Science for IUCN’s Programmes |

**Conserving Biodiversity**

**Applying IUCN criteria to invertebrates: How red is the Red List of European butterflies?** [article]

The authors assessed the threat status of the 483 European butterfly species. Using semi-quantitative data on changes in distribution and in population sizes provided by national butterfly experts. The new Red List of European butterflies determined one species as Regionally Extinct. 37 species as threatened (Critically Endangered, Endangered or Vulnerable) and a further 44 as Near Threatened. Using semi-quantitative data on distribution and population trends to compile a scientifically underpinned Red List however resulted in underestimation of extinction risks, and the resulting list should be taken as a conservative estimate of threat. Combining the new Red List status with the data provided by the national butterfly experts, allowed determination of conservation priorities for butterflies in Europe.


**Socioeconomic legacy yields an invasion debt** [article]

Globalization and economic growth are recognized factors in establishment of invasive species but as many problematic alien species are not recent arrivals but were introduced several decades ago current patterns of alien-species richness may better reflect historical rather than contemporary human activities, a phenomenon which might be called “invasion debt.” The authors show that current numbers of alien species established in the wild are indeed more closely related to indicators of socioeconomic activity from the year 1900 than to those from 2000, although the majority of species introductions occurred during the second half of the 20th century. The consequences of the current high levels of socioeconomic activity on the extent of biological invasions will thus probably not be completely realized until several decades into the future.


**The pitfall-trap of species conservation priority setting** [article]

The authors analysed the relationships among species’ structural complexity, scientific attention, IUCN threatened species listing, and conservation investments at different organisational levels and report that despite the guidance to consider criteria other than extinction risk status, an excessive use of Red lists persists in the setting of conservation priorities. They report that organisinal complexity, available scientific information, and species listing combine together to create a positive feed-back loop, in which more complex organisms have a larger proportion of threatened species in the Red lists and legal lists leading to more supported by more funds. They propose the need to counteract this trend through increased scientific effort on lower taxa and expansion of Red lists to assess lesser-known taxonomic groups as well as the need to use other criteria for species conservation prioritisation.

Martin-Lopéz B, JA Gonzalez and C Montes 2011 Biodivers Conserv 20:663–682

**Long-term effects of a trophic cascade in a large lake ecosystem** [article]

This report documents the multitrophic level impacts that introductions or invasions of nonnative organisms can mediate in a spatially extensive system over more than a century. The authors outline a trophic cascade of impacts that extended to primary producers and to a nonaquatic species, the bald eagle. The opossum shrimp, *Mysis diluviana*, invaded Flathead Lake, Montana, where Lake trout had been introduced 80 y prior but remained at low densities. With establishment of nonnative *Mysis*, Lake trout subsequently flourished on this food source and this voracious piscivore now dominates the lake fishery; formerly abundant kokanee were extirpated, and native bull and westslope cutthroat trout are imperiled. The future of the system will be influenced by climate change and a lake trout reduction program that is underway.


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**June 2011**

**Fun to Know**

City traffic noise may determine what birds you see [abstract]


Clouds amplify urban light pollution [article]


A bird’s eye view is very different to ours! [article]


Using Batman to teach physiology [article]

Has the Earth's sixth mass extinction already arrived? [abstract]
Mass extinctions have happened only five times in the past 540 million years or so and biologists now suggest that a sixth mass extinction may be under way, given the known species losses over the past few centuries and millennia. The authors review how differences between fossil and modern data on species threat, the latter including IUCN Red List information. Their results confirm that current extinction rates are higher than would be expected from the fossil record, highlighting the need for effective conservation measures.

Assisted colonization: integrated conservation strategies in the face of climate change [article]
Assisted colonization, transporting species to a new range predicted to be favorable for persistence under future climate scenarios, has been proposed as a method for addressing these challenges and has become the subject of controversy and discussion in the conservation community due to its highly manipulative nature, questions about widespread feasibility, and uncertainty associated with the likelihood of translocated species becoming invasive. The authors review available information on assisted colonization and propose an integrated conservation strategy that includes management for habitat connectivity, conservation genetics, and when necessary, assisted colonization of species. They argue that an integrated approach will facilitate persistence for a larger proportion of species than is possible by solely using assisted colonization while also reducing the uncertainty of conservation outcomes.

Grazing intensity impacts soil carbon and nitrogen storage of continental steppe. [article]
Recent studies have underscored the importance of grasslands as potential carbon (C) sinks. The authors performed a grazing experiment with seven stocking rates to investigate the effect of increasing grazing pressure on soil C and nitrogen (N) storage in the temperate grasslands of northern China. The results revealed that C and N storage in both 0–10 cm and 10–30 cm soil layers decreased linearly with increasing stocking rates. Carbon storage in the 0–10 cm soil layer was significantly higher in lightly grazed grasslands than in heavily grazed grasslands after a 5-yr grazing treatment. Our findings suggest an underlying transformation from soil C sequestration under light grazing to C loss under heavy grazing, and that the threshold for this transformation is 4.5 sheep ha\(^{-1}\) (grazing period from June to September).

Climate Change, Uncertainty, and Natural Resource Management [article]
Climate change and its associated uncertainties are of concern to natural resource managers but they have often dealt with uncertainties and have developed corresponding approaches to decision-making. The authors identified 4 types of uncertainty that characterize problems in natural resource management including environmental variation, partial controllability, partial observability and structural uncertainty. They examine ways in which climate change is expected to exacerbate these uncertainties, as well as potential approaches to dealing with them and some of the associated challenges both at institutional/political level and the technical level. They conclude that adaptive resource management approaches that are already in use will be the methods of choice for managers trying to deal with the uncertainties of climate change.

Toward a Management Framework for Networks of Protected Areas in the Face of Climate Change [abstract]
The authors report on an approach to determine appropriate climate change adaptation strategies for individual protected areas based on projections of future changes in the relative proportions of emigrants (species for which a site becomes climatically unsuitable), colonists (species for which a site becomes climatically suitable), and persistent species (species able to remain within a site despite the climatic change)....
Using the sub-Saharan African Important Bird Area (IBA) network as a case study, they found that appropriate conservation strategies for individual sites varied widely across sub-Saharan Africa, and key regions where new sites could help increase network robustness varied in space and time. Although these results highlight the potential difficulties within any planning framework that seeks to address climate-change adaptation needs, they demonstrate that such planning frameworks are necessary, if current conservation strategies are to be adapted effectively, and feasible, if applied judiciously.

Quantitative Analysis of Culture Using Millions of Digitized Books [abstract]
The authors analyzed a collection of digitized texts containing about 4% of all books ever printed in english between 1800 and 2000 as a means to investigate cultural trends quantitatively. They show how this approach can provide insights about fields as diverse as lexicography, the evolution of grammar, collective memory, the adoption of technology, the pursuit of fame, censorship, and historical epidemiology.

Data archiving in ecology and evolution: best practices [abstract]
Many journals have recently adopted policies requiring that data from their papers be publicly archived. This paper provides suggestions for best practice for data archiving. The author notes that data are a valuable part of the legacy of a scientific career and archiving them can lead to new scientific insights while also increasing opportunities for credit to be given to the scientists who originally collected the data.
**Mimicking nature**

**Highlights for Agave Productivity** [article]

Agaves can grow in marginal arid and semiarid lands where their special ecological and physiological adaptations to environmental conditions give them the potential to produce substantial biomass. Agaves can benefit from the increases in temperature and atmospheric CO2 levels accompanying global climate change. An Environmental Productivity Index can predict the effects of soil and environmental factors on CO2 uptake and hence on the regions appropriate for cultivating agaves. In turn, their increased cultivation can support the production of innovative earth-friendly commodities that can be used as new bioenergy feedstock.


**Underestimating the damage: interpreting cetacean carcass recoveries in the context of the Deepwater Horizon/BP incident** [article]

Evaluating impacts of human activities on marine ecosystems is difficult when effects occur out of plain sight. The Deepwater Horizon/BP oil spill in the Gulf of Mexico was the largest in the U.S. history, but some reports implied modest environmental impacts, in part because of a relatively low number (101) of observed marine mammal mortalities. The authors estimate historical carcass-detection rates for 14 cetacean species in the northern Gulf of Mexico that have estimates of abundance, survival rates, and stranding records and their preliminary analysis suggests that carcasses are recovered, on an average, from only 2% (range: 0–6.2%) of cetacean deaths. Thus, the true death toll could be 50 times the number of carcasses recovered, given no additional information. While there are caveats to this estimate, it does provide a counterpoint to illustrate the magnitude of misrepresentation possible in presenting only observed carcass counts.


**Managing Ecosystems for human well-being**

**Resilience in Agriculture through Crop Diversification: Adaptive Management for Environmental Change** [article]

The authors discuss one mechanism to increase resilience in agro-ecosystems, namely implementation of increased agricultural crop diversification. Despite potential benefits of adopting crop diversification to improve resilience, adoption has been slow. Economic incentives encouraging production of a select few crops, the push for biotechnology strategies, and the belief that monocultures are more productive than diversified systems have been hindrances in promoting this strategy. However, crop diversification can be implemented in a variety of forms and at a variety of scales, allowing farmers to choose a strategy that both increases resilience and provides economic benefits.


**Hard choices: Making trade-offs between biodiversity conservation and human well-being** [abstract]

This paper explores the complex trade-offs that exist between human well-being and biodiversity conservation goals, and between conservation and other economic, political and social agendas across multiple scales. Resolving trade-offs is difficult because social problems - of which conservation is one - can be perceived and understood in a variety of disparate ways, influenced (in part at least) by how people are raised and educated, their life experiences, and the options they have faced. The new conservation debate challenges conservationists to be explicit about losses, costs, and hard choices so they can be openly discussed and honestly negotiated. Not to do so can lead to unrealized expectations, and ultimately to unresolved conflict. The authors conclude by presenting a set of guiding principles that can serve to orient strategic analysis and communication regarding trade-offs.

McShane TO, Paul D. Hirsch, Tran Chi Trung et al (2011). *Biological Conservation* 144: 966-972
Leadership, social capital and incentives promote successful fisheries [abstract]
The authors examined 130 comanaged fisheries in a wide range of countries with different degrees of
development, ecosystems, fishing sectors and type of resources. Using Ostrom’s framework for analyzing
socio-ecologic systems, they identified strong leadership as the most important attribute contributing to
success, followed by individual or community quotas, social cohesion and protected areas. Less important
conditions included enforcement mechanisms, long-term management policies and life history of the
resources. Fisheries were most successful when at least eight co-management attributes were present,
showing a strong positive relationship between the number of these attributes and success, owing to
redundancy in management regulations.

Traditional Knowledge, Use Practices and Conservation of Medicinal Plants for HIV/AIDS Care in Rural Tanzania
HIV/AIDS pandemic is currently the most socio-economic challenge that faces Tanzania as it affects mostly the
young and most economically productive population. Despite the government’s intervention to provide anti-
retroviral to people living with HIV/AIDS, many of them especially those living in the rural areas can neither
afford them due to poverty nor access them due to distance to health centers. Many people opt to use of
traditional medicines and this paper reports that 90% of the population in the district examined relies on
traditional herbal medicines to manage the disease. Seventy-five plant species belonging to 66 genera and 40
families were found to be used. With decreasing natural stocks of medicinal plants, and based on the results of
this study, the conservation of important non-timber forest products and the region’s medicinal plant
biodiversity is vital.

Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the
food chain)? [abstract]
This paper reviews estimates of food related greenhouse gas (GHG) emissions at the global, regional and
national levels. The authors report that efficiency-focused technological measures, while important, may not
only be insufficient in reducing GHGs to the level required but may also give rise to other environmental and
ethical concerns. They show that in addition to technological mitigation it will also be necessary to shift
patterns of consumption, and in particular away from diets rich in GHG-intensive meat and dairy foods. This
shift, while potentially beneficial for food secure, wealthier populations, raises potentially serious nutritional
questions for the world’s poorest people.

Global land use change, economic globalization, and the looming land scarcity [article]
A central challenge for sustainability is how to preserve forest ecosystems and the services that they provide
us while enhancing food production. This paper reviews four global scale mechanisms— the displacement,
rebound, cascade, and remittance effects—that are amplified by economic globalization. The authors discuss
case studies of a few developing countries that have managed a land use transition over the recent decades
that simultaneously increased their forest cover and agricultural production and find that these countries have
relied on various mixes of agricultural intensification, land use zoning, forest protection, increased reliance on
imported food and wood products, the creation of off-farm jobs, foreign capital investments, and remittances.
Globalization can be harnessed to increase land use efficiency rather than leading to uncontrolled land use
expansion. To harness globalization as a means of increasing land use efficiency, land systems should be
understood and modeled as open systems with large flows of goods, people, and capital that connect local
land use with global scale factors.