Biodiversity and global health—hubris, humility and the unknown

In November 2011, botanists on a remote island off Papua New Guinea discovered a new species of orchid—uniquely and mysteriously night-flowering [1]. New to science, and with so much more to understand, this flower is threatened by deforestation [2]. Also in November 2011, a survey of 583 conservation scientists reported a unanimous (99.5%) view that ‘it is likely a serious loss of biological diversity is underway at a global extent’ and that, for scientists, ‘protection of biological diversity for its cultural and spiritual values and because of its usefulness to humans were low priorities, which suggests that many scientists do not fully support the utilitarian concept of ecosystem services’ [3]. In terms of management, some scientists now advocate controversial conservation strategies such as triage (prioritization of species that provide unique or necessary functions to ecosystems) [4, 5].

Meanwhile, there are many scientists who contend that there is an urgent need to improve our understanding of the importance of biodiversity for human health and well-being, arguing that only an anthropocentric view of biodiversity within a paradigm ‘ecosystem service’ will enable decision-makers to prioritize the theme [6–9]. A 2011 UN report argues that this need for understanding is especially urgent in fragile and vulnerable ecosystems where communities depend directly on the resources of their environment [10]. Here we have a paradox: international conservation scientists think that we cannot protect biodiversity on the basis of its cultural and spiritual value, nor its usefulness to humans. Other scientists argue that using a utilitarian ecosystem services framework is the only way to get humans to protect biodiversity. Meanwhile, communities directly dependent on biodiverse ecosystems are often those who best understand and protect biodiversity, for exactly these reasons of use and spiritual connection, but they do not hold only a utilitarian view of their environment and its diversity. These communities often define their own ‘health’ as integrally linked to the ‘health’ of the ecosystem, and they see themselves as an integral part of the ecosystem [11].

It is generally accepted that the destruction of biodiverse ecosystems internationally is not by communities directly dependent on these ecosystems, but from processes such as deforestation, mining, resource extraction and biopiracy, generated by external human demand [12–16]. Rich countries and their populations are currently particularly responsible for the resource extraction that impacts negatively on biodiversity and on the well-being of local communities [17]. However, increasingly, urban populations in every country demand resources and products from biodiverse regions, and with rising urban populations this threat is likely to increase.

To illustrate, we can take one example. Amazonia is one of Earth’s most important biodiverse tropical moist forest ecosystems. As the Amazonian forest reaches the Andes it becomes a contiguous and equally vital ecosystem: the Yungas or Cloud Forest [18]. These two sister forests are amongst the most biodiverse ecosystems of the world, spanning several Latin American countries (including Brazil, Argentina, Peru, Bolivia, Venezuela, Colombia and Ecuador), and over 7 million square kilometres [18, 19]. For millennia, across modern
geopolitical boundaries, Amazonia/Yungas has been protected by over 1000 different indigenous peoples [20]. In turn, Amazonia/Yungas has provided health and spiritual well-being for indigenous peoples via food, medicines, home and culture [21]. Using a utilitarian view of the ecosystem, these forests also provide the world with some of its most important ecosystem services in terms of forest and food resources, current and potential new medicines, rainfall regulation and a global carbon sink [19, 22].

In terms of protection of these ecosystems, there is evidence that recognized ‘indigenous territories’ within Amazonia/Yungas are better protected, in terms of biodiversity and environmental damage, than other conservation units such as national or regional reserves [23, 24]. Yet deforestation, resource extraction and climate change threaten all parts of the Amazonia/Yungas [19, 25–28], and indigenous communities, amongst the most marginalized peoples in Latin America [29], are experiencing increasing threats to their territories, and their health and well-being [20]. Figures 1–3 show different aspects of the Andean Yungas and high mountain ecosystems of Argentina. The ecosystems are highly biodiverse. We are only beginning to understand the extent of their importance for human well-being, and these incredible forests are at risk from deforestation, mining and climate change.

It is notable that, recognizing their vital role in ecosystem understanding protection, indigenous peoples and local communities now play an important part in global policy processes, including the United Nations Convention on Biological Diversity (CBD) and the UN Framework Convention on Climate Change (UNFCCC) [30]. In 2011, the IUCN met with indigenous representatives and conservation organizations to discuss conservation priorities in the context of indigenous rights. IUCN agreed to review the implementation of resolutions related to indigenous peoples taken at the 4th World Conservation Congress (WCC4) in 2008, and to advance their implementation. These resolutions, along with the Durban Action Plan and the Programme of Work on Protected Areas of the United Nations Convention on Biological Diversity (CBD), are often termed as the ‘new conservation paradigm’ [31].

Scientists, UN agencies, and indigenous and local communities agree that we have reached a critical time for biodiversity globally. But who will decide on the policies for protection of biodiversity? Triage may be on the agenda of pessimistic conservation scientists, but indigenous and local communities would rarely have such hubris as to assume that they have the wisdom to make triage
decisions, and nor would many communities have the arrogance to think they have the right to intervene in this way in their complex ecosystems.

While debates continue and biodiversity declines annually, there is a group of actors who will be crucial in decisions on our planet’s future, including biodiversity and climate change. The world’s population is now predominantly urban [32]. It is urban citizens who are driving the exploitation of the world’s ecosystems and the model of unsustainable over-consumption [33]. It is highly likely that it is urban populations who will decide the fate of biodiversity and climate change, through their decisions about resource use and consumption [34, 35].

We demand a great deal of urban populations when we ask them to lead a sustainable future. The majority of urban citizens are trained, as are most scientists, to hold a utilitarian view of the environment. Perhaps this is the great hubris of recent human history—the assumptions of the anthropocentric view of the global ecosystem: seeing our planet only for its services or its threats, and viewing ourselves as somehow external to the integrity of the ecosystem. And our most profound arrogance is in the assumption that we understand the implications of our destruction of biodiversity for the well-being of future generations.
There is much to be learnt from the indigenous and local communities who depend directly on, value spiritually, and fight for, their biodiverse ecosystems. And perhaps the most difficult thing to learn is the humility that these communities have—they do not assume that they know enough about the ecosystem to be able to decide which species the planet needs and which it does not. They do not hold a model that sees human beings as separate from their global ecosystem in all its complex biological and cultural diversity. They do not see themselves as owners of the planet, but as guardians of it for the future.

2012 will see a plethora of UN and government meetings devoted to the Rio + 20 summit and its theme of a green economy in the context of sustainable development and poverty eradication. Biodiversity and climate change should be key concerns of this meeting. But it will not be global summits that protect biodiversity or reduce the emissions that produce climate change—and it will not be scientists arguing for and against the utilitarian concept of ecosystem services. The real decision-makers will be every human on the planet and their resource needs and their choices. We have some evidence of what the global population ‘needs’, in terms of food, water and shelter [36], but we do not know for sure what they will ‘choose’. More worryingly, even if the global population chooses to change their view of the planet and their place in it, and to reduce resource consumption to sustainable levels, we do not know if we will be in time.

ERL focus issue on biodiversity, human health and well-being

ERL is contributing to Rio + 20 through a special issue devoted to the issues of biodiversity, human health and well-being. We particularly welcome papers from scientists and community groups working on biodiversity from the perspective of a broad understanding of health and well-being, including spiritual, cultural and intergenerational aspects; urban groups working on biodiversity and well-being; and the links of biodiversity to the green economy in the context of sustainable development and poverty alleviation.

References

[1] Schuiteman A et al 2011 Nocturne for an unknown pollinator: first description of a night-flowering orchid (Bulbophyllum nocturnum) Bot. J. Linnean Soc. 167 344–50
[2] Kinver M and Gill V 2011 Botanists discover ‘remarkable’ night-flowering orchid BBC News Science and Environment (www.bbc.co.uk/news/science-environment-15818662)
[3] Rudd M A 2011 Scientists’ opinions on the global status and management of biological diversity Conserv. Biol. 25 1165–75
[4] Bottrill M C et al 2008 Is conservation triage just smart decision making? Trends Ecol. Evol. 23 649–54
[5] Parr M J et al 2009 Why we should aim for zero extinction Trends Ecol. Evol. 24 181. Bottrill M C et al 2009 Finite conservation funds mean triage is unavoidable Trends Ecol. Evol. 24 183–4
[6] Pushpangadan P and Behl H M 2005 Environment & Biodiversity: Agenda for Future (Lucknow: International Society of Environmental Botanists) (http://isebindia.com/icpep-3/icpep-3-s-2.html)
[7] Alves R and Rosa I 2007 Biodiversity, traditional medicine and public health: where do they meet? J. Ethnobiol. Ethnomed. 3 14
[8] Center for Biodiversity and Conservation 1997 Biodiversity and Human Health: A Guide for Policymakers (New York: American Museum of Natural History)
[9] Chivian E 1997 Global environmental degradation and biodiversity loss: implications for human health Biodiversity and Human Health ed F Grifo and J Rosenthal (Washington, DC: Island) pp 7–38
[10] UNEP-WCMC 2011 Health and Well Being of Communities Directly Dependent on Ecosystem Goods and Services: An Indicator for the Convention on Biological Diversity (Cambridge: UNEP-World Conservation Monitoring Centre)
[11] Newton C, Stephens C and Bristow F 2007 Utz Wachil: a study of indigenous perceptions of health and environment in five countries Ecolhealth 4 461–772
[12] Jones G P et al 2004 Coral decline threatens fish biodiversity in marine reserves Proc. Natl Acad. Sci. 101 8251–3
[13] Merson J 2000 Bio-prospecting or bio-piracy: intellectual property rights and biodiversity in a colonial and postcolonial context Osiris 15 282–96
[14] Soejarto D D 1996 Biodiversity prospecting and benefit-sharing: perspectives from the field J. Ethnopharmacol. 51 1–15
[15] Foley J A et al 2007 Amazonia revealed: forest degradation and loss of ecosystem goods and services in the Amazon Basin Front. Ecol. Environ. 5 25–32
[16] King S R, Carlson T J and Moran K 1996 Biological diversity, indigenous knowledge, drug discovery and intellectual property rights: creating reciprocity and maintaining relationships J. Ethnopharmacol. 51 45–57
[17] Witzig R and Ascencios M 1999 The road to indigenous extinction: case study of resource exploitation, disease importation, and human rights violations against the Urarina in the Peruvian Amazon Health Hum. Rights 4 60–81
[18] Fundacion Proyungas 2007 Bitácora de las Yungas: Bosques Nadados (Tucuman: Fundacion de las Yungas)
[19] US Government 2003 Conserving Biodiversity in the Amazon Basin: Context and Opportunities for USAID (Washington, DC: USAID)
[20] Montenegro R A and Stephens C 2006 Indigenous health in Latin America and the Caribbean Lancet 367 1859–69
[21] Stephens C, Nettleton C and Bristow F (ed) 2003 Utz’ Wach’i: Health and Well-Being Among Indigenous Peoples (London: Health Unlimited and the London School of Hygiene and Tropical Medicine) (http://www.lshtm.ac.uk/php/sehr/indigenous/docs/utzpamphlet.pdf)
[22] Brown A et al 2007 Finca San Andres—Un Espacio de Cambios Ambientales y Sociales en el Alto Bermejo (Ediciones del Subtropico: Yerba Buena)
[23] Ramos A and Junqueira R 2010 The contribution of indigenous people to forest conservation and recovery Everything is Connected: Climate and Biodiversity in a Fragile World ed C Foley (London: DEFRA) (http://sd.defra.gov.uk/2010/11/everything-is-connected-climate-and-biodiversity-in-a-fragile-world/)
[24] Dunning E, Osti M and Pavese H 2010 The role of protected areas in mitigating climate change and conserving biodiversity Everything is Connected: Climate and Biodiversity in a Fragile World ed C Foley (London: DEFRA) pp 7–10 (http://sd.defra.gov.uk/2010/11/everything-is-connected-climate-and-biodiversity-in-a-fragile-world/)
[25] Kunz C R, Bravo S and Panagatti J L (ed) 2003 Fuego en los Ecosistemas Argentinos (Santiago del Estero: Instituto Nacional de Tecnología Agropecuaria)
[26] Miranda C P 2003 Tucumán y Los Recursos Naturales. Biodiversidad Los Recursos Silvestres, Los Ambientes Naturales y Las Areas Protegidas (Tucumán: Gobierno de La Provincia de Tucumán)
[27] Redford K H, Naughton L and Ráez-Luna E F 2000 Forest wildlife and its exploitation by humans The Conservation Atlas of Tropical Forests: The Americas ed C S Harcourt and J A Sayer (New York: Simon and Schuster/IUCN)
[28] Kappelle M and Brown A (ed) 2001 Bosques Nadados del Neotrópico (San Jose: Editorial INBio)
[29] Hall G and Patrinos H A 2005 Indigenous Peoples, Poverty and Human Development in Latin America: 1994–2004 (Washington, DC: The World Bank)
[30] Macchi M 2008 Indigenous and Traditional Peoples and Climate Change (Geneva: IUCN)
[31] IUCN 2011 IUCN to review and advance implementation of the ‘new conservation paradigm’ focusing on rights of indigenous peoples CEESP News, 2 May 2011 (available from: www.iucn.org/about/union/commissions/ceesp/ceesp_news/?7399/IUCN-to-review-and-advance-implementation-of-the-new-conservation-paradigm, cited 29 November 2011)
[32] UN Habitat 2010 State of the World’s Cities 2010/2011: Bridging the Urban Divide (Nairobi: UN Human Settlements Programme) (first published by Earthscan 2008)
[33] Rees W 1996 Ecological footprints of the future. Overview People Planet 5 (2) 6–9
[34] Stephens C 2011 Revisiting urban health and social inequalities: the devil is in the detail and the solution is in all of us Environ. Urban. 23 29–40
[35] Anderson J M 2005 Blueprint for a greener city: growth need not cost the earth Water Sci. Technol. 52 61–7
[36] United Nations Population Division 2008 World Urbanization Prospects: The 2007 Revision Population Database (New York: United Nations Population Division)