



World

CONSERVATION

THE MAGAZINE OF THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE

APRIL 2009

Life support

Human health and the environment

New drugs
from nature

Saving lives,
saving money

Disease
control



IUCN
Rue Mauverney 28
1196 Gland, Switzerland
Tel +41 22 999 0000
Fax +41 22 999 0002
worldconservation@iucn.org

www.iucn.org/worldconservation

Editor: Anna Knee
Managing Editor: John Kidd
Circulation: Cindy Craker

Contributing editors:
Stephanie Achard
Deborah Murith
Olivia Pasini

Design: ätta design sàrl, Geneva, Switzerland
Printed by: Polygravia, Châtel St Denis, Switzerland

Opinions
Opinions expressed in this publication do not necessarily reflect the views of IUCN, its Council or its members.

Subscriptions
Subscriptions to print or electronic versions of *World Conservation* are free. To subscribe, please visit www.iucn.org/worldconservation or e-mail us at worldconservation@iucn.org.

Comments and suggestions
Please e-mail the *World Conservation* team at worldconservation@iucn.org, or telephone us on +41 22 999 0116.

Next issue
The next issue of *World Conservation* will be on climate change. Submissions and article suggestions are welcome; please send them before 5 June 2009.

Back issues
Back issues of *World Conservation* are available at: www.iucn.org/worldconservation

Paper
This magazine is printed on FSC paper.

Photographs
Cover: © iStockphoto; p 5: © iStockphoto
p 6: © Ann Monn/Jupiter/Reuters; p 7: © iStockphoto; p 9: © Biosphoto/Gunther Michel/Still Pictures; p 10-11: © Grafoo/Dreamstime.com
p 12: © Dani Cardona/Reuters; p 14: © Joshua R. Ginsberg; p 16: © Visuals Unlimited/ Corbis; p 17: © Eduardo Munoz/Reuters; p 18-19: © Martin Harvey/Corbis; p 20: © Paul Cooklin/Jupiter/Reuters; p 21: © Biosphoto/Menghini Julien/Still Pictures; p 22-23: © 4 Eyes Photography ; p 24: © Clearviews/Dreamstime.com; p 26: © iStockphoto; p 27: © Showface/Dreamstime.com; p 28: © Bloopiers/Dreamstime.com; p 30-31: © McPhoto/Still Pictures; p 32: © Alphaspiri/Dreamstime.com; p 34: © Sherez/Dreamstime.com

© International Union for Conservation of Nature and Natural Resources

Contents

Your space	4
Feedback on <i>World Conservation</i>	

In sickness and in health	5
What's health got to do with the environment?	

THE BODY

Losing it	6
By losing biodiversity, we're losing the opportunity to discover new drugs says Eric Chivian	

Easing the pressure	8
Danna Leaman looks at the measures needed to ensure the sustainable use of medicinal plants	

Bracing for change	10
Courtney Cavaliere summarises new research on the impacts of climate change on medicinal plants and the people who depend on them	

Fact file	11
A few facts about our health and the environment	

Reaching out	12
William B. Karesh explains how promoting the human health message can engage new partners for conservation	

Forewarned is forearmed	13
Diseases that could spread into new areas because of climate change	

Beyond borders	14
The increased disease risk posed by transboundary conservation areas must be urgently addressed	

A sting in the tale	16
How invasive alien species are a growing menace to our health	

Joint venture	17
Chris Banks and Jean Thomas describe a community health project in Papua New Guinea that helps conservation	

Conditions and cures	18
Five well known diseases; five systems of medicine—how they link to the environment	

THE MIND

Lessons from big brother	20
We have much to learn from ancient civilizations about the links between a healthy environment and the health of people says Juan Mayr Maldonado	

A holistic approach	22
Ana Persic and Irene J. Klaver describe the intangible mental, spiritual and cultural health benefits of protected areas	

Taking the lead	23
John Senior explains a new management approach that is emerging for protected areas which promotes their health benefits	



THE WAY FORWARD

Saving lives, saving money.....24

Tackling climate change and improving human health should be the same battle say Maria Neira and Diarmid Campbell-Lendrum

Resorting to nature27

Health and spa resorts must operate sustainably says Arnfinn Oines

Talking Heads28

Doctors outline some pressing environment-related health issues and what needs to be done about them

Bridging the divide30

Jo Mulongoy says the Convention on Biological Diversity can help to integrate global biodiversity and health policy

A healthy choice32

The health of rural communities can benefit from sustainable trade in biodiversity products—Rik Kutsch Lojenga and Pierre Hauselmann explain

The road to recovery34

Jeff McNeely and Sue Mainka outline the steps needed to conserve medicinal biodiversity

We're in this together35

Global cooperation in tackling health and environmental challenges

Toxic trouble35

Health problems caused by chemicals in the environment

Your space

I'd like to respond to the article 'Perverse Priorities' in the May 2008 issue.

The hundreds of billions of dollars a year that governments around the world spend on perverse subsidies—subsidies that encourage environmentally harmful activities (e.g. excessive fishing, logging, farming or fresh water consumption)—are the root cause of many of our most pressing environmental problems, and yet they rarely receive the attention they deserve.

There are many in the environmental community, including some at IUCN, who erroneously attribute the widespread scourge of perverse subsidies to the forces of 'globalization'. The truth, in fact, is the opposite. In a truly globalized economic system, such as the one envisioned by the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO), perverse subsidies would be eliminated. The most recent round of the WTO collapsed because many nations (notably India and China) could not agree on the large decreases in agricultural tariffs that would accompany a large decrease in agricultural subsidies in the OECD countries.

For many years the WTO has included a working group tasked with decreasing the world's obscene fisheries subsidies which are not only distorting international trade but wreaking havoc on the world's fish stocks and marine biodiversity. It is not globalization which drives perverse subsidies, but national governments and the special interests that dominate them.

Jason Scorse, United States
Monterey Institute of International Studies

It was good to see a review of the new protected area category guidelines in the last issue.

As follow up, I'd like to note that the guidelines will be at the centre of a major capacity-building exercise over the coming year and invite readers to get in touch if they want more information. The concept of protected area categories has developed far beyond just being a recording device for government data and they are increasingly being used for planning protected area systems and for setting national policy and legislation.

A proper understanding of them is therefore increasingly important. The changes to the categories, and even more significantly to the IUCN protected area definition, are subtle but significant. In particular, nature conservation is given greater emphasis in defining a protected area than was the case in the past and the guidelines contain some additional principles and explicit advice on use, and application in a range of biomes with the intent to eliminate potential confusion.

Importantly, alongside the categories, which are defined by management objective, a classification system using governance types is also presented, making more explicit reference to indigenous and community conserved areas than in the past. We are seeking interest in helping to publish additional language versions, beyond the current English, Spanish and French. Plans are being formed to produce online training materials, running regional workshops and working individually with governments and others on practical application.

If you need more information or specific help, please contact me at the address below.

Nigel Dudley, United Kingdom
equilibrium@compuserve.com

World Conservation welcomes your feedback

We'd like the magazine to stimulate debate, so please let us know what you think. Do you disagree with an article? Have we missed the point? What are you or your organization doing? Send your comments to: **worldconservation@iucn.org**

You can also post comments on individual articles at **www.iucn.org/worldconservation**

In sickness and in health

Why we're talking about health.

Most people have a vague idea that their health is somehow linked to the environment—headlines about Avian influenza and West Nile virus have certainly boosted awareness. But few understand just how intricate and important the connections are. Many of our health challenges relate directly to the environment and the profound impact we are having on the planet.

Environmental hazards are responsible for a quarter of the global burden of disease and nearly 35% in Sub-Saharan Africa. And many leading risk factors for disease such as unsafe water, pollution, poor sanitation and malnutrition are environment-related. Climate change is altering the frequency and distribution of infectious diseases with tropical diseases emerging into cooler areas where they were previously unknown. Storms, heat waves, droughts and floods can have a devastating effect on health—floods for example often bring cholera outbreaks.

Patients who have a view of green space stay in hospital less time and require a lower intake of pain killers than those without.

But the environment is an important ally to health, if looked after properly. Around 80% of people in developing countries rely on traditional medicines, mostly from plants. More than half of the most commonly-prescribed drugs in the developed world such as aspirin come from natural sources. Frogs, chimpanzees, bears and sharks are being studied to find treatments for diabetes, kidney disease, osteoporosis and many other serious disorders. Cures for AIDS and cancer could be at our fingertips if we took better care of biodiversity.

Human health also depends on well-functioning ecosystems. We cannot live without the goods and services that nature provides to purify our air and fresh water, maintain soil fertility, pollinate plants, break down waste, provide food and fuel and keep diseases in check.

When asked to conjure up an image of calmness and well-being, most people think of nature, be it a forest, a lake or a beach. Research shows that patients who have a view of green

space stay in hospital less time and require a lower intake of pain killers than those without. Job stress is reduced and productivity improved when workers have views of natural settings. All this backs up what to us in the conservation community is obvious: that people are 'hard-wired' to nature through spiritual, emotional and psychological connections.

Health is officially defined as the state of complete physical, mental and social well-being. Well-being includes poverty reduction, livelihoods

Many of the articles call for a break down of the single sector 'silo mentality' that has hampered progress to date. They call for an interdisciplinary approach to tackling our health and environment challenges and we look at some key initiatives that are leading the way. It is clear that we must make our 'business' relevant to other communities including development, industry and agriculture. One key message that emerges is that the environmental and health communities have much in common and must



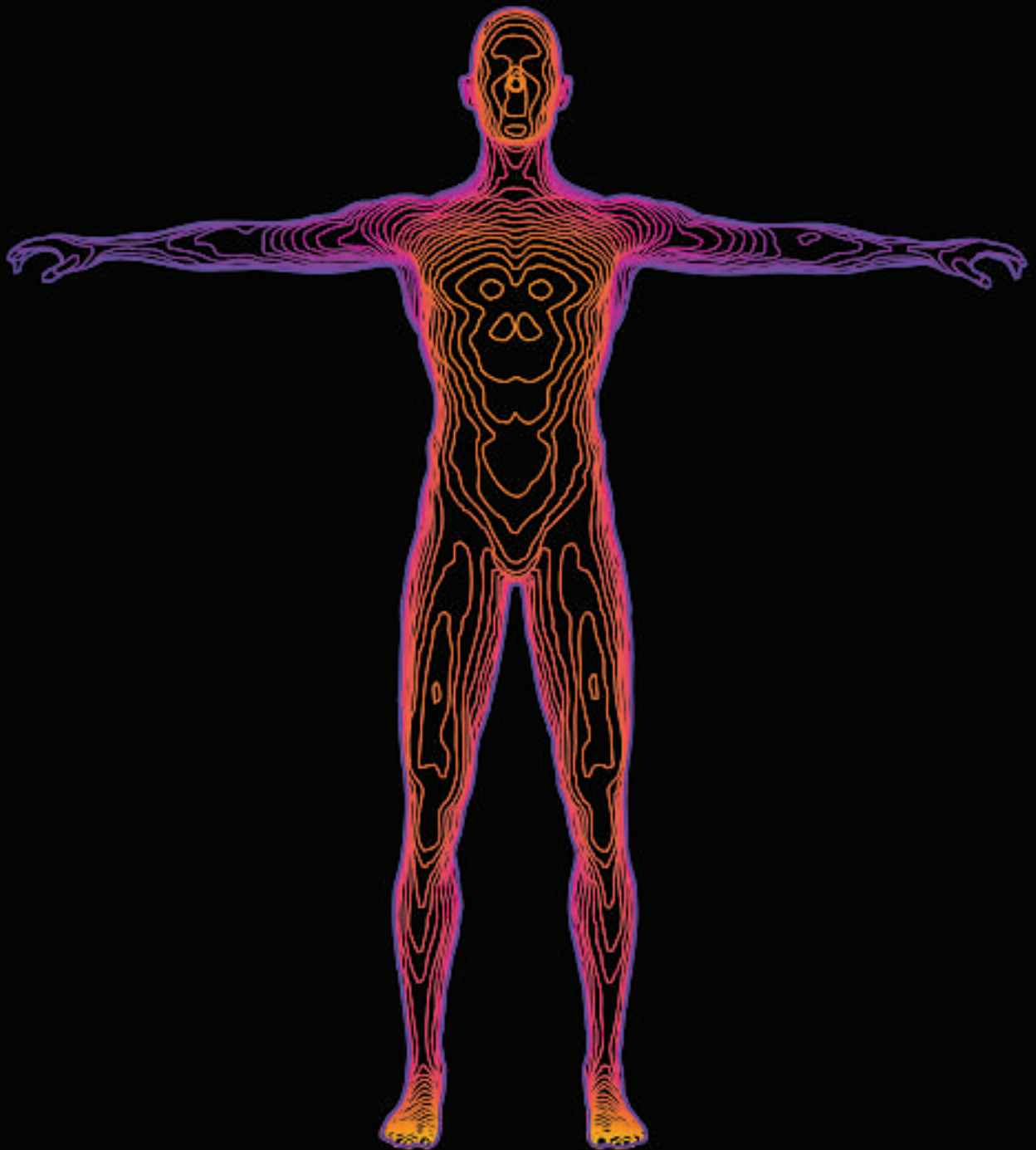
and physical security but this is far too much to tackle in one issue of *World Conservation*. Instead, we're focusing on physical, mental and spiritual health.

Politicians are paying greater attention to health issues. Cynics would argue that this is only because they are feeling the economic and political pressure of growing healthcare bills. But still the environmental component is often ignored in policy making. For years, environmentalists have relied on the ecological, ethical and aesthetic case for nature conservation and have been slow to wake up to the importance of the links between health and the environment. Although these links are now emerging as one of the most powerful arguments for conservation, we need to do much better in communicating them to decision makers and the public.

join forces in working towards shared goals. Another is that the information and knowledge we generate on the relationships between health and nature must be made freely available, especially to those, like many of our readers, who have the power to act. ■

Losing it

With the accelerating loss of biodiversity, we are losing critical opportunities to understand and fight human disease, says Eric Chivian.



In the 1980s, with three other Harvard faculty members, I helped start an organization called International Physicians for the Prevention of Nuclear War, a group that won the 1985 Nobel Peace Prize. The most important contribution of the tens of thousands of physicians who became part of this federation was to help people grasp just how catastrophically destructive a nuclear war would be. We did this by translating the abstract, technical science about nuclear weapons explosions into concrete, human health terms that people could relate to, and as a result, I believe, we helped change public opinion and even public policy.

But with human-induced damage to the global environment like climate change and biodiversity loss, the level of complexity is an order of magnitude greater; the changes occur slowly and on global scales. It is therefore essential that physicians and public health professionals be involved in helping the public understand the human dimensions of environmental degradation. We have no Hiroshimas or Nagasakis to use as models. And the task is made much more difficult because most people have a fundamental misunderstanding about the environment: that they are somehow separate from it; that we can degrade the oceans, the atmosphere and the soils, and lose countless species in the process, as if this has no effect on us whatsoever. This, I believe, is at the heart of the global environmental crisis, and is the reason why more than 100 leading scientists spent the last seven years working on *Sustaining Life: How Human Health Depends on Biodiversity*, to help people understand our intimate connections with Nature, to make it clear that we don't have a choice about whether to protect the natural world or not. We must do so, because our health and our lives depend on it.

There are so many ways our health depends on a healthy environment, particularly healthy biodiversity and ecosystems—through controlling the spread of infectious diseases and invasive species, and providing clean air and water, and medicines. But perhaps one of the most powerful arguments for safeguarding biodiversity is that which describes its role in medical research and as a source of new medicines. More than 70,000 plant species are used medicinally, either traditionally or in modern medicine. Aspirin was originally derived from salicin, extracted from the willow tree. Cancer-fighting drugs have been derived from the Rosy Periwinkle plant, and many groups of animals from bears to sharks, provide important research models that can help us understand and fight disease.

Polar bears have become iconic figures in discussions about what we will lose with climate change, but their medical value is rarely mentioned. During hibernation, polar bears are essentially immobile, and yet they don't develop osteoporosis, which every other mammal, including ourselves, gets as a result of prolonged immobility. Osteoporosis is a huge public health problem for the elderly, resulting in more than 70,000 deaths in the US alone

each year and costing the economy some US\$ 18 billion annually in direct healthcare costs and lost productivity. Hibernating bears have compounds in their blood streams that may one day allow us to prevent and treat this disease. Polar bears become massively obese feeding on seal blubber prior to hibernating, but they don't develop Type 2 diabetes, as we tend to when we become obese. This is also not well understood, but must be studied in the wild. Yet we will lose this opportunity if we lose polar bears. Obesity-related Type 2 diabetes is essentially epidemic in the US, afflicting some 5% of the population and killing close to a quarter of a million people a year.

Many groups of animals, from bears to sharks, provide important research models that can help us understand and fight disease.

Cone snails are a large group of predatory snails that defend themselves and kill their prey by firing poison-coated harpoons at them. There are thought to be around 700 cone snail species and each one is believed to make 100–200 distinct toxic compounds. These toxins have been intensively investigated by researchers for new medicines. Only about six species and about 100 toxins have been studied in detail, and already several important new compounds have been found. One has been synthesized as a painkiller and is being marketed as Prialt, used for the treatment of severe chronic pain that is not responsive to opiates. Morphine has been our most effective painkiller but Prialt is a thousand times more potent and even more importantly, it doesn't cause addiction, or tolerance—the state when more medication is needed to achieve the same effect. The use of potent painkillers from cone snails that do not cause tolerance is a watershed in medi-

cine, equivalent in some ways to the discovery of penicillin. Some believe that cone snails may provide more leads to important medicines than any other group of organisms. And yet they live in coral reefs which are threatened by global warming around the world.

More than a third of all known amphibian species are threatened with extinction—yet amphibians contribute to human medicine in many ways. As just one example, the Crucifix Toad found in southeastern Australia, defends itself from biting insects by secreting a sticky, protein-based glue from its skin that hardens in seconds and catches insects, even in heavy rain. This is being adapted for the surgical repair of various types of human tissue, where there is a need for a strong, flexible, porous adhesive. Synthetic glues are strong enough, but they are generally toxic and brittle and don't allow the exchange of gases and fluids necessary for healing. Most biological glues, for example those from various proteins like albumin are not strong enough to repair tissues that are subject to shear forces, such as torn knee cartilages.

We have to make these examples more widely known, to shift global policy making onto the right path. Environmentalists and health professionals can, and are starting to form, an effective alliance in starting the process. Scientists with expertise in a wide range of disciplines, from industrialized and developing countries alike must work together to convince people, particularly decision makers, that human beings are an integral part of Nature, and that our health depends ultimately on the health of its species and on the natural functioning of its ecosystems. We hope they will develop innovative and equitable policies based on sound science that preserve biodiversity and promote human health for generations to come. ■

Eric Chivian, M.D. is Director of the Center for Health and the Global Environment at Harvard Medical School. He is co-author of the Oxford University Press book *Sustaining Life: How Human Health Depends on Biodiversity*.



Easing the pressure

Demand for medicinal and aromatic plants is soaring. Danna Leaman outlines the measures needed to ensure their use is sustainable.

Every human culture has found medicines in the natural world. They come from species in nearly every kingdom—plants, animals, fungi and micro-organisms but the majority come from plants. Demand for traditional remedies and other plant-based health products, the so-called ‘botanicals’, is increasing worldwide, particularly in rapidly-expanding urban societies. Increased consumption of medicinal plants, through expansion of local, regional and global markets, is placing growing pressure on a resource that is largely harvested from already depleted wild populations in shrinking habitats.

Over 50% of prescription drugs are derived from chemicals first identified in plants. Considering how widely used medicinal plants are as a resource, we know surprisingly little about them. We don’t yet have a global list of all plant species used as medicines but members of IUCN’s Medicinal Plant Specialist Group are working to compile one based on published pharmacopoeias and sources that document plants used in various systems of medicine throughout history. This list currently includes nearly 16,000 species of higher plants and a small number of mosses, ferns and lichens. But we know that many more species are used in local and traditional systems of medicine and these are gradually being documented in ethno-botanical research. We estimate that 50,000–70,000 species are already used as sources of herbal medicines but respect the rights of traditional communities to manage access to and benefits from their knowledge.

We also have limited information about the conservation status of medicinal plants. Very few plant species have been assessed globally for the IUCN Red List of Threatened Species™ or against any other criteria. Only 4% of species have been assessed for their conservation status and of those, few medicinal plant species have been assessed for their conservation status. Many of the assessments that have been carried out have been at the local, regional and national level, where they can be used directly in health policy. Putting together this patchwork of assessments under a global umbrella is extremely challenging.

However, we do know that approximately 3,000 medicinal and aromatic plant species are traded internationally and that many more are important in local and regional systems of trade that are not easy to monitor. Just as are all other plant species, medicinal plant populations are threatened by habitat loss,

invasive species and climate change but wild collection is a particularly serious threat.

Some of the most important medicinal plants in commercial trade are long-lived tropical or high-mountain species. These habitats are among those most threatened by habitat destruction and increasingly by climate change. But medicinal plants face the added pressure

Over 50% of prescription drugs are derived from chemicals first identified in plants.

of growing collection at a commercial scale because of the expanding markets for herbal products. With fewer than 1,000 species of medicinal plants in commercial cultivation, the vast majority of species are collected from wild populations.

Several measures are being implemented to try to ensure the conservation and sustainable use of medicinal plants. As well as the global list, we’re also compiling local and regional lists that can be useful to policy making and conservation action at the local level. We’re also looking at the attributes that make species vulnerable to extinction so that we can better identify those under threat. We’ve been carrying out conservation status assessments and training other people to undertake them as these assessments are critical for priority setting in conservation and management.

Working with the World Health Organization, WWF and TRAFFIC, we’re revising the global guidelines for medicinal plant conservation. We’re also taking a much broader look at what can be done to protect species that are not currently threatened by focusing on sustainable use. This involves working with the herbal products industry, wild collectors, resource managers and government agencies overseeing herbal medicine policy to define the principles of sustainable wild collection. We have launched a good practice standard—the International Standard for Sustainable Wild Collection of Medicinal and Aromatic Plants (ISSC-MAP) to improve industry practices through certification and to improve management practices generally. We are working with governments of countries such as India and China as major sources of medicinal plants and with CITES—the Convention on International

Trade in Endangered Species of Wild Fauna and Flora. We have come together with partners in industry, certification and resource conservation to establish the FairWild Foundation, which will manage the implementation of the ISSC-MAP together with organic and fair trade standards for wild-collected plants. ■

Danna Leaman is Chair of IUCN’s Medicinal Plant Specialist Group and a Director of the FairWild Foundation.

<http://data.iucn.org/themes/ssc/sgs/mpsg>

www.fairwild.org

IUCN is working with TRAFFIC, WWF and other partners, with financial support from the German Federal Ministry for Economic Cooperation and Development (BMZ), to implement ISSC-MAP through a joint ‘Saving Plants that Save Lives and Livelihoods’ initiative, and to certify sustainable wild collection under the auspices of the FairWild Foundation. Projects are underway in Brazil, Cambodia, India, Lesotho, Nepal and Bosnia-Herzegovina, with more proposed for China and the Ukraine. ISSC-MAP aims to stop over-exploitation, illegal harvest and illegal trade in wild plants, through establishing sound quota systems. Central to the projects are the customary rights of local communities and indigenous peoples and the establishment of benefit sharing agreements over genetic resources.



Medicine and money

Wild plant species form the foundation of healthcare practices throughout much of Asia, particularly traditional practices, such as traditional Chinese medicine, Ayurveda, Siddha, Unani and Tibetan medicines. Compounds such as paclitaxel, the cancer drug from the Himalayan, Pacific and other species of yew are widely used in Europe, North America and elsewhere. While new and important uses for magnolia are being explored, many species of this medicinal plant are threatened with

extinction. Long used in traditional medicine for respiratory problems, bacterial and viral infections, and high blood pressure, the magnolia family's medical potential is just beginning to be understood.

In India, collection and processing of medicinal plants contributes at least 35 million workdays per year to the poor and under-employed, but rising demand is threatening this vital source of livelihood income both in India and elsewhere.

Devil's claw, native to southern Africa, has been used for thousands of years to treat fever, rheumatoid arthritis and digestive conditions. European colonisers brought devil's claw, so called for the small hooks on the plant's fruit, to Europe in the 1900s where it is used to treat inflammation and pain. Most of the world's supply of devil's claw comes from Namibia.

Ginkgo biloba is one of the oldest living tree species and its leaves are among the most extensively studied botanicals in use today. Although Chinese herbal medicine has used both the ginkgo leaf and seed for centuries, in Europe and the United States, ginkgo supplements are among the best-selling herbal medications. People use ginkgo leaf extracts hoping to improve memory, to treat or help prevent Alzheimer's disease and other types of dementia, and for circulatory disorders.

Bracing for change

Courtney Cavaliere outlines the ways in which medicinal plants and the people who depend on them are being affected by climate change.

The fate of medicinal and aromatic plants in the face of climate change could be particularly significant due to their therapeutic and economic value. Many of the world's poorest people rely on medicinal plants as their main healthcare resource and as an important source of income. Losses of these species could have serious ramifications for communities around the world.

Possibly most at risk are species endemic to regions or ecosystems that are particularly vulnerable to climate change, such as Arctic and alpine regions. Rapid warming and changing weather patterns in these areas are altering regional biodiversity and the distribution of vegetation. Changes in these environments and loss of suitable habitat could place the survival of some plant species in jeopardy. Wild populations of the medicinal Arctic plant *Rhodiola rosea* may be significantly affected by increased competition and rising sea levels. Traditionally used to treat infections, strengthen the immune system and protect the heart, the species is becoming more popular in the mainstream herbal industry. It could one day serve as a promising business venture for the Canadian Inuit.

One alpine medicinal plant that experts fear could be threatened by climate change is the snow lotus, which grows in the Himalayas and is used in traditional Tibetan medicine to treat high blood pressure, heart conditions and reproductive disorders. Tibetan doctors spend about a month every year in the mountains collecting medicinal plants, many of which are difficult to cultivate.

Climate change may also have an impact on the effectiveness of medicinal plants in the Arctic. Plants that grow in such extreme climates often produce chemical compounds to protect themselves against the cold and UV radiation. Changing temperatures and environments could mean that these plants produce a smaller quantity of these compounds, which could reduce their therapeutic power. Research is being carried out in the Canadian Arctic to find out how increased global temperatures might affect berry-producing shrubs that are important to the diets and traditional medicinal practices of Inuit communities.

Some effects of climate change appear to be impacting plants worldwide. Like many other plants, some wild medicinal species have begun to flower earlier and shift their ranges in response to changing temperatures and weather patterns. Such shifts could ultimately

endanger wild medicinal plants by disrupting their timed relationships with other plants and pollinators, by exposing early-blooming species to late cold spells and by creating migratory challenges for some species.

Evidence also indicates that extreme weather events can affect the production and collection of medicinal plants. The extremely dry soil conditions resulting from recent abnormally hot summers has prevented the reseeding of medicinal plants such as chamomile in Germany and Poland. Hungary has experienced increasingly severe flooding for the past three to four years, which has led to reduced harvests of fennel and anise. Floods and

hailstorms in India destroyed psyllium and wild mint crops in 2008.

Climate change effects will certainly increase in the near future. More research is needed to better understand the impact on medicinal species, particularly since the users, harvesters and manufacturers of medicinal herbs could all be affected. ■

Courtney Cavaliere is Assistant Editor of *HerbalGram*, the quarterly journal of the American Botanical Council. Her full article on climate change and medicinal plants is published in *HerbalGram* issue 81, www.herbalgram.org





Fact file

- Polluted indoor and outdoor air, contaminated water, lack of adequate sanitation, toxic hazards, disease vectors, ultraviolet radiation and degraded ecosystems are all important environmental risk factors for children, and in most cases for their mothers as well.
- A lack of water and poor water quality can compromise hygiene and health. This increases the risk of diarrhoea, which kills approximately 1.8 million people every year, as well as trachoma (an eye infection that can lead to blindness) and other illnesses.
- Childhood death and illness from causes such as poverty and malnutrition are associated with unsustainable patterns of development and degraded urban or rural environments.
- Indoor air pollution associated with the still-widespread use of biomass fuels kills nearly one million children annually, mostly as a result of acute respiratory infections. Mothers, in charge of cooking or resting close to the hearth after giving birth, are most at risk of developing chronic respiratory disease.
- Malaria, which may be exacerbated as a result of poor water management and storage, inadequate housing, deforestation and loss of biodiversity, kills an estimated one million children under five annually, mostly in Africa.
- Intense short-term fluctuations in temperature can cause heat stress (hyperthermia) or extreme cold (hypothermia) and lead to increased death rates from heart and respiratory diseases. Record high temperatures in western Europe in the summer of 2003 have been associated with a spike of an estimated 70,000 more deaths than the equivalent periods in previous years.
- Asthma deaths are expected to increase by almost 20% in the next 10 years if urgent actions to curb climate change and prepare for its consequences are not taken.
- Climatic conditions affect diseases transmitted through water, and via vectors such as mosquitoes. Climate-sensitive diseases are among the largest global killers.

World Health Organization
www.who.int

Reaching out

The human health message can help engage new partners for wildlife conservation, says William B. Karesh.



With mad cow disease, monkey pox, Ebola and Avian influenza now household words, it is clear that the health of wildlife, people and domestic animals is inextricably linked. The exponential growth in human and livestock populations, rapid urbanization, intensive agriculture and the massive global trade in animals is increasing the spread of infectious diseases that emerge from contact between animals, humans and the ecosystems in which they live.

One of our challenges as conservationists is to think of innovative ways to engage new constituencies in achieving our goals. We need to find an alignment with other groups by

identifying some shared concerns and we're finding that using the human health message is an effective way of doing so.

Millions of kilogrammes of bush meat are consumed each year in Central and West Africa, threatening many species including great apes. We need to change the situation by engaging the people who depend on wild animals for food for their families. By taking health as an entry point, we're finding that local people often share the same goals as conservationists: they want to feel safe, protect the health of their families and their livestock, and secure their natural resources into the future.

Ebola hemorrhagic fever, one of the most virulent diseases known, can be traced back to great ape mortality and the handling of other infected animals. In Central and West Africa, people hunt and unknowingly bring sick animals back to their village where the disease then spreads. Human monkey pox also occurs in the remote villages of this region close to tropical rainforests where there is more frequent contact with infected animals.

We need to better understand the health of primates as so many infectious diseases can be transferred from them. Capacity building and community education is critical. We can train local people

to monitor primate health and carry out a disease investigation so that they can start to take care of their natural resources. The laboratories used to do this can also be used to diagnose and treat people in remote areas. Disease in wildlife can then be detected early on and serve as a warning to prevent its spread to people. This approach is proving sustainable because with limited resources local people can take 'ownership' of the activities. Conservationists or health professionals can pass on their skills and move on to build capacity in other areas in need.

We're also trying to offer alternatives to consuming wildlife by providing domestic animals as sources of protein to villages. But this presents another set of challenges: domestic animals also bring disease. All over the world, wildlife populations have been infected by diseases brought in by domestic animals transported during human colonization, including rinderpest, foot and mouth disease and tuberculosis. Livestock disease continues to this day to be a tremendous threat to wildlife.

In the Congo basin, where cattle are being imported, we have to avoid the mistakes of the past. It's like opening Pandora's box: once a disease like brucellosis or tuberculosis is let loose into the wild, it is very difficult to control. We need to establish surveillance systems to monitor the cattle being brought in and work with local doctors, nurses and abattoir staff to show how human and livestock health are connected. In some areas, nurses are taking samples from abattoirs to test for TB in cattle.

Many of our high profile diseases are driven by human behaviour. SARS—Severe Acute Respiratory Syndrome which originated in China is the result of mixing together lots of species from different places. When you move animals around in wildlife trade markets, you mix and match millions of bacteria and viruses. A recent study revealed that in Phnom Penh, over a period of 10 months, 800,000 birds moved through just two markets. These were forest birds and grassland birds mixing with people, cats, dogs, chickens and rabbits. And then we're surprised when we get hit with a 'new' disease. To me, the only surprise is that we're surprised! Wild species didn't evolve to live like this, in close proximity with people and domestic animals. So as we move wildlife and domestic animals around the world in vast numbers, you can understand how new diseases, or new reactions to old diseases emerge. It's a recipe for disaster.

And this dangerous situation is only driven by the demand for food. With demand for protein likely to triple in the coming years, we need to bring new partners, particularly food producers and the agricultural sector into the conservation fold and show that we have common goals. Just like us, they need a safe environment and healthy products.

With Avian influenza we have done this by establishing a coalition, the Global Avian Influenza Network for Surveillance (GAINS) which spans 36 countries and involves wildlife veterinarians, centres of disease control, public health workers, the food and agriculture industry and conservation organizations. In the wild, the vast majority of strains of Avian influenza do not cause serious disease. The highly pathogenic version of Avian influenza is a product of poorly managed intensive poultry farming.

GAINS aims to improve our understanding of how the influenza viruses transmit in wild birds, and to disseminate information to governments, international organizations, the private sector and the general public. It provides a warning system for the global spread of the highly pathogenic strains that threaten domestic poultry, human health and biodiversity, particularly avian. Amateur bird watchers are also contributing and we're making all the data publicly available. The aim is to expand GAINS to a worldwide network that monitors wildlife and livestock health.

Human health issues are not the remit of already over-stretched conservationists. That's why the environmental community needs to engage with the medical community. This creates a powerful force for conservation as both groups have significant resources and extensive professional networks. It's a huge opportunity and one that is finally being tapped. Partnerships, like our One World – One Health™ initiative, are essential for progress; working towards shared goals and forming more effective policies that address the health connections between people and animals. ■

Dr William B. Karesh is Vice President of Global Health Programs at the Wildlife Conservation Society and co-chair of IUCN's Wildlife Health Specialist Group.

Wildlife Conservation Society
www.wcs.org
www.OneWorldOneHealth.org

IUCN Wildlife Health Specialist Group
www.iucn-vsg.org

Forewarned is forearmed

Health experts from the Wildlife Conservation Society (WCS) have released a report that lists 12 pathogens that could spread into new regions as a result of climate change. All have potential impacts to both human and wildlife health, as well as global economies.

The report *The Deadly Dozen: Wildlife Diseases in the Age of Climate Change* provides examples of diseases that could directly spread as a result of changes in temperature and rainfall or indirectly as a result of humans and animals changing their behaviour or activities in response to climatic change. The best defence, according to the report's authors, is a good offence in the form of wildlife monitoring to detect how these diseases are moving. Health professionals can then start to prepare.

The monitoring of wildlife health provides us with a sensitive and quantitative means of detecting changes in the environment say the authors. It can help governments, public health agencies and communities detect and mitigate threats before they become disasters.

"The term 'climate change' conjures images of melting ice caps and rising sea levels that threaten coastal cities and nations, but just as important is how increasing temperatures and fluctuating precipitation levels will change the distribution of dangerous pathogens," says Dr Steven E. Sanderson, WCS President and CEO. "The health of wild animals is tightly linked to the ecosystems in which they live and influenced by the environment surrounding them, and even minor disturbances can have far-reaching consequences on what diseases they might encounter and transmit as climate changes. Monitoring wildlife health will help us predict where those trouble spots will occur and plan how to prepare."

The *Deadly Dozen*—including diseases such as Avian influenza, Ebola, cholera, and tuberculosis—is illustrative only of the broad range of infectious diseases that threaten humans and animals.

As well as the health threats that diseases pose to human and wildlife populations, the pathogens that originate from or move through wildlife populations have already destabilized trade to a large extent and caused significant economic damage. For instance, Avian influenza and several other livestock diseases that have re-emerged since the mid-1990s have caused an estimated US\$ 100 billion in losses to the global economy.

www.wcs.org

Beyond borders

With Transfrontier Conservation Areas, wildlife, domestic animals and people are coming into unprecedented contact. The threat of transmissible disease must be urgently addressed, says the Animal Health for the Environment And Development (AHEAD) initiative.

Transfrontier Conservation Areas (TFCAs) which aim to re-establish the movement of wildlife within larger landscapes are a welcome concept for boosting economic development and biodiversity conservation. Yet the absence of formal policies on animal disease control could have negative impacts on public health, agriculture, commerce, even conservation itself.

With the recent rapid growth in global tourism, the transboundary management of natural resources, particularly wildlife, has become a major focus of attention in southern Africa. A key economic driver linking these conservation and development initiatives is nature-based tourism that seeks to maximize returns from marginal lands in a sector where this region enjoys a global comparative advantage.

However, the management of wildlife and livestock diseases including zoonoses—diseases like bovine tuberculosis and rabies that can be transmitted between animals and people—within larger landscapes remains unresolved and is an issue of major concern for livestock production, export markets and public health.

Whatever the potential of wildlife-based tourism to generate wealth in such areas, the current reality is that small-scale agro-pastoralists living in adjacent communal lands depend on livestock for their livelihoods. The need to balance their livelihoods and environmental security with the development of alternative land uses gives rise to a complex set of development issues. An integrated approach offers the most promising way to address these issues, one in which the well-being of wildlife and ecosystems, domestic animals and Africa's people are assessed holistically, through a 'One Health' lens.

One could argue that the extensive fencing that has separated wildlife and livestock since the late 1950s has in many ways been the simplest approach to minimizing disease problems. But this fencing has blocked key migratory pathways that wildlife have used for thousands of years in times of thirst and hunger. Conservationists are understandably excited about the possibility of more land for wildlife and the benefits linked to sound stewardship of biodiversity. This excitement, however, should be tempered by the fact that much remains unknown—TFCA proponents should proceed with caution in the face of ecosystems and processes that are not fully understood.

Wildlife corridors for instance, can serve not only as biological bridges for wildlife, but also for vectors and the pathogens they carry. Thorough assessments of disease risks should be

made before fences come down in areas that may have developed different types of pathogen or parasite loads over time. When it comes to animal health programmes and policies in transboundary landscapes where domestic as well as wild animals cross international borders, making the right decisions becomes even more critical.

With rapidly expanding trade through the Southern African Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA) and rapid globalization, these issues will increasingly affect

the development paths of many African countries. Yet there is no formal policy on animal health and disease control for the transfrontier conservation areas being developed.

In response, the Wildlife Conservation Society, IUCN and other partners have tapped into some of the most innovative conservation and development thinking on the African continent in launching AHEAD—Animal Health for the Environment And Development. Through this initiative, veterinarians, ecologists, biologists,



social and economic scientists, agriculturists, wildlife managers, public health specialists and others from across East and southern Africa have been brought together to share ideas on how wildlife conservation and development can be mutually reinforcing.

The need for a holistic approach could not be more urgent. In parts of southern Africa, fences are already coming down, allowing wildlife and livestock access to areas and to each other for the first time in decades. While this represents a potential milestone for conservation and the nature-based tourism

Wildlife corridors can serve not only as biological bridges for wildlife, but also for vectors and the pathogens they carry.

(photographic, hunting, etc.) revenues it supports, it also demands a closer look. What effects might these transfrontier areas have on the health and sustainability of wildlife, domestic animals and human communities?

The Great Limpopo TFCA is among the largest landscapes devoted to conservation on the planet, encompassing five national parks and spanning three countries: South Africa, Zimbabwe and Mozambique. Kilometres of fence are being removed and the subsequent reunion of long-separated wildlife populations, together with new opportunities for wildlife to come into contact with livestock, make addressing disease issues an urgent priority.

The multidisciplinary AHEAD Great Limpopo Transfrontier Conservation Area Working Group, focused on issues at the wildlife/domestic animal/human health interface, was established to consider how to ensure the TFCA succeeds as a viable, sustainable form of land use. The group is focusing on three key areas: animal health and disease; land-use, ecosystem goods and services, and animal health; and human health and livelihoods, animal health and ecosystem health. The Working Group functions to connect and support the wide range of stakeholders involved at local, national and regional levels. Land use/land tenure regimes within the Great Limpopo TFCA include national parks, neighbouring game reserves,

hunting areas, conservancies, irrigation agriculture and intervening areas of communal lands under traditional tenure.

Diseases such as malaria, anthrax and trypanosomiasis (*nagana*—sleeping sickness of cattle) play a significant role in the overall development of the Great Limpopo TFCA region. Foot and mouth disease continues to impact the livestock industry, with control measures having major secondary impacts on the wildlife industry in south eastern Zimbabwe and in north eastern South Africa adjacent to Kruger National Park. Increasing contact between populations of wildlife, domestic animals and people only increases the risks of the emergence or resurgence of diseases. The advent of HIV-AIDS and the spread of bovine tuberculosis pose more recent threats to human well-being, and development, across the region.

This is why the 'One Health' perspective is so critical—for sustainable resource management policies and land-use decisions not just in the Great Limpopo TFCA, but in other conservation landscapes across Africa. If those whose mandate is biodiversity conservation do not address the threats that the livestock sector associates, rightly or wrongly, with wildlife and disease, a vision for protected areas and TFCAs in many parts of the world is likely to fail.

Southern African TFCAs may provide excellent models within which to study and mitigate the political and social tensions between biodiversity conservation and livestock agriculture in the broader region. Doing so effectively will be critical to successful, sustained biodiversity conservation, public health and agri-biosecurity.

We must continue to learn from disciplines with which we may not have communicated well in the past and consciously work to break down sectoral barriers that technical language and vocabulary have historically helped to reinforce.

Whether we are looking at a large, complex international land-use matrix such as a TFCA or at a small, isolated protected area surrounded by human activities, these issues merit more attention than either the conservation or development communities have given them to date. With a healthy respect for the complex challenges facing the places and people we care about and adequate resources to fill the knowledge gaps, a successful 'One Health' approach in southern Africa and beyond is certainly within our grasp. ■

Dr Steve Osofsky is Director, Wildlife Health Policy for the Wildlife Conservation Society and a member of IUCN's Wildlife Health Specialist Group.

AHEAD was launched at the IUCN World Parks Congress in Durban, South Africa in 2003. For more information, including the primer *As the Fences Come Down: Emerging Concerns in Transfrontier Conservation Areas* see www.wcs-ahead.org

A sting in the tale

Invasive alien species are a growing threat to human health.

Globalization is responsible for spreading thousands of invasive alien species around the world. These species are not only the second greatest threat to native biodiversity but can also be harmful to human health.

Exotic diseases are on the rise because of increased transportation and encroachment of humans into previously remote ecosystems. Introduced birds, rodents and insects including mosquitoes, fleas and tsetse flies can all serve as vectors and reservoirs of human diseases. Shipping moves over 80% of the world's commodities and transfers more than 10 billion tones of ballast water internationally each year. Many

is the key to reduction of threats from both new diseases and harmful species that invade human societies," says Geoffrey Howard, IUCN's Global Coordinator for Invasive Species and member of the technical team of the Global Invasive Species Programme.

"Once a biological invasion is able to establish and flourish, it is very difficult and very expensive to control. We have seen this in the past with infectious diseases, invasive pests and weeds but often do not act quickly enough with new invasions. Recognition of emerging threats is now possible through globally-available information so that prevention is often practical if the policies and pro-

cedures'.

These are created during blooms of some microscopic algae known as dinoflagellates that produce powerful toxins. The toxins accumulate in filter-feeding organisms such as oysters, scallops or mussels, and can poison people who eat them. The toxin produced by one alga can cause Paralytic Shellfish Poisoning which, in extreme cases, causes muscular paralysis, respiratory difficulties and even death.

Certain species of fire ants are causing problems. The Red Imported Fire Ant is an invasive pest that has spread to many areas of the world, particularly the US, Australia, the Philippines and China and is feared for the severity of its multiple stings and bites. Some people are also allergic to the ant's venom; in some cases the allergy may be severe enough to be fatal. Millions of dollars are spent every year on medical treatment and control efforts.

The European Wasp is a native of Europe, North Africa and temperate Asia but has spread since the early 1950s to North America, South Africa, South America, New Zealand and Australia. The wasp can be a serious pest, aggressively defending its nest and swarming out to attack if disturbed. Its sting is painful and multiple stings, or a sting in the throat, can be dangerous.

And many invasive plant species are causing havoc for both ecosystems and people across the world. Native to Mexico and the US, *Parthenium* (*Parthenium hysterophorus*) is proving one of the worst weeds for agriculture, the environment and human health in Australia and parts of Africa. Its tiny seeds get into grain deliveries to developing countries. Some people suffer severe allergic reactions to the plant or its pollen; it can cause dermatitis, hay fever and asthma. *Parthenium* weed is toxic to cattle, and meat from livestock that eat it can be tainted. In some parts of Africa, people suffer so badly from asthma that they have to abandon their farms.

The Global Invasive Species Programme of which IUCN is a member, is implementing a Global Strategy on Invasive Alien Species which provides a framework for mounting a global scale response to the problem. ■

www.gisp.org



unwanted organisms take hold in foreign locations such as those that cause harmful algal blooms. Invasive species have long term public health implications and incur huge costs to national economies. And efforts to control this growing menace can bring a new suite of harmful impacts—pesticides applied to treat a particular pest species for example, could pollute soil and fresh water supplies.

"The direct and indirect impacts invasive species are having on human health are just one more reason why decision makers should be taking this threat extremely seriously. Prevention

cedures are in place and there is willingness to act fast rather than 'wait and see,'" he adds.

Fish and shellfish have been introduced all over the world for aquaculture and the live food trade. Not only can these species escape and become a threat to ecosystems and livelihoods, but pathogens and parasites associated with them can be a risk to human health. Diseases such as cholera can be transported with introduced species, establish in local shellfish populations in the new area, and then infect humans.

Damage to the environment, the economy and human health is being caused by 'red

Joint venture

Community health projects can be a boon for biodiversity conservation. Chris Banks and Jean Thomas describe an initiative that is helping to ease pressure on a critically endangered species in Papua New Guinea.

Scott's tree-kangaroo, or Tenkile (*Dendrolagus scottae*), is the most threatened of all tree-kangaroo species. This charismatic animal was once heavily hunted for food by local people. In 1988 the alarm bells were sounded by IUCN's Conservation Breeding Specialist Group, which assessed all New Guinea tree-kangaroos and warned that the Tenkile was on the verge of extinction.

their lives. Former conservation sceptics are now on board and more people are willing to work with TCA to achieve its goal of protecting biodiversity in the Torricelli Mountain Range. Research is being carried out on the Tenkile and information about the species is disseminated in local schools.

The RWSSP started by training local people to become facilitators of a participatory health

94 to 16 people; grille (skin fungus) from 95 to 29; and eye infections from 102 to 18. There have been major improvements in sanitation facilities: 60 pit-toilets (with cement floors) installed and 156 upgraded pit-toilets, 523 hand-washing facilities, and sixty 1,000 gallon water tanks installed across 18 villages.

The initiative means a reduced work load for women, who now have to walk only 10 minutes to water tanks compared to one hour to the nearest rivers. Previously villagers disposed of rubbish over cliffs and in piles; there are now 363 rubbish pits. Almost 800 people have attended an HIV/AIDS awareness programme.

The ultimate goal of the Alliance is to establish the Torricelli Mountain Range as a Protected Area. This will provide the legal protection from not only large-scale commercial development such as logging and mining, but also from local impacts such as over-hunting and harvesting of natural resources. A 'bottom up' approach is being used in which resource owners agree to establish the protected area, establish their own rules and penalties and then manage it accordingly.

Zoos Victoria (ZV) was represented at the original 1998 meeting and has since become the TCA's major partner. In light of the remoteness of the TCA's main base at Lumi, which has no email access, ZV provides an important focal point for international contact with the TCA.

Chris Banks is Coordinator of Conservation Partnerships, Zoos Victoria, Australia. Jean Thomas is Capacity Building Officer, Tenkile Conservation Alliance in Papua New Guinea. ■

www.tenkile.com

http://zoo.org.au/Conservation/Programs/International/Tenkile_Conservation_Program



In response, the Tenkile Conservation Alliance (TCA) was established in 2001 in Papua New Guinea as a non-governmental organization to implement a range of research, conservation training and sustainable livelihood projects. In 2008 this was extended to include a Rural Water Supply and Sanitation Programme (RWSSP) funded by the European Union. This is proving an excellent example of how community development projects can help achieve biodiversity conservation.

The primary aim of the programme is to improve the health and hygiene of rural communities, but it is also helping to achieve conservation goals. It has inspired people to work together and identify the communities' needs as a whole, and has dramatically strengthened their relationship with TCA. 'Seeing is believing' and the programme is proving to people that the TCA is making a difference to

and hygiene education programme, which was attended by more than 1,600 people from 18 villages. The process allowed people from all ages to work together and identify the sanitation problems in their own community and how they could make changes to improve their health.

Each clan then paid a 10% community contribution to instil a greater sense of ownership of the materials they received. Further training was given on making pit-toilets with a cement floor, vent pipe and hole cover, and installing hand-washing facilities and water tanks. TCA transported the materials to central drop-off points and villagers then moved the equipment to their villages by hand, a time-consuming operation due to poor road and track conditions.

Once the materials were installed and used, the results were very impressive, with significant community health improvements. Diarrhoea cases dropped from 148 to 8 people; scabies from

Conditions and cures

Five diseases and five systems of medicine—how they link to the environment.

According to the World Health Organization (WHO), 13 million deaths worldwide could be prevented every year by environmental improvements. Environmental risks including pollution, hazards in the work place, UV radiation, noise, and climate and ecosystem change all need to be tackled to generate a better global bill of health.

Cancer

Cancer causes about 13% of all deaths and, according to the American Cancer Society, 7.6 million people died from cancer in 2007 alone. Carcinogens, such as tobacco smoke, radiation, chemicals or infectious agents can be present in the environment. Pesticides have been linked to various types of cancers including breast cancer, bowel cancer, leukaemia and lymphomas. On the other hand, the environment might hold the key to curing cancers, with sea anemones and corals being used in research. Quercetin, a natural substance found in apples, onions, tea and red wine has the potential to prevent and treat prostate cancer.

Malaria

A vector-borne infectious disease caused by protozoan parasites, malaria is widespread in tropical and subtropical regions, with some 515 million cases occurring annually and resulting in one to three million deaths, mainly in young children in Sub-Saharan Africa. Malaria is one of the most common infectious diseases and an enormous public health problem. It is treated with drugs such as derivatives of quinine which was originally discovered by the Quechua Indians of Peru in the bark of the cinchona tree and first brought to Europe by the Jesuits, and artemisinin which is found in the plant *Artemisia annua*.

HIV/AIDS

Now considered a pandemic, AIDS was first recognized by the US Centers for Disease Control and Prevention in 1981. Its cause, Human Immunodeficiency Virus, or HIV, was identified by American and French scientists in the early 1980s. In 2007, according to UNAIDS WHO, some 33.2 million people lived with AIDS worldwide, whilst it killed 2.1 million people, including 330,000 children. Over three-quarters of these deaths occurred in Sub-Saharan Africa. According to the UN Food and Agriculture Organization and WHO, a well-balanced diet helps people live with HIV/AIDS and may even contribute to delaying the virus' progression. Healthy ecosystems and biodiversity are key to a healthy and varied global food supply.

Coronary heart disease

Coronary heart disease, or CHD, is a condition in which proper circulation of blood and oxygen is not provided to the heart and surrounding tissue. CHD is the leading cause of death for both men and women in the US, and WHO rates it as the top cause of death in high-income groups. According to the American Heart Association, a third of those deaths could be prevented if people exercised more and followed better diets, illustrating the importance of a healthy environment and eating healthy meals.

Diarrhoea

Diarrhoea kills 1.81 million people annually in low income groups. According to Net Doctors in the UK, seven children die of diarrhoea every minute globally, mainly due to poor-quality drinking water and malnutrition. The illness is caused mainly by virus, bacteria or parasites. In developed countries, diarrhoea is no longer a killer; it mainly becomes dangerous when dehydration occurs. A clean environment and access to fresh drinking water and uncontaminated food are essential in avoiding diarrhoea. The medical journal *The Lancet* reports for instance that washing hands with soap can reduce the risk of diarrhoeal diseases by 42–47% and interventions to promote hand-washing might save a million lives.





Medicine, the science of preventing, diagnosing or curing disease, comes in many shapes and forms, depending on geographical location and belief. From western, allopathic medicine to Traditional Chinese Medicine and other forms of complementary or alternative medicines, all, to some degree, rely on natural substances, or elements synthesized from the environment. Since time immemorial, people have relied on plants and animals to find cures. Today, the biggest pharmaceutical companies still look to nature to inspire their research, whilst the global annual market for herbal medicines stands at over US\$ 60 billion. Following are some examples of how different types of medicine draw on nature.

Allopathic medicine

Allopathic medicine is the broad category of medical practice, sometimes called Western medicine, conventional, scientific or modern medicine. A cornerstone to its development was the creation of the American Medical Association in 1848. Allopathy's ensuing popularity reflects scientific progress including the production of vaccines and drugs to treat disease. Today, according to WHO, pharmaceuticals account for 15%–30% of health spending in transitional economies and 25%–66% in developing countries, yet 25% of modern medicines are still made from plants first used traditionally.

Traditional Medicine (TM) and Complementary or Alternative Medicine (CAM)

Traditional Medicine (TM) and its adaptations, termed 'Complementary' or 'Alternative' Medicine (CAM) in industrialized countries, have been used for thousands of years. TM/CAM encompass healing practices beyond the realm of conventional medicine and include naturopathy, chiropractic, herbalism, Traditional Chinese Medicine, Ayurveda, meditation, yoga, biofeedback, hypnosis, homeopathy, acupuncture and diet-based therapies. In Europe, North America and other industrialized regions, over 50% of the population have used CAM at least once, and, according to the US Commission for CAM, in 2000, US\$ 17 billion was spent on traditional remedies, whilst in the UK, annual expenditure amounts to US\$ 230 million.

Traditional Chinese Medicine

Considered a CAM in much of the western world, Traditional Chinese Medicine (TCM) remains a primary form of care throughout most of Asia. It comprises herbal medicine, acupuncture, dietary therapy, Tui na and Shiatsu massage, and is based on theories including Yin-Yang, the Five Phases, the human body Channel system, Zang Fu organ theory, six confirmations and four layers. TCM originated thousands of years ago through observations of nature, the cosmos and the human body. Today, in China, traditional herbal preparations account for 30%–50% of the total medicinal consumption. Some of the secrets of TCM are being revealed in modern medicine. The herbal remedy *Artemisia annua* for instance, which has been used in China for almost 2,000 years, is effective against resistant malaria and could help prevent thousands of deaths.

Homeopathy

An alternative medicine, homeopathy dates back to the end of the 18th century and is based on the theory that a sick person can be treated using a substance that can produce, in a healthy person, symptoms similar to those of the illness. According to WHO, in 1999, homeopathy was "one of the most widespread non-conventional approaches to treatment known to the world". However, the lack of convincing scientific evidence supporting its efficacy has caused homeopathy to be regarded as a 'pseudo science'. Nevertheless, current annual use of homeopathy varies from 2% of people in the UK and US to 15% in India, where it is considered part of traditional medicine.

Ayurveda

Thought to have originated in India and considered by some as the oldest healing science, Ayurveda is a holistic approach to health where illness is prevented by maintaining balance in the body, mind and consciousness. This is achieved through a proper diet and lifestyle, complemented by herbal remedies. Ayurveda is very popular in Asia and is becoming widespread elsewhere. In Sri Lanka, there are more Ayurveda practitioners than trained modern medicine professionals, whilst according to WHO, in 2003, 65% of India's rural population used Ayurveda and herbal medicine for their primary health care.

Lessons from big brother

Politicians would do well to embrace the wisdom of ancient civilizations about the connections between a healthy environment and the health of their people, says Juan Mayr Maldonado.



Most will never have heard of the Kogi, one of the few remaining pre-Colombian civilizations, and yet, we have so much to learn from them. Embracing their unique vision of life, we can recognise how mental and physical health is underpinned by a thriving environment. Research has shown that, when asked to conjure up images of peace and wellbeing, 95% of us think of nature, be it a beach, a field or a lake. Like the Kogi, deep down, modern civilizations are wired to nature.

High in Colombia's Sierra Nevada de Santa Marta, the Kogi believe they are the 'Elder Brother' of mankind, responsible for keeping the balance of the universe, for the benefit of everyone, including the 'Younger Brother', perceived as being the rest of mankind who, through ignorance and greed, is killing Mother Earth.

Like the Kogi, deep down, modern civilizations are wired to nature.

How does this relate to politicians and their ability to take decisions in favour of nature? The Kogi understand the links between human health and biodiversity. They know that to be healthy, people need to be happy, living in harmony with their surroundings. Health is connected to peace of mind and spirit. In the words of the 'Mamas'—the spiritual leaders and traditional authorities of the Kogi—the 'Younger Brother' does not look back at the past and learn the elder's knowledge, instead he chooses to press on towards a future that increasingly lacks a spiritual dimension.

In politics, as in all spheres of society, a growing disconnect between people and the environment is straining what should be obvious links between health and biodiversity. Yet environmentalists have been ringing the alarm bell for years, trying to draw attention to the environmental crisis we are living in, appealing to government leaders to see the ties between environmental health and human well-being. It is only by restoring order in the environment that human health, understood as both mental and physical, will be maintained. The teachings of the Kogi illustrate that one cannot go without the other. Disturbed biodiversity will not equate to healthy minds and vigorous bodies.

The Kogi have another important lesson to share. From the top of their mountain ranges, they are showing the rest of the world how to care for an incredible array of ecosystems that house impressive numbers of animals and plants. And they are doing so humbly, without greed, demonstrating a depth of spiritual richness, based on respect for others and respect for the fauna and flora that 'Younger Brother' has long forgotten. As carers of nature, they protect watersheds that

ultimately sustain thousands of people who are oblivious to the fact that, should the Kogi not be there to protect the mountains, they probably would not have clean drinking water or sufficient reserves for their crops.

Decision makers often have to see with their own eyes what others repeat to them constantly.

For the Kogi, the natural cycle is the same for humans as it is for animals and plants, going from birth to death. They have a clear application of sustainability and their cultural diversity is central to safeguarding biodiversity. Government and society at large therefore need to embrace other cultures and visions as new allies, accepting that different livelihood patterns may ultimately hold the key to sustainability. It is also time for a new ethical attitude, respecting other individuals, communities, animals and plants, to emerge. A model based solely on consumerism is doomed to failure.

From a practical point of view, getting such messages across to government is not as straightforward as it may seem. Although much of the reasoning is in place, presidents and decision makers often have to see with their own eyes what others repeat to them constantly. In the case of the Kogi, a face-to-face meeting between decision makers and indigenous elders marked the turning point that ultimately ended a 500-year struggle to return traditional lands to indigenous peoples.

The elders emanate a special kind of energy, commanding respect, and, confronted with nature at its best, even the most resistant decision maker capitulates.

Another path to the hearts of decision makers is through the business sector, again, a potential new ally. Decision makers may be caught off balance when the environmental flame is not carried by the 'usual suspects'. A pro-biodiversity message delivered by the business community appears to resonate louder with decision makers than if it was given by the environment ministry or lobby groups directly. And so, as with people from alternative cultures, those with different backgrounds should also be considered new allies to rely upon in sounding the alarm bell and rallying new stakeholders to hold up the biodiversity pillar to ultimately ensure sound human health. ■

Juan Mayr Maldonado is former Minister of the Environment of Colombia. He has served as Councillor and Vice President of IUCN.



A holistic approach

The health benefits of protected areas extend well beyond the physical, say Ana Persic and Irene J. Klaver.

The World Health Organization defines health as 'a state of complete physical, mental and social well-being.' It recognises that health is influenced by diverse factors—biological, behavioural, social, economic, political, cultural and environmental. In a globalizing, urbanizing and industrializing world, biological and cultural diversity are being changed at an unprecedented rate affecting the integrity of the environment and human well-being. Against these trends, protected areas make an increasingly important contribution not only to conservation but also to human health. Yet the benefits of protected areas for broader human health and well-being are still under-recognised, especially with regard to the more intangible aspects.

Protected areas help safeguard healthy ecosystems which underpin biological and cultural diversity. It is increasingly recognised that they also provide a variety of ecosystem services like the provision of fresh water, food and medicines, as well as regulation of climate and vector-borne diseases, and that these material services have explicit health benefits for human populations. Less recognised are the so-called cultural services protected areas provide for human health and well-being. Reflection, inspiration, recreation, spiritual enrichment, aesthetic experience, intellectual challenge and cognitive development are essential aspects of mental and spiritual health. But these non-material or intangible services are highly under-estimated in most protected area planning, management and evaluation.

The World Network of Biosphere Reserves is an exception. Designated under UNESCO's Man and the Biosphere Programme, the Network sees humanity as an integral part of a biosphere and places human well-being at the heart of ecologically-sound management. The goal is to reconcile conservation and sustainable use of natural resources with economic, social and cultural development based on sound science and community involvement through participatory planning. Using this approach, human well-being does not come at the cost of the environment and ecological health does not impede human development. Biosphere reserves focus on the material and non-material ecosystem services for improving the physical and economic health of local communities, as well as their social, cultural, mental and spiritual well-being.

Experience has shown how non-material services are highly valued by communities that

live in and around and visit biosphere reserves. Recreation—in its broadest sense—is an important element in the biosphere reserves' management plans. The plans emphasise educational and recreational activities, including aesthetic and spiritual experiences arising from human-nature interactions which engender a sense of place and of well-being. This often strengthens the cultural identity and social stability of residential or neighbouring communities while creating rewarding experiences for visitors. Recreation in this sense reflects its true meaning: the Latin *re-* which means 'again' with the verb *creare* meaning 'to create', that is, to 'create oneself again', refresh and restore.

Recreational activities in biosphere reserves range from simple relaxation through hiking, swimming, bird-watching and fishing, to taking part in environmental and cultural study. The combination of casual leisure with serious learning creates a powerful experience. Recreation is also intimately tied to spiritual experiences, particularly in sacred sites. Sacred forests or sacred hills form an integral part of biosphere reserves like Uluru-Kata Tjuta in Australia, Bogd Khan Uul in Mongolia and Xishuangbanna Biosphere Reserve in China. Besides religious importance, sacred natural sites also have symbolic significance; they are places of contemplation of spiritual, social and cultural values, places where memory and spirituality come together. As such, they represent models for nature conservation built on religious and spiritual values, while conserving the tangible services that support local communities.

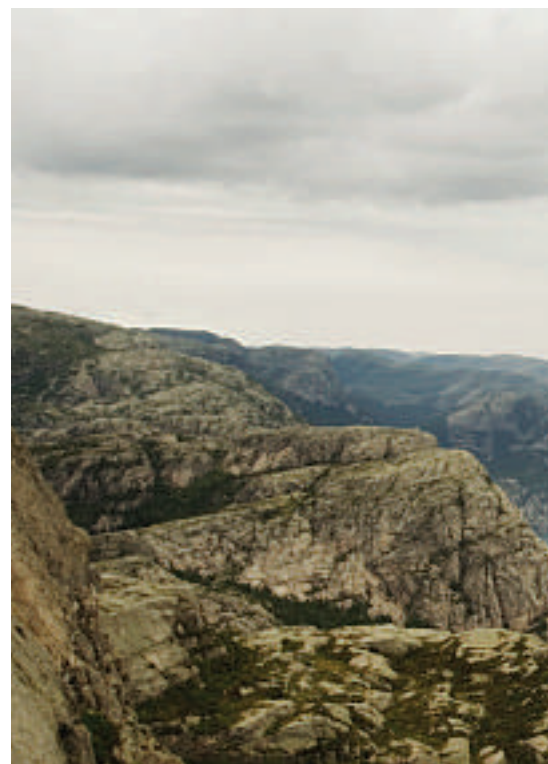
The effects of intangible ecosystem services on well-being are so convincing that one might question their description as 'intangible'. They might be harder to measure than the tangible services but the effects are definitely palpable. The rise of eco-tourism is a clear sign of the growing importance of non-material or intangible ecosystem services.

An eco-tourism-based visit to a biosphere reserve allows people to engage in learning, exploring or even working in the place. The passive tourist gaze is transformed into a participatory 'co-inhabitational' experience. Crucial ingredients of eco-tourism are biological and cultural diversity preservation, local socioeconomic benefits and sustainable, low-impact practices that build environmental and cultural awareness and respect.

The Cape Horn Biosphere Reserve has developed a programme called 'Tourism With a Hand Lens', which fosters appreciation for

nonvascular plants like mosses. Local people and tourists learn about the beauty and ecological value of the 'Miniature Forests of Cape Horn' through guided tours using hand lenses to look at these less charismatic species. Visits such as these invite people to experience the fullness of life in an area thereby shifting tourism and recreation away from a sheer use of a place towards a commitment to conservation.

It will always be difficult to measure the intangible benefits as they are hard to isolate or subject to scientific scrutiny. This makes it difficult to incorporate them into more conventional protected areas management, plan-



ning and valuation. However, if protected areas are to safeguard our heritage for future generations then greater efforts must be made by scientists, managers and politicians to value both the tangible and intangible services they provide for overall human health. ■

Dr Ana Persic is Assistant Programme Specialist with UNESCO's Man and the Biosphere Programme and Dr Irene J. Klaver is Associate Professor of Philosophy at the University of North Texas.

Taking the lead

Australia is at the forefront of a new approach to protected area management, one that promotes the links between human health and nature. John Senior explains.

Parks are loved by just about everybody. Whilst we intuitively recognise our dependence on the natural systems that sustain us, we often overlook the extensive benefits we derive from them. Apart from the obvious benefits of open space for physical activity, parks are sanctuaries from urban pressures, places for people to connect and havens for children to explore the wonders of the natural world. They provide us with a sense of place, cultural identity and spiritual nourishment. We experience a greater sense of health and well-being when surrounded by nature.

which supported the many seemingly obvious presumptions of the early park planners during the 19th century in the US and UK. Continuing research around the world has further reinforced the findings which relate to the value of nature to health and well-being at both individual and community levels, and to its preventative as well as restorative benefits.

On the basis of the research, Parks Victoria has progressively adopted its *Healthy Parks Healthy People* approach to all aspects of its business. This symbiotic philosophy seeks to boost the connections between a healthy environment and a healthy society, particularly

‘inside out’. Following this new approach means the organization can more easily achieve its fundamental conservation mandate by gaining political and community support.

Bridging sectoral boundaries is vital to rethinking the role of parks. New partnerships are required, disciplinary barriers must be overcome and common interests identified between related constituencies such as the health and community sectors. Over the last century the worlds of sustainability and health have developed almost independently of one another, despite the best intentions of each.

However collaboration does not just happen—a shift in deep-seated, fragmented ways of understanding parks is required across a whole range of sectors. Political support, leadership, research and public awareness campaigns are all necessary. From its beginnings as an awareness-raising campaign *Healthy Parks Healthy People* has evolved into a new park management paradigm supported by many of the world’s leading park and health organizations. We are finding that such terms are more accessible to the public and are more likely to win community support than the traditional ‘protected area’ terminology.

In adopting the new philosophy, Parks Victoria has laid out several guiding principles and actions. These include remaining relevant to societal needs and planning for the future; responding to climate change and communicating what it means for parks; better engaging with the community and striving for excellency as park managers—using an evidence-based approach to decision making, making the best use of expertise and data, and evaluating performance. ■

John Senior is Manager, Strategic Partnerships, Parks Victoria.

Parks Victoria will host the inaugural *International Healthy Parks Healthy People Congress* in Melbourne in April 2010.

www.healthyparkshealthypeople-congress.org

The paper on the health benefits of contact with nature by Deakin University is available at:

www.parkweb.vic.gov.au/1process_content.cfm?section=99&page=16

Parks Victoria manages a diverse range of environments throughout the State of Victoria, Australia including national (terrestrial and marine) and state parks, conservation reserves and major metropolitan parks in Melbourne. It is uniquely placed to communicate with its urban constituencies about the value of biodiversity in relation to human well-being, thereby maximising advocacy and visitor impact.

In 2002 an independent review of the health benefits of contact with nature was published by Deakin University and updated in 2008. This revealed a large body of evidence

as more people now live in urban environments and have less contact with nature. Never more so than in the face of growing obesity and mental health concerns has nature had the opportunity to take centre stage.

Parks Victoria recognises that it has a clear role to play in enabling people to experience the health benefits associated with the natural environment and is repositioning itself as a provider of services with deep societal benefits rather than as a custodian of natural values alone. We are now looking at parks management from the ‘outside in’ rather than from the



Saving lives, saving money

We have a once-in-a-lifetime opportunity to align health, environment and economic objectives, say Maria Neira and Diarmid Campbell-Lendrum of the World Health Organization.



While climate change is identified as the defining challenge of this century, ensuring health for all remains the unfinished business of the last century. More than 10 million children die every year—an affront to human dignity. And in recent months, the emergence of the global financial crisis threatens to cut the resources available to spend on tackling either of these problems. This is prompting some to ask, in such hard times, should we invest in saving lives now, on combating climate change, or neither? Which is more important: glaciers, people, or bank balances?

On closer inspection, however, these apparently stark choices start to break down, to be replaced by a more hopeful outlook. Could this be a once-in-a-generation opportunity to bring health, environment and economic objectives into better alignment?

Over the last 20 years, the World Health Organization (WHO) has been sounding the alarm bells with ever greater urgency. Climate change will affect, in profoundly adverse ways, the basic requirements for good health: clean air and water, viable food crops and adequate shelter. Each year, about 60,000 people die in weather-related natural disasters, almost one million from malaria, over two million from diarrhoea and 3.5 million from under-nutrition. With each of these threats being highly sensitive to climate conditions, we can expect increasing temperatures and more extreme weather to make it even more difficult to combat them. The burden of these diseases falls mainly on the poor, on women and particularly on children who have contributed least to global greenhouse gas emissions. They need, and deserve, protection.

Here is the first opportunity for alignment between climate change and health. In the language of the climate change community, there is a need for 'health adaptation', to protect those who are most vulnerable from the risks associated with climate change. Our global machinery and resources such as the Adaptation Fund (for concrete adaptation projects in developing countries that are Parties to the Kyoto Protocol) should therefore be directed to help protect health.

When the health community looks at this situation, they use their own language, of disease prevention, or public health protection. But the objective is the same—safeguarding lives, whatever the weather. Most importantly, the health community has a great capacity to help achieve this goal. Climate change is expected to lead to changes in existing health issues rather than the emergence of new, unfamiliar, diseases. The necessary preventive actions to deal with most climate-sensitive diseases are already well known. Strengthening these actions would help save lives now (the goal of health protection) and reduce vulnerability to climate change in the future (the goal of adaptation).

To take one example, climate change, along with other global trends such as

increasing movement of people, disease vectors and pathogens, threatens to spread infectious disease and exacerbate epidemics. The health sector already has surveillance systems in place, from the local to the international level, but there are weaknesses in coverage and in response capacity that will be increasingly shown up in a changing climate. The best response therefore is to strengthen existing health surveillance systems and integrate them with those that monitor climate and other environmental conditions that favour disease outbreaks, along with disease in wildlife and farmed animals.

As another example, global freshwater resources are declining, mainly due to water extraction and contamination. Climate

Each year, about 60,000 people die in weather-related natural disasters, almost one million from malaria, over two million from diarrhoea and 3.5 million from under-nutrition.

change is expected to add to water stress, particularly in already dry regions such as the Eastern Mediterranean and North Africa. An integrated programme of scaling up of water and sanitation services, provision of point of use disinfection and water conservation, would reduce both the current burden of disease and vulnerability to further water stress.

Of critical importance in the current economic conditions is that these actions are highly cost-effective. Investments in water and sanitation infrastructure have a significantly favourable benefit-cost ratio. New approaches such as warning and alert systems to prevent deaths in heat waves are also showing themselves to be highly cost-effective. Whether these are called climate change adaptations or public health measures, they are good deals.

The second point of alignment relates to the long term goal of climate stabilization. Many of the measures that could reduce greenhouse gas emissions such as the use of cleaner energy sources for power generation, transport and in the home, and urban planning that enables safe and efficient use of public transport, carry important health 'co-benefits'. These include potential reductions in some of our largest disease burdens—the 800,000 deaths per year from outdoor air pollution, the 1.5 million from indoor air pollution, the 1.9 million from physical inactivity and the 2.6 million from obesity.

Health arguments present a huge and neglected opportunity for those pushing for climate change mitigation. Experience has shown that quantifying the benefits to health and well-being can often tip the balance in

favour of more environmentally-friendly choices. For example, a cost-benefit analysis of the US Clean Air Act showed that each dollar invested in implementing the Act generated 42 dollars in societal benefits—almost entirely through health improvements. The 2007 Intergovernmental Panel on Climate Change report showed that the costs of many mitigation interventions would be partly or wholly compensated by health benefits. These are often valued close to or higher than the 'social cost' of carbon dioxide or the 'market cost' in carbon trading schemes. In other words, these interventions should be valued and provided with incentives as much for protecting health as they are for protecting the climate.

These health benefits are also immediate and local—often making them particularly attractive to politicians and the general public. Some people are arguing, correctly, that if richer populations moderated their consumption of red meat, this would help reduce greenhouse gas emissions. They should argue just as forcefully that this would also help reduce their risk of obesity, heart disease and colon cancer.

In order to achieve mutual benefits for health and the environment, we are going to have to start working closer together. We already have the mandates to do so. The UN Secretary General has identified climate change and health as priorities for his term in office. The Millennium Development Goals bring together health, environment and development objectives. The stated aim of the UN Framework Convention on Climate Change (UNFCCC) is as much to avoid damage to health and wellbeing, as to the environment and economic development. And last year, the 193 countries represented at the World Health Assembly passed a resolution calling for

Climate change will affect, in profoundly adverse ways, the basic requirements for good health: clean air and water, viable food crops and adequate shelter.

stronger action to protect health from climate change—bringing the health community fully on board in confronting this global challenge.

But these efforts are still too isolated from one another. Although health is supposedly central to the UNFCCC and is frequently identified as a priority in national adaptation plans, there is close to zero health representation at the UNFCCC Conference of the Parties. It is therefore no surprise that very few health adaptation projects are submitted, and that even fewer are funded. Perhaps more importantly, we may miss the chance to ensure that a new, low-carbon future also promotes health, which would be everybody's loss.

We can do much better than this. The health and the environment sectors have huge strengths, in public support, the skills and motivation of millions of professionals and volunteers, and significant (although still inadequate) financial resources. There will be some situations when there are real conflicts between environmental and health objectives. In these cases, you can expect WHO to argue strongly for those actions which will save or improve the most lives in the shortest time. But we will be on the same side much more

often than we oppose each other. Combating climate change and improving health should be the same battle. ■

Dr Maria Neira is Director of Public Health and Environment and Dr Diarmid Campbell-Lendrum is a specialist on climate change and health at WHO.



Resorting to nature

Eco-friendly health resorts and spas are springing up around the world. Arnfinn Oines of Six Senses explains how resort managers are under increasing pressure to operate sustainably.

The spa industry is booming. With our frenzied lifestyles, increasing stress levels and modern illnesses, more and more people are looking to the health benefits of alternative treatments, many of them based on natural products. While treatments such as aromatherapy are becoming widely accessible to the general public, there is also a growing demand from affluent consumers for luxury spa holidays. Many resorts are located in sensitive areas and this environmentally-conscious clientele is demanding responsible practices from the people who own and manage them.

More and more people are looking to the health benefits of alternative treatments, many of them based on natural products.

A new concept called One Planet Living has emerged from WWF which focuses on how we can restore the planet instead of just protect it. People are starting to recognise that they have a physical impact—an ecological footprint—on the world and are willing to account for it. This doesn't just apply to minimalist 'tree-huggers', but to an increasing number of affluent consumers. And resorts are finding that operating responsibly not only reduces their physical impact but also makes financial sense.

With resorts in several ecologically-sensitive areas in Asia, the Pacific and Indian Ocean islands, Six Senses has a particular duty to prove environmental stewardship. It has developed a Social and Environmental Programme in line with the company's core purpose: To create innovative and enlightening experiences that rejuvenate its guests' love of 'SLOW LIFE'—sustainable, local, organic, wholesome, learning, inspiring, fun, experiences.

How does this core purpose relate to the concept of One Planet Living and ecological footprint? The key lies in developing and operating the company's properties with a focus on areas such as responsible design, energy efficiency, water and waste management and responsible purchasing. Responsible design, or eco-architecture, is critical to improving a resort's immediate

ecological footprint. Biomimicry imitates nature's ability to take care of itself. The Six Senses Earth Spa at Six Senses Hideaway Hua Hin in Thailand imitates the traditional techniques used in rural villages in northern Thailand, built entirely from a mixture of clay-like mud mixed with rice husks and straw, forming circular, domed buildings. The interiors remain at a comfortable temperature, even in summer without the use of air-conditioning.

Another key area is improving the ecological and carbon footprint of resorts through improved energy efficiency and making use of clean technology. Improving energy efficiency also means significant cost reductions. At one resort, a US\$ 130,000 investment for a mini chiller system saves US\$ 45,000 annually and reduces carbon emissions by 300 tons. Another invests in solar cogeneration clean technology, which will enable the resort to turn off generators, saving annual diesel bills of US\$ 1 million and reducing carbon emissions by 4,000 tons.

Water use will be an increasingly pressing issue for the spa industry particularly as many resorts are built in water-scarce areas. Several measures can be taken to improve a resort's water footprint. Installing rainwater collecting systems in two resorts means they are now self sufficient in water supply, leading to an annual saving of US\$ 350,000. Water is further treated by reverse osmosis and minerals are added to provide drinking water for guests. This also eliminates the pollution generated by importing water and plastic as reusable glass bottles are used. Waste water treatment should be a standard for all resorts—reed beds prove an efficient, natural method.

By focussing on the three Rs: *Reduce, Reuse, Recycle*, waste does not need to be a problem. Suppliers should be asked to reduce packaging and use natural products. Simple measures such as using the reverse side of printed paper reduces the volume of paper needed and saves money. At one resort a 'waste to wealth' concept has been introduced, turning waste into useable products such as bio-char, and bio-gas. This reduces imports of soil and fertilizers used for the resort's herb and vegetable gardens.

Responsible purchasing has a tremendous impact both on the well-being of the planet and the local community. Choosing local, fair trade and organic products ensures that money stays with the local people and reduces the carbon footprint of food and

product miles. Six Senses places a strong emphasis on buying local products, such as fixtures and fittings, room amenities and food.

As with all parts of the tourism sector, responsible resort operation is no longer an option, it's an obligation. ■

Arnfinn Oines is responsible for the Six Senses Resort and Spa's Area Environment Conscience for Thailand & Vietnam.

Six Senses was a contributor to *Biodiversity: My hotel in action* produced by IUCN and Accor.





Talking Heads

World Conservation asked members of the International Society of Doctors for the Environment what they see as the most significant environment-related health impacts and the greatest policy priorities.



Dr Lilian Corra
Argentina

Environmental changes are proving to be a very significant cause of disease, and especially contribute to the burden of disease in developing and transitional countries. With chronic diseases and the long-term effects from early exposure of embryos, fetuses and young children to toxins being reflected in recent medical studies, we are starting to gain a better understanding of the links between health effects and environmental factors.

Environmental health has to be analysed in terms of both short and long term effects. Children's health and well-being is at the heart of the drive towards sustainable development. Chronic diseases have a high cost, affect production and the important human resources of developing countries. Environmental factors that damage children's health and have effects later in their adult life therefore deserve special attention.

Our organization, the Argentinean Association of Doctors for the Environment (AAMMA), developed and published indicators on children and environmental health in Argentina. Developing this kind of tool helps to show that it is important to take into account new and emerging health indicators in public health such as asthma, diabetes type 2, neurodevelopment diseases and childhood cancer that allow us to define environmental changes and measure their impacts on human mobility and mortality rates. This kind of information allows us to establish a baseline and monitor the situation to better drive environmental policies.

As an example, chemical safety should be paramount for human health. Chemicals in the environment that act as hormone (endocrine) disruptors affect brain development and have a considerable impact on intelligence, learning and behaviour. They also affect fertility and reproduction including by reducing the quantity and quality of sperm. These are just two examples of impacts that should be addressed in public health policy. We also have to bear in mind that environmental factors interact with each other bringing unpredictable consequences. Climate change affects the behaviour of chemicals in the environment and human induced changes alter the incidence and patterns of disease.

There is a strong need for collaboration and joint planning between the different sectors involved in environmental management and health policy including industry, the private sector and academia. Everything must be done to increase the knowledge and understanding among the different actors of how to generate safe and effective environmental management. New strategies are needed to respond to new and emerging problems.

Dr Lilian Corra is a paediatrician with extensive experience of the impact of environmental factors on health. Dr Corra founded the Asociación Argentina de Médicos por el Medio Ambiente (AAMMA), in 1992 and is currently responsible for the International Secretariat of the International Society of Doctors for the Environment (ISDE).



Dr Hanns Moshhammer
Austria

Air pollution is a significant health issue. But it is perhaps more meaningful to classify environmental factors by pollution source rather than media such as air or water. For example, road transport is an important contributor to urban outdoor air pollution, noise and accidents. All this considered together, road transport could be seen as one of the most pressing environmental health problems in my country.

I see that policy makers in the public health field often neglect environmental causes of disease. Their concept of prevention is restricted to campaigns focused at behavioural changes. History has proven this approach to be unsuccessful. Health policy should be formed in cooperation with other policy fields not restricted to the environment but also extending to transport, trade, housing and social affairs. The health sector should contribute to decisions in all policy fields. This would mean significant changes in the training of health professionals. Until now, medical training only focuses on individual treatment of disease.

Much has been done and many indicators of environmental quality such as urban air quality have improved. Cleaner technologies and stricter laws have contributed. Until now, these improvements mostly happened without the involvement of the health sector. The environmental movement has been successful in generating several improvements, but it has only recently recognised the persuasive argument of human health concerns in pressing for change.

Austria is active in the European Environment and Health process led by the World Health Organization. At their last ministerial meeting in 2004, the European Health and Environment Ministers signed the Children's Health and Environment Action Plan for Europe. As part of this plan, the Austrian Ministry of Environment is implementing activities and pilot projects to improve the environment for our children. But because of competing interests it is a constant struggle to sustain any improvements.

From my viewpoint as a university researcher, some research is directly commissioned by policy makers but it is important that other important scientific findings are made accessible to them and to environmental NGOs. Informing the media and the public about the links between environment and health is necessary to raise awareness and promote the necessary changes.

Dr Moshhammer studied medicine at the University of Graz, Austria and worked for 10 years at Vienna's public health service. Since 2000 he has worked at the Institute for Environmental Health, Medical University of Vienna where his research focuses on the health effects of air pollution. Dr Moshhammer is also President Elect of the International Society of Doctors for the Environment.

www.aamma.org



Dr Robert Gould
United States

A great deal of evidence shows that a number of illnesses including reproductive and developmental disorders are related to exposure to pesticides and a variety of other toxins. Heavy metals and solvents, and contaminants from air pollution can cause tumours and chronic respiratory diseases including asthma, while exposure to radioactive materials can lead to genetic and developmental problems.

However, at this point, I consider climate change to be the greatest environmental threat to human health because of the projected effects on a wide variety of diseases. These include nutritional, vector-borne and water-borne infectious diseases and acute respiratory diseases.

There needs to be a vast, globally-coordinated response to climate change that includes prevention, mitigation and adaptation strategies. New technologies should be shared freely, without proprietary limitations. A concerted effort is required to demilitarise the world—across-the board-disarmament, including nuclear weapons, to avoid further environmental and social stress and to free-up the resources needed to divert the world away from environmental disaster.

In my specific area of work as a physician/pathologist, there are opportunities to directly improve the environmental footprint of my department for example, through better handling of solvents and waste, participation in the hospital's 'Green Team', and providing educational outreach to colleagues on various environmental health issues. From the standpoint of the Kaiser system in which I work, there is a great deal of innovation taking place on the hospital system side of things—green buildings, alternative energy and so on, but more needs to be done to educate fellow physicians on the importance of these changes to their particular practices, and the direct positive impact they can have on their patients' health.

Much of my work with Physicians for Social Responsibility has been at the educational level, informing fellow physicians and other professionals about various public and environmental health issues from nuclear-related health threats to climate change. Our efforts aim to leverage the voice of physicians to support the policies needed. Far more effort is needed at a societal level, but it is important for us in the health community to capture the credibility and influence of our peers in bringing about the necessary changes.

Dr Robert Gould is a pathologist and President of the San Francisco Bay Area Chapter of Physicians for Social Responsibility (PSR), a key member of ISDE in the US. PSR provides the medical and public health voice for policies to stop nuclear war and proliferation and to reverse global warming and toxic degradation of the environment.

www.psr.org

Doctors for the environment

International Society of Doctors for the Environment is an independent, non-governmental organization with national and regional member organizations in over 35 countries and Consultative Status with the World Health Organization. Members are family doctors, researchers and clinicians who are aware of the ecological problems affecting human

health and safety and who strive to promote healthier lifestyles. Concerned about growing pollution and environmental decay, and the rise in incidence of diseases related to environmental degradation, they initiate and promote effective preventative action.

www.isde.org

Bridging the divide

Conserving biodiversity is critical to achieving international targets on human health and well-being. Kalemani Jo Mulongoy explains how the Convention on Biological Diversity offers a useful framework for integrating global biodiversity and health policy.

When governments adopted the Convention on Biological Diversity (CBD) in 1992 and its Cartagena Protocol on Biosafety in 2000, they acknowledged the critical importance of conserving biodiversity and sustainably using its components for meeting the food, health and other needs of a growing world population. Specific reference to human health in the texts of the CBD and the Cartagena Protocol is made in relation to the risks associated with the use and release of living modified organisms resulting from modern biotechnology.

international priority. These goods and services underpin sustainable development and therefore, achievement of the Millennium Development Goals (MDGs), in particular Goal 1—eradicating extreme poverty and hunger and Goal 6—combating HIV/AIDS, malaria and other diseases. The Millennium Ecosystem Assessment, endorsed by the CBD Parties, emphasised how healthy ecosystems are vital to sustain good health and prevent disease. Pollution of freshwater that leads to illness or slash and burn practices that lead to respiratory diseases are just two examples

care.” For assessing progress towards the biodiversity target, the Parties agreed to develop the “health and well-being of communities who depend directly on local ecosystem goods and services” as one of the key indicators of the status of biodiversity.

The CBD’s work programmes recognise that the conservation and sustainable use of biodiversity will make a significant contribution to health improvements and human well-being, food security and sustainable livelihoods. For example, the programme of work on agricultural biodiversity and its



In addition, the Convention calls on Parties to identify and monitor species which are of medicinal, agricultural or other economic value as well those used in medical research. As such it offers a useful framework for integrating human health and biodiversity policy and increasing awareness of the critical links between the two.

Adoption of the ecosystem approach in 2000 as the primary framework for action under the Convention recognised that humans are an integral part of ecosystems and that maintaining the capacity of ecosystems to provide goods and services is an

of ecosystem disturbances that adversely affect human health. We know that the harmful effects of ecosystem service disruption are felt everywhere but they are being borne disproportionately by the poor.

Health issues are taken into account in the target set by CBD Parties to significantly reduce the rate of biodiversity loss by 2010 as a contribution to poverty alleviation and to the benefit of all life on earth. One of the goals is to “maintain the capacity of ecosystems to deliver goods and services, including food and medicine, and support sustainable livelihoods, local food security and health

cross-cutting initiative on biodiversity for food and nutrition are fundamental to achieving MDG 1 on poverty and hunger and Goal 7 on environmental sustainability. Other actions called for to meet the objectives of the CBD include among others, the development of gene banks for genetic materials important for food or health care; the prevention of ecosystem degradation and disturbances that can lead to the outbreak and spread of diseases; the establishment of protected areas, particularly in marine areas; the restoration of degraded ecosystems; and recovery of species and genetic resources.

Addressing the impacts of invasive alien species including those used in the live food trade is being encouraged as part of this year's International Day for Biological Diversity.

The CBD voluntary guidelines on environmental impact assessments take into account both beneficial and adverse human health impacts. They urge policy makers to address the risks posed by disease vectors, particularly mosquitoes and snails (in inland waters), over-use of antibiotics in livestock and poultry, over-consumption of non-timber forest products, and the impacts of

biodiversity that are of medicinal value or important for food and agriculture.

A range of strategies and reforms are necessary to safeguard human health while conserving biodiversity and ecosystem function for which the CBD can be a catalyst. There is an urgent need to adopt a multi-sectoral approach that integrates research and policy on biodiversity, food and nutrition, health, agriculture, hunger and poverty reduction; and raises awareness of the importance of biodiversity conservation to meeting health and development objectives.

CBD Parties want to see greater cooperation among UN organizations to increase their effectiveness in addressing all areas relevant to human health such as biosafety, invasive alien species, climate change and agricultural biodiversity. They are requesting strengthened collaboration with the World Health Organization and the Cooperation on Health and Biodiversity (COHAB) Initiative as well as other relevant organizations to support the work on biodiversity and health related issues, including by developing compendiums of tools for capacity-building and awareness-raising in



tourism on indigenous and local communities, particularly their food and health security.

Parties to the CBD recognise that more work is needed to fully understand the links between human health and ecosystem health in different biomes, including in marine areas beyond national jurisdiction, and under different pressures, particularly climate change and invasive alien species. National or regional level databases are needed to bring together information, including traditional knowledge, on the identity and conservation status of components of

This requires improved cooperation between different departments at the national level.

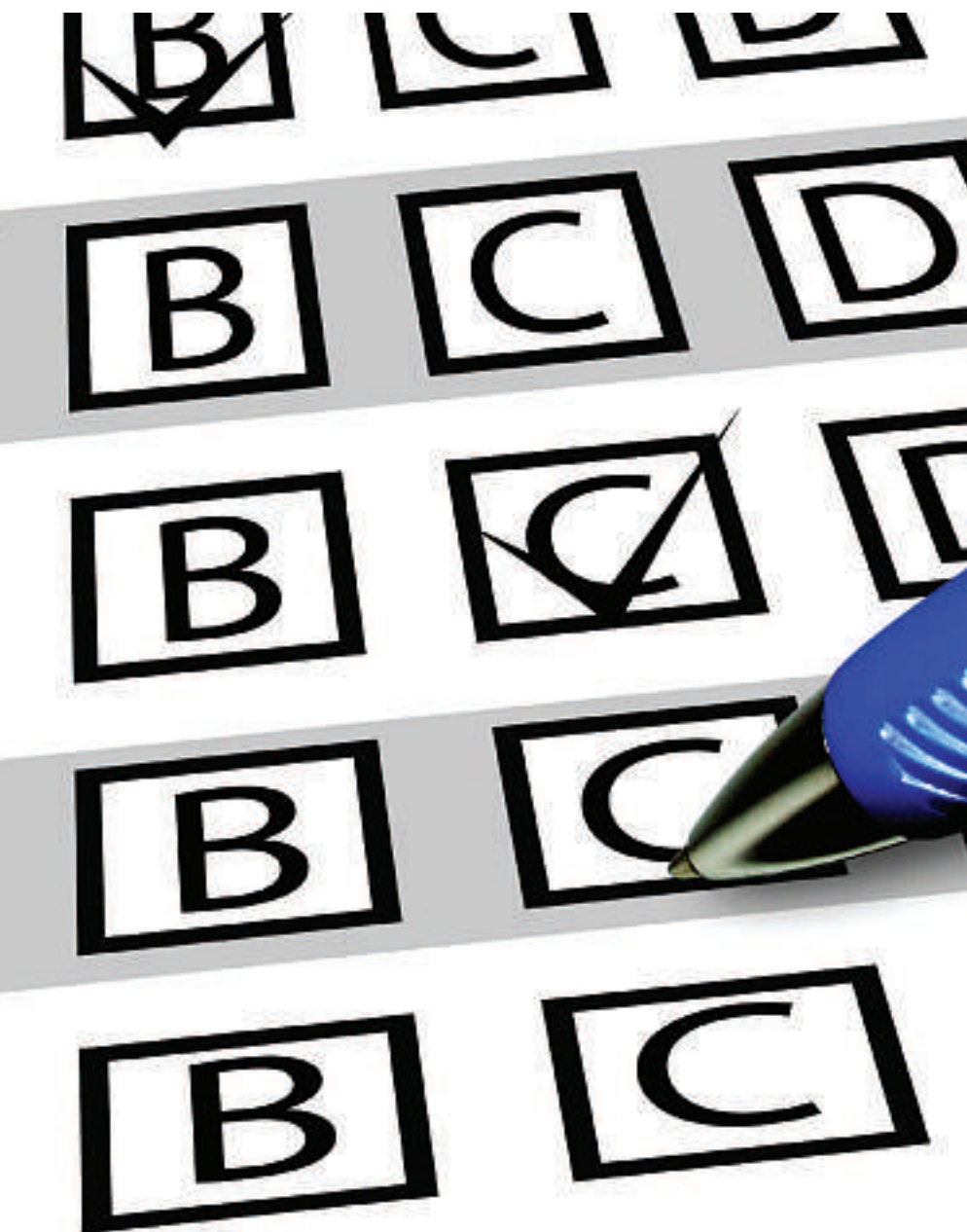
The Cartagena Protocol encourages the international community to implement capacity-building initiatives including in the food security and public health arenas, and to provide greater support for border control and quarantine measures. It also calls for improved coordination of policies relating to trade, food security, human health and environmental protection, and a boost in scientific research and information exchange.

the health sector. Tools to address disaster risks, disease emergence, nutrition security and climate change adaptation through biodiversity conservation are already under development. ■

Kalemani Jo Mulongoy is Principal Officer, Head of the Scientific, Technical and Technological Matters Division, Secretariat of the Convention on Biological Diversity.

A healthy choice

Ethical and sustainable trade in biodiversity products can bring some indirect health benefits to poor rural communities. Rik Kutsch Lojenga and Pierre Hauselmann explain.



Consumers today are voting with their wallets. They want to know that the products they buy are made from ingredients obtained ethically and sustainably. And a growing number of businesses, including those in the cosmetics, pharmaceutical and complementary medicine sectors want guidance on how to source their materials in biodiversity-friendly ways.

Adhering to the concept of Ethical BioTrade on the supply and demand sides can bring health benefits, both direct and indirect, to thousands of the rural poor.

Ethical BioTrade is a set of trading and management practices related to products derived from biodiversity that contribute to its conservation and sustainable use. It respects traditional knowledge and ensures

the equitable sharing of benefits along supply chains. Although human well-being and the improvement of livelihoods are an integral part of sustainable development, the objectives of Ethical BioTrade are not directly health related. Yet our experience shows that there are several ways in which it can have a positive impact on people's health. It can lead to an increase in living standards from trade of biodiversity products; provide access to medicines, health services and medical assistance to remote populations through the transport of these products; and offer direct health benefits through the use of ingredients derived from biodiversity.

In Peru, a mega-biodiverse country, 30% of the population is still not connected to the national health system and finds cures in natural remedies administered

In Peru, a mega-biodiverse country, 30% of the population is still not connected to the national health system and finds cures in natural remedies administered traditionally.

traditionally. Only a few years ago, Bombon, a remote region in the high Andes, was plagued by high infancy and maternity mortality rates. Then the therapeutic applications of Maca, a root from the high Andes became known and the product began to be traded, providing a source of income for the region. Since then, the farmers have witnessed a significant increase in their income, and mortality rates have fallen significantly.

Once a month a boat arrives at an Afro-colombian community in the Choco area on the Pacific coast of Colombia to pick up fruits of the small tree *Genipa americana* collected by villagers. Ecoflora, a small Colombian BioTrade company, transforms the fruits into a colouring extract used, among other things as a paint for tattoos. The boat has started to come regularly since Ecoflora began buying the fruit to supply

its clients in Europe. Every time the boat travels to the community, the villagers take advantage of it by having all kinds of basic supplies brought in. Basic medicines are always on the cargo list and sometimes the boat carries a doctor or a nurse.

There are many similar examples. Baobab fruits are collected in remote areas of Malawi, and the truck that picks up and transports the fruit carries all types of useful items, including medicines. This happens also in the remote Amazon villages of Ecuador, and probably anywhere such trade is established with remote communities. However modestly, this trade creates a life line for people that depend on, and are guardians of, their natural resources.

The plant *Centella asiatica* is used in the cosmetics and pharmaceutical industries

In Colombia, Labfarve, a laboratory that researches medicinal plants, provides affordable medicines to the poorer segments of society.

for its wound-healing and anti-inflammatory properties. Serdex, a division of Bayer HealthCare and a member of the Union for Ethical BioTrade, uses *Centella asiatica* from Madagascar as an ingredient for its products. It sources from about 1,500 peasant families in an area of over 9,000 km² and the collectors receive a 30–50% premium for the species. Serdex also contributes to community projects including supplying electricity to a local hospital.

In Colombia, Labfarve, a laboratory that researches medicinal plants, provides

affordable medicines to the poorer segments of society. It is part of the Corpas Group, which includes a medical school and a hospital, all of which share a strong social commitment. Labfarve uses a wide range of species derived from Colombia's rich biodiversity, from the high Andes to the Amazon region. By implementing the principles of Ethical BioTrade throughout its supply chains, the laboratory links the benefits of affordable and efficient remedies for patients to providing better living conditions for the different actors in the supply chains, up to the producers. Labfarve, a founding member of the Union for Ethical BioTrade, has long-term contracts with its suppliers, provides continuous training and shares 10% of its profits with local communities.

While there are numerous positive impacts of Ethical BioTrade on health and its principles and criteria include safeguards to avoid harmful effects such as threatening the food security of local populations, unintended negative impacts may still occur. That's why the organizations involved in BioTrade are developing an impact assessment system to monitor the changes in areas in which BioTrade activities take place, including in health-related issues. ■

Rik Kutsch Lojenga is Executive Director of the Union for Ethical BioTrade, Pierre Hauselmann is the Union's Technical Director.

The Union for Ethical BioTrade promotes the 'sourcing with respect' of ingredients derived from native biodiversity. Members join on the condition that they make a strong commitment to implement the principles of BioTrade developed by the United Nations Conference on Trade and Development and inspired by the Convention on Biological Diversity (CBD). As this implementation is independently verified, it offers enterprises a way to demonstrate their positive contribution to the objectives of the CBD whilst creating tangible business benefits. IUCN and the International Finance Corporation are among the Union's founding members.

www.ethicalbiotrade.org

The road to recovery

Jeffrey A. McNeely and Sue Mainka outline some of the measures that are needed to secure a future for medicinal biodiversity.

The actions that we take today will affect our health tomorrow and in the future. Environmental degradation from habitat loss, over-exploitation and climate change all have implications for human health, particularly through the loss of medicinal biodiversity—the subset of biodiversity that supports human health and well-being. This loss will affect us all—rich and poor, young and old and everyone in between.

Looking at biodiversity through a human health lens can provide new perspectives on conservation. It can take biodiversity out of the unique realm of ministries of environment and put its conservation at the heart of efforts to tackle poverty, food security, climate change and many other global challenges.

A broad suite of measures are needed to safeguard medicinal biodiversity at all levels (local to global) and by all stakeholders. Support is needed for the Convention on Biological Diversity (CBD) provisions on sustainable use of medicinal biodiversity and for the other international conventions that deal with biodiversity conservation, notably the Convention on International Trade in Endangered Species (CITES) which addresses medicinal species of animals (such as rhinos and tigers) and plants (such as Hoodia or devil's claw). Climate change has far-reaching implications for both human health and biodiversity and these must be addressed together under the United Nations Framework Convention on Climate Change. To date, health issues have received inadequate attention by the Parties to the climate convention. And actions taken in one Convention should complement and build on those taken in others.

But beyond the domain of environmental governance, health and biodiversity need to be mainstreamed into development cooperation at both the international and national level. All development actions should understand and support the role of ecosystem services in delivering successful sustainable development.

Ecosystems must be protected from human activity such as infrastructure development until the potential impacts are fully understood. At the ground level, habitat destruction and fragmentation can increase the spread of disease and must be avoided. Proposed resource extraction projects such as forestry and mining and the development of human settlements in previously undisturbed habitats should also consider the increased risk of disease.

Experience has shown that preventing invasions of potentially harmful species is



more cost-effective than trying to tackle them once they have become established and threaten biodiversity and human health. Human, animal and plant health controls have been established but need to be implemented more effectively. The World Trade Organization should be working with the CBD and the World Health Organization to address issues of invasive alien species that may be harmful to human health and biodiversity. At the national level, governments need to coordinate the activities of their agencies responsible for human health, animal health, plant health, transport, tourism, trade, protected areas, wildlife management, water supply and other relevant fields.

We already have several tools available to use in our campaign to conserve medicinal biodiversity. Protected areas are important for conserving medicinal species and should explicitly recognise those species found within them, identify their range and populations, and educate the public about their importance. A national system of protected areas can serve as an antidote to habitat destruction and a means of adapting to climate change as well as maintain ecosystem functions. Nearly all countries have protected area systems but these need to be expanded and managed more effectively if they are to make the maximum contribution to biodiversity conservation and human health.

Indigenous peoples have identified almost all of the medicinal species that exist within their territories and many still depend on them for their healthcare, yet the traditional knowledge which is passed on from generation to generation may be even more seriously threatened than biodiversity. We therefore need stronger efforts to conserve the

entire package of both medicinal biodiversity and cultural knowledge. Central to this is implementation of CBD provisions on access to genetic resources and benefit sharing.

Different stakeholder groups naturally have different interests in medicinal species. Those concerned with nature conservation focus on habitat protection, sustainable collection from the wild, appropriate controls on trade and so forth. Those with social interests seek acknowledgement of traditional knowledge and a secure income for harvesters and farmers. Those with economic interests are concerned with quality standards and a profitable trade. Managing these sometimes competing interests is a significant challenge for the future but it is in everyone's interests to conserve medicinal biodiversity. We are seeing the emergence of increasing numbers of new infectious diseases. Potential treatments to these diseases are likely to come from nature, if only we have the wisdom to conserve the full diversity of genetic resources so that these treatments are available when we need them. ■

Jeffrey A. McNeely is IUCN's Chief Scientist and Dr Sue Mainka is Senior Coordinator of IUCN's Global Programme.

We're in this together

In August 2005, 150 people from over 60 countries met in Galway City, Ireland for the First International Conference on Health and Biodiversity (COHAB 2005). Participants included people from every sector: environment, health, food production, development, economics and education, representing Intergovernmental Organizations, Non Government Organizations, governments, academia, practitioners, indigenous and local community leaders, and business interests. This was the first time that such a diverse group had come together to address the links between human health and the status of global biological diversity.

The conference proceedings clearly showed that biodiversity provides society with essential life-supporting goods and services, and the critical infrastructure required to sustain healthy populations. The event also recognised that, while issues such as climate change have captured the public imagination and motivated significant policy responses, the urgency of the biodiversity crisis and its implications for our health is not well recognised. As Eric Chivian and Aaron Bernstein state in their book *Sustaining Life*, "not only are the full dimensions of biodiversity loss failing to inform policy decisions, but the general public, lacking an understanding of the health risks involved, is not grasping the magnitude of the biodiversity crisis.... Tragically, aesthetic, ethical, religious, even economic arguments have not been enough."

Delegates highlighted the need to foster further cross-sector dialogue and collaboration on biodiversity conservation for human well-being, and called for greater efforts to overcome the barriers to communication between disciplines. In response, in 2006 the COHAB Initiative (Co-operation on Health and Biodiversity) was established as a forum for experience sharing, information exchange and capacity building on issues linking biodiversity to human health. Through various activities including the Second International Conference on Health and Biodiversity in 2008, the Initiative has become a major international project involving partners on every continent. COHAB works to increase co-operation between sectors to address the gaps in awareness, policy and action on the importance of biodiversity to every aspect of our lives and livelihoods. By highlighting the link between biodiversity and health, the Initiative works to motivate the health sector and the public to become more active in policy discussions and planning for conservation, and helps to inform policy makers about the health implications of biodiversity loss.

Issues addressed by COHAB include nutrition and dietary health; emerging infectious diseases; medicinal resources; disaster prevention, relief and recovery; indigenous community health; and social, spiritual and psychological well-being.

www.cohabnet.org

Toxic trouble

Persistent Organic Pollutants (POPs) are chemicals that remain intact in the environment for long periods of time, accumulate in fatty tissues and increase in concentration as they move up the food chain. POPs are a significant risk to human health, ecosystems and wildlife. With the potential to be transported by air and water currents far from their point of release, POPs are widely distributed in the environment. Health effects can include cancer, allergies and hypersensitivity, damage to the nervous system, reproductive disorders and disruption of the immune system. The Stockholm Convention on Persistent Organic Pollutants works to eliminate or reduce emissions of POPs into the environment. It is an example of how a cross-sectoral and international response can tackle health issues. Under the convention, 12 POPs are identified for priority action including DDT, PCBs, dioxins and furans. Other chemicals may be added later.

There is growing concern about the potential effects of a number of environmental chemicals that, when absorbed into the body, have the potential to change the normal functioning of the endocrine system—the complex network of glands and hormones that regulates many of the body's functions, including growth and development and the way our organs operate. These chemicals, often called **endocrine disruptors (EDCs)** which include some pesticides and plasticizers are suspected to alter reproductive function in men and women, increase the incidence of breast cancer, cause abnormal growth patterns and neurodevelopmental delays in children and change immune function. Effects of exposure to EDCs in a variety of wildlife species have also been reported. The World Health Organization says that studies on the effects of these chemicals should remain a high global priority, particularly studies on children as exposure during early development may have irreversible effects.

CAN WE STOP THE EXTINCTION CRISIS?



© Joe Zammit-Lucia



THE IUCN RED LIST
OF THREATENED SPECIES™

The world's most comprehensive information source
on the global conservation status of plant and animal species.

www.iucnredlist.org