



Frequently Asked Questions Regarding COP 9

2010 TARGETS

Are we on track to hit the target or miss it, and if we miss it, by how much?

While there are numerous examples of actions which have been taken to reduce the rate of biodiversity loss, the available evidence suggests that the 2010 Biodiversity Target will not be met. At a global level biodiversity, and the ecosystem services which it underpins, continues to be lost. With the exception of the large increase in the size of terrestrial protected areas, it is unlikely that the 2010 target will be reached. More information on the 2010 Biodiversity Target and on the progress which has been made in meeting it can be found in the second edition of Global Biodiversity Outlook and the Millennium Ecosystem Assessment.

If biodiversity is so hard to measure, how can progress towards the 2010 target be measured in a meaningful way?

Biodiversity, given its complexity is hard to measure, however it is not impossible. In order to measure the progress which has been made in meeting the 2010 target the Conference of the Parties to the Convention on Biological Diversity agreed to a series of indicators which can be used to determine the general status and trends of biodiversity. These indicators measure different aspects or elements of biodiversity. When these indicators are considered as a whole they provide an illustration of the global biodiversity status. In addition there are an increasing number of national and regional studies which are being conducted as part of monitoring activities. The information from these studies and assessments further informs discussions surrounding the condition of biological diversity. More information on the indicators adopted by the Conference of the Parties can be found on the Convention's Webpage or in the second edition on Global Biodiversity Outlook.

With just two years to go, how realistic is achieving this goal?

Though great progress has been made in conserving biodiversity and in using it more sustainably, on the whole it does not appear that the 2010 Biodiversity Target will be met. However with about two years left before 2010 there is still time for additional initiatives to be taken. At the same time, it is important to look beyond 2010. Many of the actions taken now will only bear fruit in 20 or 50 years because both natural systems and societies have a certain degree of inertia. But even if we don't see the consequences of our actions and policies by 2010 we have to initiate a move towards a biodiversity-conscious society now. The year 2010, declared as the International Year of Biodiversity by the United Nations, thereby helps to mobilize the necessary actions and partnerships.



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Hopelessly over-optimistic and meaningless aren't they? For e.g. the world's population increases by 200,000 a day, with entire regions where women are denied their rights to control family size so what hope for our fellow species when one is filling every nook and cranny is filling out every sq. metre?

The 2010 Biodiversity Target is a laudable target and represents a commitment on behalf of the world community to work towards a common goal. Though reaching the 2010 Target will be a monumental task it is not meaningless as it represents one of our best opportunities for ensuring our future wellbeing. While population growth is regarded as an important indirect driver of biodiversity loss, if policies to promote sustainable development and the appropriate use of biodiversity are in place, it can be mitigated. The same is true for the other major causes of biodiversity loss. Further there is a general recognition of the need to address the underlying causes of biodiversity loss, the so-called indirect drivers of change. There is just no consensus of how to go about doing this.

Will the world reach the targets of slowing the rate of biodiversity loss?

While it does not appear that the global rate of biodiversity loss will be slowed by 2010, this does not mean that the rate of biodiversity will not be slowed in the future. Many governments and organizations, at various levels, are taking concerted actions to conserve and sustainably use biodiversity.

Will the European Union reach its tougher goal of halting the rate of biodiversity loss?

Analyses by the European Environment Agency show that the European Union will not achieve its target of halting biodiversity loss. Moreover, it is difficult to include the effects of the EU on biodiversity outside the EU.

What needs to be done to reach these targets?

The programmes of work, tools and policies developed under the Convention on Biological diversity are largely sufficient to meet the 2010 Biodiversity Target. What has been lacking is their implementation. The most realistic way of slowing the rate of biodiversity loss is for the guidance provided by the Convention on Biological Diversity to be more fully implemented and mainstreamed. Biodiversity must be considered in all sectors not merely in those related to the environment. It must be a consideration in all planning processes and the cost of biodiversity loss needs to be included in financial and trade considerations.



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If the goals are not reached, what should be done in the longer term to avoid people giving up?

It will be important to build from the momentum which has already been created. In particular the greater and more widespread promotion of the positive actions (success stories) which have been taken to meet the 2010 target could be one method to ensure that people remain engaged.

ACCESS & BENEFIT SHARING

**Won't this just spur more product development with artificial ingredients?
Could this stifle research that may not be aimed toward commercial value?**

Response to the first two questions:

On the contrary, by providing a clear and agreed framework, an international regime on ABS would bring certainty to both providers and users of genetic resources, thus encouraging the use of genetic material and research. In the negotiation process, negotiators are taking into account the need to avoid creating obstacles to research.

How is this working out in the real world?—does it work as well as it sounds?

A publication entitled *Access and Benefit-Sharing in Practice: Trends in Partnerships across Sectors*, published as part of the CBD Technical Series No. 38, will be launched at COP 9. It explores access and benefit-sharing agreements and practices in different sectors of industry, as well as the nature of these partnerships, the characteristics and procedures common to different sectors seeking access, and sharing benefits. These include: prior informed consent; the negotiation of mutually agreed terms, including benefit-sharing, agreements/contracts employed; and compliance and legal remedies if contracts are breached. Based on a review of recent literature, the collection and analysis of ABS contracts and agreements, interviews with more than forty individuals from industry, government, NGOs, international agencies and research institutions, and specific case studies, some interesting conclusions are drawn which should usefully inform the negotiation process of the international regime on access and benefit-sharing.

This is allowed for in the CBD and totally ignored and unworkable isn't it?

It is not allowed for in the CBD; it is a legally binding obligation under the CBD. However, it is a complex issue that covers different types of genetic resources (e.g. plant,



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animal, micro-organisms) used by different types of users (e.g. researchers, academia, private companies), for different purposes (e.g. basic research, commercialisation) in different sectors of industry (e.g. pharmaceutical, biotechnology, seed and crop protection, horticulture). For this reason, it is not easy to apply. Increasingly, efforts are being made to increase awareness of access and benefit-sharing among users of genetic resources and various associations of users have developed guidelines and/or codes of conducts to inform their constituency about the realities of access and benefit-sharing and to encourage them to follow access and benefit-sharing requirements.

AGRICULTURAL BIODIVERSITY

How can poor farmers access the rich crop diversity in gene banks?

Through the assistance of international, national and non-governmental organisations that can help facilitate access, with adequate and appropriate funding support. We should recognise also that “poor” farmers in many cases are also custodians of rich crop diversity through maintenance of these resources on their farms and collective community conservation programmes.

How much agricultural biodiversity do we need in order to maintain a predictable food supply?

This is difficult to quantify. What we know is that biodiversity is required in order to sustain agriculture (= make food supplies predictable). “Predictable food supply” is more complex than just supplying on a stable basis the basic calories, fat and protein needed. The CBD Initiative on Biodiversity for Food and Nutrition aims to improve not only food supply but the dietary importance of a diverse diet to nutrition. In addition, diverse agriculture contributes to diverse and more stable (sustainable) economies – economies which involve a large number of people – this is particularly important in developing countries where agriculture can contribute to lifting people out of poverty.

Can we feed everyone in the world and still pay attention to biodiversity?

We cannot feed the world without paying attention to biodiversity. Food production depends on biodiversity. It is not one or the other.

Can the promotion of biodiversity in agriculture realistically be integrated into large-scale farming?

Absolutely, and in many areas it already is. For example, in Europe much agriculture is large-scale, and many farmers are now incorporating biodiversity considerations into



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their practices (for example, planting hedgerows to provide wildlife habitat, instead of wire fences); large-scale agriculture can reduce the use of pesticides and the over-use of fertilisers and water – and without reducing production. The scale of agriculture does not preclude any attention to biodiversity.

Isn't it better to have pest and drought resistant crops?

Yes, and this is already being done. Drought resistance will become increasingly important as the climate changes.

Is there any more land that can be used for agriculture than is in use now?

The situation varies by region. In some developed countries or regions agricultural area is declining because agriculture tends to be mainly intensive, efficient, and food demands are decreasing with decreasing (or stabilising) population growth. Other areas potentially have more land – but it involves converting the land from other uses. Many countries/regions have limited opportunities to expand agricultural areas (in particular the more densely populated developing countries with high population growth). Globally – there is limited space for expansion. And biofuels is changing the picture – as it competes for land with food production. The issue really is the efficiency to which the land is put. Rather than expand inefficient agriculture it is better to make more efficient use of the land already under cultivation. Land is also not the only problem. In very many areas the constraint to increasing agricultural production is not land availability but water availability.

The most diverse range of crops is grown in sub-Saharan Africa and yet it is the one place where food production has not kept up with population growth...surely it is production based on a few high yielding GM crops that we need not more fashionable green lobby diversity?

It is not one approach or the other. Problems with the supply of food and the demand for it in Africa, or anywhere, are not limited to the nature of the crop grown. Many factors are involved including especially economic and cultural factors. For example, access to markets, infrastructure, food preferences, and the ability to purchase food. High yielding crops (whether GM or not) have their role under the right circumstances. But high yielding crops are not necessarily the most socio-economically appropriate even if they promise higher yields. For example, they often require more investment, more fertiliser and pest control – resources unavailable to small scale farmers. They also reduce farming diversity – which can increase yields, but increases vulnerability to factors outside the control of farmers (e.g., commodity prices, marketing constraints). High yield crops can



be risky – and poor people should avoid further risk. Overall, we need both – increased yields and more diversity.

Are biofuels putting pressure for more land use alongside crops - extending farmland at the expense of forests or scrub land, squeezing out less high-yield varieties?

Overall – yes. In cases where biofuels displace food crops on existing land, the loss in food production, even if not felt locally, needs to be compensated by extra production elsewhere. Agricultural production and food commodities are globalised through trade. What happens with biofuels and food in one country has impacts on what happens in other countries.

How is climate change spreading crop ranges towards the poles, affecting their diversity?

As the climate changes, areas suitable for growing particular crops change. This is already happening. The nature of the impact depends on the requirements of the crop. In some cases the cultivation will shift into areas previously too cold. In other cases it will shift away from areas becoming too warm. And this is not limited to polar shifts – it is occurring more noticeably with altitude (as higher sections of mountains become warmer). As agriculture moves into or out of regions – their biodiversity will be affected. But moving the farming is not always possible, nor desirable. A better response is to stay in the same place and grow varieties more appropriate to the changing conditions. And to develop those varieties we need to maintain and use the existing diversity. But the impacts of climate change on agriculture do not relate just to temperature increases. Some would argue that is a minor consideration. An important factor is that as temperature changes the water cycle changes – and changes in rainfall patterns are likely to have a greater impact on farming than whether the temperature itself increases.

What are the threats from genetically modified varieties? How do you ensure that these do not out-compete native varieties?

The threats can operate at the biological level (e.g., hybridisation with wild plants); at the economic level (GM crops can out-compete small-scale farmers resulting in lost livelihoods) and cultural levels (e.g., dependence on GM crops can result in the erosion of the local knowledge of local communities and together with it their current contribution to biodiversity conservation); and at the ethical level (e.g., loss of rights of local communities to preserve their culture and knowledge). On the other hand, under appropriate circumstances, GM crops can offer potential benefits. The way in which to



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ensure that desired outcomes result from the use of GM crops is to take a precautionary approach and to have transparent impact assessments, policies and strategies that consider all the potential outcomes based on the best possible and impartial advice and decision making processes which involve the full and effective participation of all of those potentially affected.

How can you protect agricultural biodiversity -- what is the role of seed banks such as a newly opened "doomsday" seed vault in the Norwegian Arctic

The best way to protect agricultural biodiversity is to make the best and most effective use of it. Farmers play a critical role and must be encouraged to continue and expand biodiversity conservation. When necessary and appropriate, farmers should have appropriate incentives to farm in more biodiversity friendly ways. Certainly, most agree that preserving biodiversity within agricultural systems (*in situ*) is the preferred and more sustainable course of action. Seed banks play an important role. They are multi-functional. They are, for example, an insurance policy against the loss of varieties within farming systems or global catastrophe. They also serve as a means to share diversity, and as libraries of information and sources of genes for the common global good. When the world's greatest literary minds write books – we put them in libraries to both conserve and share, for the common good. It is the same for seeds.

BIODIVERSITY OF INLAND WATERS

Is it true to say that the invasion of alien species is the greatest global threat to inland waters diversity?

No. Globally the main threats are habitat loss and degradation (including drainage and conversion of wetlands, loss of wetlands through over use of water, pollution, excessive loading of nutrients and sedimentation/soil erosion from poor land use practice). Invasive alien species are certainly an important threat. But the threats and their impacts vary from location to location. They also work in combination. For example, some species tend to be more invasive when inland water ecosystems become degraded through other means.

How do you protect lakes and rivers from increasing pollution in many nations?

By improving land use practices and reducing pollution in all relevant regions within the river or lake basin. Where more than one country shares the basin – international cooperation is required in order to manage the problem. Article 5 of the CBD refers to the need for international cooperation amongst relevant Parties on matters of mutual interest. This needs to be operationalised for specific issues through additional management and



regulatory frameworks. Such cooperation usually comprises river basin or watercourse cooperative agreements backed up with adequate infrastructure for monitoring, information sharing and dialogue.

What are the success stories around the world for cleaning up?

There are many – enough to be optimistic but not enough to start reversing global trends. There is a serious shift towards the rehabilitation of inland water ecosystems. Water quality was one of the first areas where progress was made. For example, many rivers in Europe during the industrial revolution were effectively biologically dead but the water quality now is much improved. The Thames River in London is a case in point. Salmon began to return to it only in the last two or three decades. Attention is now also shifting towards restoring river and lake habitats – including river floodplains. In developed countries this has largely been driven by public pressures for a cleaner environment, and the enormous economic value of recreational services provided by inland waters. But in some developing countries the same is happening – but is, importantly, motivated by the desire to sustain livelihoods and the more direct economic benefits of inland waters. Small successes can be found in many regions – often led by local communities. On the larger scale, India, for example, has invested heavily in cleaning up the Ganges River. Considering the constraints to doing so the progress made is welcome. Overall, however, the continuing rate of decline of systems is outstripping improvements in others.

Is a canal from the Red Sea to fill up the shrinking Dead Sea a good idea?

This depends whose idea it is and what is meant by “good”. The people that depend upon the Dead Sea, and those impacted by the canal, should decide. To do this they need to be well informed and there needs to be a transparent and participatory decision/policy making process. There are options – the most logical one is to mitigate those factors that contribute to the shrinking, and this could well be cheaper than building and managing a canal. If a canal were to be built, the ecology of the Dead Sea would be different from its original state. Do the people around the Dead Sea want it to be restored to its original state – or simply filled up again? You need to ask them. But the provisions of the CBD would favour the former approach.

Are hydroelectric dams overall a good thing (renewable energy, no carbon emissions etc) or bad because of the way they can disrupt rivers, flood plains where people live?

Both. Energy produced by hydropower, case-by-case, is not “no carbon emissions”. There is growing evidence that many, if not most, emit significant carbon dioxide and



other greenhouse gases through the destruction and decomposition of vegetation in the reservoir, and by degrading wetlands downstream (and degraded wetlands can emit large amounts of greenhouse gases). If badly planned, sited and managed, they can also disrupt rivers, floodplains, fish migrations and people etc. They also have a limited lifespan and large ones are a problem to decommission because the reservoirs tend to fill up with silt. But all energy generation has its drawbacks. It is a matter of balancing development and energy supplies. Hydropower has a role to play if properly considered, planned and managed. But all too often hydropower planning schemes do not consider the full range of impacts and in particular on the services provided by rivers which currently have no market values.

BIODIVERSITY & CLIMATE CHANGE

How will climate change affect biodiversity - is it all bad news or will some species gain (and bring benefits to people)?

Since the mid-1800s global temperatures have increased by about 0.6°C¹, impacting the entire world, from low-lying islands in the tropics to the vast Polar Regions. This rapid climate change is having an impact on species and ecosystems including the provision of ecosystem services on which we all rely.

Some species are being negatively impacted by climate change while others, such as warm water fish are actually seeing an expansion in their range. Species which seem to be benefiting most from climate change include pests and invasive plants which are better able to rapidly adapt to changes.

How can people use biodiversity to address climate change (e.g. in adaptation through crop varieties)?

Mobilizing resources such as land races of common crops, mangroves, riparian wetlands and resilient species can enhance results, improve cost-effectiveness and ensure the sustainability of adaptation investments. For example, the conservation or restoration of river floodplains can be an important response to increasing flooding events, or droughts. Not only can it be more cost effective than traditional engineering responses but also provides substantial benefits in terms of fisheries, increased resilience and an improved aesthetic and cultural environment.

¹ Temperature data is provided by IPCC



In Malaysia, for example, the value of mangroves for coastal protection is estimated at \$300,000 per kilometers of coast based on the cost of installing artificial coastal protection. Following the degradation of the reef around the Male in the Maldives, the cost of installing artificial breakwaters was US\$10 million per kilometer.

Biodiversity-based adaptation can also contribute to enhanced food security including in Africa, where the demand for food is expected to reach \$100 billion by 2015, double its level of 2000. At the same time, climate change is expected to lead to changing precipitation regimes which will increase water stress in sub-tropical regions including Southern Africa which is projected to lose 30% of its maize crop by 2030. Adaptation linked to agricultural biodiversity, such as changing varieties and agro-forestry, can avoid 10-15% of the projected reductions in yield under changing climatic conditions.

What effects on biodiversity are we seeing already from climate change?

Climate change is already forcing biodiversity to adapt either through shifting habitat, changing life cycles, or the development of new physical traits. Impacts already observed include:

- The Common Murre has advanced breeding by 24 days per decade over the past 50 years in response to higher temperatures
- The Baltimore Oriole is shifting northward and may soon disappear entirely from the Baltimore area
- The average weight of female Polar Bears in Canada has decreased by 20% over the last 25 years
- An increase in the number of female Sea Turtle hatchlings when compared to males as a result of higher nest temperatures.

Projections of further impacts include:

- In sub-Saharan Africa between 25 and 40% of mammals in national parks will become endangered while as many as 2% of the species currently classified as critically endangered will become extinct
- In the Succulent Karoo and Fynbos ecosystems in Southern Africa more than 50% of habitat is expected to be lost by 2050
- In the Amazon Basin, 30 of 69 tree plant species studied could face extinction.
- Mangroves in marginal and exposed areas are expected to decline in Brazil, Ecuador, Colombia, Guyana, El Salvador and Venezuela
- In Asia, up to 50% of biodiversity is at risk while as many as 88% of reefs may be lost over the next 30 years



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- As many as 1522 plant species in China and 2835 plants in Indo-Burma could become extinct
 - If sea level rises 10 millimetres a year, mangroves could disappear from Antigua and Barbuda as early as 2030.

Some species may go extinct. But will others find a way to adapt?

Many species, if given the opportunity, will adapt to climate change. Mangroves, for example, will move inland in response to climate change and sea level rise as long as their route isn't blocked by settlements, infrastructure or other non-compatible land uses.

In fact, one of the key concerns for species when consider adaptation is that other pressures, such as habitat fragmentation, over-use or pollution will limit the natural ability of species to adapt to climate change.

Will tropical species be able to take root in warmer temperate zones?

Some species will be able to shift poleward or upward in elevation as temperatures increase. For examples, many species of butterflies are already moving north in Europe.

It is important to remember, however, that temperature is only one parameter associated with habitat suitability. If soils are different in temperate zones, plants may not find the nutrients they need. Likewise if precipitation regimes change species may find that they cannot access enough water or are out-competed by other species that are better adapted to wetter climates.

Things grow better in greenhouses don't they...surely there will be winners and losers, and at the end of the day the more acclimatized plants and animals will win out – wasn't this what Darwin was all about?

Darwin's theory of evolution did indeed focus on competition and adaptation however, it is important to note that he was studying natural cycles and natural pressures. The evidence is now clear that climate change is being caused by human activities and that it is causing changes in climatic conditions at a rate much faster than anything previously recorded or studied.

Has climate change become the biggest threat to species -- ahead of pollution, rising human populations, etc?

The Millennium Ecosystem Assessment and reports by WWF reveal that climate change is likely to become the second largest threat to biodiversity. However it is important to



note that while the impacts of some threats are stabilising or even decreasing, the impacts of climate change will continue to increase for at least the next 50 years.

How can you help animals and plants to move if the climate shifts? Perhaps by setting up corridors for migrations?

Given the importance of climate change -biodiversity links, it is important to:

- i. Identify and conserve that biodiversity which is especially sensitive to climate change
- ii. Preserve intact habitats so as to facilitate the long-term adaptation of biodiversity
- iii. Improve our understanding of climate change – biodiversity linkages
- iv. Fully integrate biodiversity considerations into climate change mitigation and adaptation plans.

Some activities to promote adaptation include the establishment of protected areas and connecting corridors, the alleviation of other anthropogenic threats to species, the application of the ecosystem approach to decision-making and, in extreme cases, *ex situ* (off site) conservation of species.

The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes the conservation and sustainable use of biodiversity in a fair and equitable manner. The main principles of the ecosystem approach focus on capacity-building; participation; information gathering and dissemination; research; monitoring and evaluation; and governance. Since the ecosystem approach takes a broad perspective to management, it is an ideal methodology through which the multiple impacts from climate change, including on biodiversity, can be reflected in comprehensive and responsive adaptation planning.

What happens in places such as the southern tip of Africa or the northern tip of Europe where species cannot move further south or north?

Species that are unable to move will likely go extinct as climatic conditions change beyond their ability to adapt.

How many species have gone extinct because of climate change -- the Costa Rican golden toad is one often quoted example?



Predictions estimate that up to one million species may become extinct as a result of climate change including vulnerable species such as Boyd's forest dragon in Australia and Brazil's *Virola sebifera* tree.

The recently extinct Golden Toad and Gastric Brooding Frog have already been labeled as the first victims of climate change however the impacts of climate change on species are complex and difficult to predict. As such there is still a lot of debate regarding climate change and extinctions. The polar bear, for example, was recently added to the threatened species list in Canada because of threats from climate change however debates are still ongoing in other countries which include polar bear habitat as to whether climate change is likely to lead to the extinction of this emblematic species.

The UN Climate Panel says that up to 30% of species will be at increasing risk of extinctions if temperatures rise more than 1C from now – which are most at risk?

Species and ecosystems which have been identified as being particularly vulnerable to the impacts of climate change include:

- Agricultural systems already at the limit of their heat and drought tolerance, agricultural areas within low latitudes, rangelands, agricultural biodiversity in dry and sub-humid lands
- Prairies, wetlands in drylands, remnant grasslands,² Mediterranean forests, desert margins, *Fynbos*
- Mangroves, boreal forests, tropical forests, cloud forests
- Peatlands, oases, prairie wetlands, high-latitude and high-altitude inland water ecosystems (such as Arctic and sub-Arctic ombrotrophic ^{3/} bog communities, and alpine streams and lakes)
- Low-lying islands, polar islands, small-island developing States
- Mangroves and other coastal wetlands, polar seas, seagrass beds, coral-reef systems
- High-alpine ecosystems, ^{4/} cloud forests, remnant native montane grasslands
- Protected areas of any of the above regions, sub-regions or ecosystems, small or isolated protected areas, protected areas with high- or low-altitude

^{2/} WWF. *Buying Time: A User's Manual for Building Resistance and Resilience to Climate Change in Natural Systems*. 2003.

^{3/} A condition in which a wetland is hydrologically independent of surface water or ground water and is almost exclusively supplied with water from precipitation.

^{4/} Halloy SRP, Mark AF 2003. Climate-change effects on alpine plant biodiversity: A New Zealand perspective on quantifying the threat. *Arctic, Antarctic and Alpine Research* 35, 248-254.



environments, coastal environments or interior wetlands, protected areas with abrupt land use transitions outside their boundaries, protected areas without usable connecting migration corridors

- Arctic regions, small-island developing States, high-altitude communities, coastal zones and dry and sub-humid areas.

BUSINESS & BIODIVERSITY

Isn't the problem essentially that there are no sound business reasons for investing in diversity... by this I mean payback in terms of paying shareholders and boosting profits... over months not years...

No. The issue is more that the 'business case' is not always well articulated, and not that there is no business case per se.

Ultimately all companies, in all sectors, irrespective of where they lie in the supply chain, depend on biodiversity.

In some sectors – for example those directly dependent on biodiversity and ecosystem services such as the fisheries sector, agriculture, etc. – the business case is rather straightforward. Hence when marine ecosystems collapse, the fishing community loses its livelihood. By extension, retailers have an obvious interest in ensuring that the fish that they are selling is from sustainable sources.

If a supermarket sells unsustainably sourced products, it is at risk of having to find alternative suppliers when the supply runs dry. In a highly competitive market such as retailing these additional costs are unwelcome. This explains why several retailers across the globe are looking into the sustainability of their supply chains, and providing additional information to their consumers, understanding that this is not (solely) a 'biodiversity' issue but a strategic business issue.

In the extractive sectors, there are also sound business reasons for integrating biodiversity in decision making. Indeed, there are well known examples of companies which have seen their projects delayed because of conflicts with regulators, stakeholders, or investors over biodiversity issues. In the case of multi-billion oil and gas projects, for instance, this is a very unwelcome outcome, with very tangible implications in terms of PR and finances.



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One can find many reasons – tangible, strategic, business reasons – for including biodiversity into business decision-making. Crucially, this ‘business case’ will depend from sector to sector and, indeed, from company to company.

In a nutshell, biodiversity creates business risks and opportunities that need to be managed.

A number of initiatives are currently underway to help companies better determine their dependence on ecosystem services and to manage this. These are regularly featured in the Secretariat’s business newsletter.

Many organizations have been developing the business case for their sector. In the financial services sector, for instance, UNEP Finance Initiative, with its members in the banking sector, recently published a briefing explaining the business case for biodiversity for financial institutions.

The need to better articulate the business case was highlighted in 2006 when Parties to the Convention adopted the first decision to focus on business. In response, the Secretariat has compiled documents explaining the business case in different sectors.

Of course, more needs to be done. Many actors – including business journalists, business schools, and business associations can help ‘translate’ into a language that better resonates with the business community about what seems, on the surface, as simply an environmental issue.

How can companies be enlisted in protecting biodiversity?

There are many ways to encourage companies to include biodiversity into decision making.

In some sectors, a lot of pressure has come, historically, from activist NGOs. Faced with bad publicity, many companies have typically changed their policies and practices. Pressure can also come from individual and institutional investors and from consumers – the end consumer can remain informed and vote with her/his feet.

Conversely, several technical and financial vehicles have also been established around the world to help identify ‘biodiversity business’ – companies that have a positive



‘return’ from a financial and biodiversity perspective. IUCN has, for instance, recently released a report examining these vehicles.

Business associations can also send a clear signal regarding the importance of biodiversity. The World Business Council for Sustainable Development (WBCSD), for instance, recently elevated its work on ecosystem services as one of four ‘focus areas’.

Governments also have a key role to play, including in establishing policies which provide incentives for companies to take biodiversity into account. The last COP, for instance, encouraged governments to engage with business when developing and implementing National Biodiversity Strategies and Action Plans.

A very obvious way to see how business can be enlisted is also to look at the efforts of the Host Government, Germany, in mobilizing the business community for COP 9. The German Business and Biodiversity Initiative has, amongst other things, managed to bring new business players to the ‘conservation table’. This initiative will be profiled in various ways during the COP.

More generally, business will be an important focus of the COP – either as part of the formal agenda, or during informal events and fora. For easy reference, the Secretariat has compiled a list of business-related events at COP 9 available at www.cbd.int/cop9/business/

Can companies help by "bioprospecting", or do all of the benefits go back to corporate headquarters with none left for local peoples?

There are many examples of good practice related to Access and Benefit-sharing.

At COP, the Secretariat will launch a publication examining Access and Benefit-sharing in practice across a range of sectors.

What companies are helping protect biodiversity and which ones are damaging it? How can you reward those with good practices?

The Secretariat does not assess the performance of individual companies.

A number of initiatives are underway to assess the biodiversity performance of companies in a range of sectors. In 2004 and 2006, for instance, Insight Investment (a UK based asset manager) and Fauna and Flora International (FFI) released a biodiversity



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benchmark for the mining, oil and gas and utilities sector. FFI, the UNEP Finance Initiative and Brazilian business school FGV are currently looking at a similar tool for the food and beverages sector. This will be profiled at the COP.

In 2006, Parties to the Convention highlighted the need to disseminate and develop good practice guidance. In response, the Secretariat has compiled good practice tools in a range of sectors. These are available online.

Makers of everything from fertilisers to tractors should be interested in protecting biodiversity: what programmes do they have?

Biodiversity is relevant for all sectors. Several initiatives are underway in several sectors to help integrate biodiversity into decision making.

In the agribusiness sectors, many initiatives are underway. Several of these will be profiled at the COP, on the occasion of the International Day for Biological Diversity (22 May). The International Finance Corporation will also be launching its Biodiversity and Agricultural Commodities Programme at COP.

An issue of the Secretariat's business newsletter focuses on agribusiness, and highlights efforts by companies, industry associations, and environmental groups. It is available at: www.cbd.int/business/newsletter.shtml

CITIES & BIODIVERSITY

Can programs to protect biodiversity help improve the conditions of slums?

Yes – in fact, the verb should be “need to” and not “can”. For large cities in developing countries (where the majority of urban growth is expected to happen), no biodiversity programme can be successful without strong links to poverty alleviation and benefit sharing. The experience accumulated by the CBD's “Cities and Biodiversity” initiative (see www.cbd.int/authorities/) proves that the two issues are actually related – enhancing the quality of the urban environment is linked to social and economic development, as can be seen in the example of Bogota, Colombia, where participative planning has led to the engagement of citizens in environmental protection – and a generation of environmentally friendly jobs. In Rio de Janeiro, Brazil, people living in the famous Rocinha slums actually demanded improved environmental conditions as their social and economic status improved. For urban populations living in poverty, biodiversity continues to be an important livelihood source – for food and for business



opportunities. Furthermore, the case studies identified in the CBD's Cities and Biodiversity initiative (see www.cbd.int/authorities/casestudies.shtml) point to the fact that health is linked to environmental balance – degradation of biodiversity resources often leads to epidemics, poor health and inappropriate sanitation. The absence of green areas raises the temperature of urban “heat” islands, with consequences to human health (see the example of Nagoya at www.cbd.int/authorities/informationresources.shtml). In the case of Sao Paulo, Brazil, for instance (see case study at www.cbd.int/authorities/casestudy/saopaulo.shtml), watershed protection, development of urban parks, and awareness-raising are part of an integrated development strategy.

Is the migration of people from rural areas to cities generally good or bad for protecting biodiversity?

As in many cases with biodiversity, it goes both ways. Unregulated urban sprawl and the proliferation of slums clearly have negative impacts, particularly on watersheds and agriculturally rich areas surrounding cities. Planned urbanization, on the other hand, such as the case of Curitiba, Brazil, actually improves the status of biodiversity resources, by setting aside specific areas for protection (both in nearby rural areas and in the so-called “green belts” of urban environments) while concentrating urban development in other areas. Curitiba is one of the cities participating in the CBD Cities and Biodiversity initiative (see www.cbd.int/authorities/). The case study posted at www.cbd.int/authorities/casestudy/curitiba.shtml proves the point made by famous urban planner Julio Lerner, former Mayor of the city, that cities can be part of the solution. The point is clear – a report by UNEP indicates that cities occupy only 2.8 per cent of the Earth's surface, but urban dwellers control the use of 75% of the planet's natural resources. This is both a threat and an opportunity for biodiversity - cities can make a difference. If decision makers in cities follow the example of networks such as ICLEI's Local Action for Biodiversity, or the CBD's Cities and Biodiversity initiative, urbanization can be a positive force for the implementation of the three goals of the CBD.

What can cities do to protect biodiversity -- raise the number of parks etc?

Cities play a defining role, as they have very specific mandates to collaborate with other levels of government in protecting biodiversity: they set land use regulations and plans, they license businesses under more or less environmentally friendly stringent norms, they play a role in implementing sustainable transportation and infrastructure, control water use and treatment, manage urban green areas and watersheds (and can encourage citizens to do the same), they can educate consumers and decision makers. Their mandate (and resources) is growing with urbanization and decentralization. Some of the world's



leading cities on biodiversity came together in March 2007, with support from the Secretariat of the CBD, at the invitation of the Mayor of Curitiba, who also hosted COP 8, and adopted the Curitiba Declaration on Cities and Biodiversity (see www.cbd.int/doc/meetings/biodiv/mayors-01/mayors-01-declaration-en.pdf), which invites cities to include biodiversity in their policies and plans, and requests national governments to work with cities on the issue. A variety of strategies and plans can be found at the CBD's web portal for cities (www.cbd.int/authorities/). Specifically, the city of Bonn, host of COP 9, has developed a complete biodiversity strategy, whose components can be seen at www.cbd.int/authorities/casestudies/bonn.shtml . Sao Paulo, Brazil, has decreased illegal logging in the Amazon, thousands of miles away, by curbing the commercialization of illegal timber (www.cbd.int/authorities/casestudy/saopaulo.shtml). Additionally, the participants of the Curitiba meeting indicated critical areas for collaboration on cities and biodiversity – see www.cbd.int/doc/others/cities-collaboration-areas-en.pdf.

Can you point to cities with good examples of protecting biodiversity?

Today, there are several networks of leading cities on the issue of biodiversity: ICLEI's Local Action for Biodiversity (see www.iclei.org/index.php?id=lab), IUCN's Countdown 2010 campaign, joined by various leading cities (www.countdown2010.net/?id=20&ctr=60), the World Mayors' Council for Climate Change and its biodiversity chapter, led by Montreal (see www.iclei.org/index.php?id=7207#c26246) and the CBD's Cities and Biodiversity initiative, with five cities of particular relevance for the CBD (Montreal, Curitiba, Bonn, Nagoya and Johannesburg – see www.cbd.int/authorities/). Among the latter, Bonn has achieved protection of up to 51% of its territory, and has engaged in an extensive awareness campaign for CBD's COP 9 (www.cbd.int/authorities/casestudies/bonn.shtml), Curitiba is well known as a global leader in urban planning, green areas and parkways (www.cbd.int/authorities/casestudy/curitiba.shtml), Nagoya has developed a complex land-use system that values green areas, revolutionized waste management and regularly measures carbon dioxide levels and temperature (www.cbd.int/authorities/casestudies/nagoya.shtml), and Montreal has a model tree planting policy, develops new parks in partnership with the private sector and offers a unique set of museums and educational institutions on biodiversity – the Nature Museums (www.cbd.int/authorities/casestudies/Montreal.shtml).

**Cities are often on river mouths, rivers or lakes: what can they do to protect these?
In many cities rivers get put into concrete pipes -- how damaging is that?**



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Water management is arguably one of the most important mandates of cities for the sustainable use of biodiversity, and watershed and estuarine protection. Unplanned urbanization and urban sprawl can damage freshwater resources, pollute water bodies and cause impacts hundreds of miles away. However, currently available technologies in watershed protection and restoration, wastewater treatment and cleaner production can avoid these damages. The example of the Catskills watershed in New York, USA, is often used: in 1997, the city purchased forested lands in the watershed to resume the task of natural water filtration, saving US\$ 6 billion by avoiding the construction and operation costs of a water treatment plant. Urban parks and watershed management strategies in Rio de Janeiro, Montreal, Singapore and Porto Alegre help protect these cities' rivers and estuaries. As for containing former waterways in urban areas into artificial channels, this clearly has serious environmental impacts, but once again, in an urban environment the final evaluation may be mixed. In Sao Paulo, Brazil, the Pinheiros and Tiete rivers were enclosed into canals in the late 80s, when they were little more than flowing cesspools which overflowed constantly due to flash floods, polluting the city and creating health hazards. With technical support from development banks, large environmental projects were started, and by 2000, their sewage flows were controlled, and water flow was managed between various dams and reservoirs. Far from having negative impacts, this allowed the rivers to improve their environmental quality, stopped seasonal overflowing that actually damaged urban parks and endangered residents' health, and by allowing the municipality to establish urban parks around the previous flooding area, increased biodiversity and allowed urban residents to get closer to nature instead of seeing it as a risk to their quality of life.

COMMUNICATION EDUCATION & PUBLIC AWARENESS

What signs are there that the biodiversity issue can get to the public in the way that climate change does...have we failed to make the direct connections between biodiversity loss and threats to human wealth and wellbeing?

The challenge of raising public awareness of the importance of biodiversity lies in what you are pointing to - the complexity of the connection between the ecosystems of the planet and their services, and human well being. A large part of the public wants to know what the conservation of biodiversity means to them in their lives and sometimes the answer is too complex to understand right away.



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The work of the Millennium ecosystem assessment a few years ago has helped us change that. Even though it was a scientific report, it helped come up with the basis for arguments about why we should preserve biodiversity. We now have some examples that help us to make the connections for people.

For example, when the city of New York needed a cost-effective way to ensure clean water - they helped establish a protected area in the watershed in the Catskills, to keep the supply of water clean.

This summer, the public woke up to the importance of birds and bees as pollinators for our blueberry and almond crops. With colony collapse disorder in the news, people started to realise that we need to conserve a variety of creatures that help plants reproduce.

The spectacular collapse of the cod fishery in Canada a number of years ago, and the tremendous job losses that ensued, helps outline how communities depend on these biodiversity resources for the very fabric of communities. Communities around the world have learned this. For example, certain fishing communities in Spain have now adopted sustainable management practices that are actually helping to restore the diversity of ecosystems and ensure a variety of fish for harvesting for years to come.

There are many more examples. We have a new publication on the Value of Protected areas (<http://www.cbd.int/doc/publications/cbd-value-nature-en.pdf>) that outlines some of this for protected areas.

If we really want to make a difference at the policy level, however, we need to get the message to a coalition of people: consumers, government and business. With our new efforts to make the business case for biodiversity, we are beginning to get the producers to act in ways that will help conserve biodiversity.



ECONOMIC VALUES OF BIODIVERSITY

We hear a lot these days about the economic values of biodiversity and the merits of economic valuation. But is it not preposterous to put a price tag on songbirds or wild flowers? And will it not lead to the commercialization and sell-out of nature?

Elements of answer:

- Looking at the recent data on biodiversity loss, it is fair to say that the sell-out of nature is already ongoing. This is precisely the case because there is no market for biodiversity loss – implying a price of zero. People essentially perceive many biodiversity assets (species, intact ecosystems) as free goods – and act accordingly.
- However, absence of a price tag does not imply absence of economic value. It is important to note that ‘economic value’ does not (only) refer to relatively narrow commercial interests – e.g. in terms of the revenues from the commercial exploitation of forests, or the number of jobs created. It also refers to the contribution of nature to human well-being – ecosystem services – in a broad sense. This would include for instance the enjoyment of a long walk in a nice forest.
- Assigning a price to biodiversity components, by well-designed policy tools, can help to close the wedge between the economic value of biodiversity assets and the absence of markets for biodiversity assets. As everybody (firms, consumers, and policy-makers themselves) would need to take this price into account in decision-making, it would improve decisions towards more biodiversity conservation.
- Valuation does not necessarily lead to the commercialization of biodiversity – in the sense of a privatization of nature and its sale ‘in chunks’ to individual owners. In many cases this is technically not feasible – how would one privatize migratory birds? But even if it were possible, it is a matter of political choice – there are many other policy instruments available.
- Finally, it is important to underline that economic valuation is not competing with ethical considerations. For instance, it does not claim to capture what many people call the intrinsic value of nature. The moral obligation to maintain living nature is not affected by the valuation exercises undertaken by economists; if anything, these exercises are meant to support, and complement, this moral obligation, and to help translate it into day-to-day decision-making and practical policy-making.



FOREST BIODIVERSITY

Is it better to protect intact forests with their biodiversity for the sake of biodiversity conservation, or to do more to manage low-diversity plantations that can bring commercial benefits, as well as storing carbon?

We need to do both. We should conserve biodiversity-rich forests, and manage plantation forests better so they fulfill environmental as well as economic and social objectives.

Conserving forests for biodiversity is a valuable activity in its own right, but it can be combined with conserving and maximizing other ecosystem services such as recreation, water filtration and storage, and carbon sequestration. And even forest conservation and timber exploitation do not need to be mutually exclusive: in Brazil, four forest management reserves totalling 40,000 km² designated in 2006 for sustainable timber extraction are expected to generate 100 million USD in annual gross revenue from timber, and provide some 8,600 jobs (Mulongoy and Gidda, 2008).

But we also need more sustainably managed forest plantations in future, because the consumption of main timber products (roundwood, sawnwood, pulp, paper) is expected to increase substantially in coming decades (FAO, 2007; Sedjo, 2001), and forest plantations can help to decrease the pressure on biodiversity-rich natural forests. In consequence of growing demand, tropical forest plantation area more than doubled between 1995 and 2005, to 67 million hectares, mostly in Asia. Other plantations, in boreal and temperate regions, have also increased in area. The use of relatively few tree species in these plantations is an issue of concern for a number of forest dependent species and for ecosystem resilience (EEA, 2005; Hagar, 2007). However, forest plantations can also contribute to biodiversity conservation, if they are planned and developed in line with key considerations, such as: establishment on degraded land (no loss of primary forests); establishing ecological corridors, and improving landscape level conservation values; and setting aside key habitats for biodiversity conservation. This can be achieved e.g. by following the recently developed Guidelines for Biodiversity Conservation in Tropical Production Forests, published by the International Tropical Timber Organization.

Does the diversity of a forest alter the amount of carbon it stores?

Not necessarily. However, the amount of carbon is influenced by the age and size of the trees: the older a forest, the more carbon it can store, until it has reached its storage



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capacity. The old-growth such as the Red Cedar forests of the Pacific West Coast in North America, which have taken hundreds or thousands of years to grow, have the highest biomass per hectare of any forest (up to 20,000 m³ of standing timber per hectare, storing about 3,000 tons of carbon), and thus also the highest above-ground carbon storage of any forest. Generally, the structural diversity, such as trees of different species, size, and age, are all positive for biodiversity, and old or decaying trees often harbour a host of other species. The red cedar rainforests of the Western US and Canada, similar to old-growth tropical rain forests, not only offers the best carbon storage, they are also amongst the most biodiversity-rich forests.

There are clear “win-win” cases for biodiversity conservation and carbon sequestration, such as peat swamp forests. These tropical forests grow on layers of organic matter which has formed over thousands of years, and can be many metres thick. The peat consists to a large part of carbon, and the wet forests on its surface protect it from escaping into the atmosphere. If these forests are logged or drained, the peat will start to decompose and release massive amounts of carbon dioxide into the air. Unfortunately, this still often happens, in particular in South-East Asia, where large peat swamp forests are cleared to make way for palm oil plantations or other land-uses. The large forest fires in the region in 2001 made Indonesia the world’s third largest emitter of greenhouse gases (Hooijer et al., 2006). Ironically, this is often done for the production of biofuels, with the aim to reduce carbon dioxide emissions. However, it would take many hundreds of years of biofuel production to make up for the loss of underground carbon stored in the peat. At the same time, tropical peat swamp forests are key habitats for numerous endangered species such as tiger and orangutan. Conserving such key natural forests should be the priority objective for REDD and other emerging mechanisms.

Can conserving forests, in practice, be shown to be more worthwhile than logging or clearing them for agriculture?

Yes. Recent studies show that already at a price of less than 1 USD per metric ton of CO₂-equivalent (the measuring unit of emission reductions), conserving the forest for its carbon would be more profitable than for most alternative uses such as logging or conversion to agriculture (Peterson et al., 2007; Mongabay, 2007). If one adds the value of other ecosystem services, and the intrinsic value of biodiversity, it is well worthwhile to conserve forests. But, once again, forest conservation and economic use are not mutually exclusive. Sustainable forest management offers an alternative which can preserve the main forest functions and its biodiversity, while providing sustainable livelihoods.



How much will it cost to preserve/conserve forest biodiversity?

Estimates suggest that for only \$5 billion USD per annum initially, deforestation could be stopped in the eight countries responsible for 70 per cent of emissions from land use, although over time these costs might rise (Stern, 2006). Other estimates put the necessary funds closer to 33 billion USD per year, which would cover all tropical forests (Mongabay, 2006). To put these figures in perspective: even 33 billion USD is less than half of the amount that US citizens spend on soft drinks per year (www.marketresearch.com); or only about 4 weeks worth of agriculture subsidies (which can be environmentally harmful) paid by European and other developed countries (James et al., 1999, Myers, 1998, van Beers et al., 1999).

The government of Norway has recently pledged around 500 million USD per year towards REDD activities (3 billion Norwegian Kroner per year).

If REDD is so sensible, what are the objections?

There are a number of questions which still need to be resolved before an international agreement and market mechanism can function. These questions revolve around three key elements:

1. *Baselines and Monitoring*: the deforestation must be measured against an agreed baseline in each participating country. This baseline should take into account deforestation rates of past years. Discussions are still ongoing how to fix this baseline, and subsequently, what accounts for a reduction, and what for an increase in deforestation.
2. *Permanence*: reducing deforestation and forest degradation is a temporary mitigation measure that will simply buy time for the necessary transition to low carbon societies. Even if all global deforestation is avoided, saving 13 million hectares of forests per year would reduce net global emission of greenhouse gases (GHGs) by only around 10-15%. Therefore, the role of forestry is regarded as complementary to other efforts rather than an alternative or a “cheap” remedy to growing emissions of GHGs.
3. *Leakage*: stopping or reducing deforestation in some countries, or some areas, could simply defer the problem elsewhere, i.e. increase the pressure on (natural) forests in countries or areas that are not participating in REDD.

Recognizing these obstacles, the United Nations Framework Convention on Climate Change (UNFCCC) has decided to explore options for overcoming them, to include



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REDD in a new climate change pact to follow the Kyoto Protocol. The Parties to the CBD have recognized REDD as a unique opportunity for forest biodiversity.

What good is having forest diversity when you are one of the 800 million people who don't get enough to eat?

For insecurity is often caused by factors that other than biodiversity conservation, such as armed conflict, poor governance, and inequitable distribution of resources. In many of these situations, forests actually provide basic or supplemental food security. World-wide, forests provide an estimated 1.6 billion people with everyday needs such as food, shelter, energy, and recreation, while an estimated 300 million people, most of them poor, depend substantially on forest biodiversity, including non-wood forest products, for their subsistence and survival (MEA, 2005), including around 150 million people belonging to indigenous groups. An estimated 5,000 commercial products are derived from forests, and up to half of all most commonly prescribed drugs in developed countries are originating from plants, mostly from tropical forests (MEA, 2005). Conserving (and sustainably using) forest biodiversity is thus a direct contribution to poverty alleviation, and to stabilizing food security, and to promoting human health. Furthermore, deforestation is often harming the poorest parts of the population (who instead would benefit from intact forests), but rather benefits large landowners or corporations who further increase their land holdings by forest conversion for cattle grazing, soy bean production, or other agricultural uses (World Bank, 2007). These commodities are usually produced for the export market.

How is deforestation to plant palm and other varieties for biofuels hitting forests?

The production of biofuels has severe impacts on forest biodiversity, through the conversion of natural or semi-natural tropical forests to plantations for energy crops. The production of biofuels (often derived from palm oil) is arguably the most dangerous threat to forest biodiversity over the coming years. Production of palm oil, soy beans, and other agricultural commodities is also rising due to a larger demand for food products and feed stock. The Organization of Economic Cooperation and Development (OECD) warned in 2007 that “the rush to energy crops threatens to cause food shortages and damage to biodiversity with limited benefits”. A UNEP study published in 2007, *The last stand of the orangutan*, projects that biofuel production could considerably accelerate the disappearance of Indonesia's last natural rainforests, thereby contributing to the possible extinction of the orangutan in the wild.



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How many species are being lost in the Amazon because of climate change and land clearance?

Scientists have calculated that up to 16 million populations of animals and plants (mostly invertebrates, such as insects) disappear per day together with their pristine tropical forest habitat (of which around 16,500 hectares, or 16.5 square kilometres per day disappearing, mostly due to land conversion for agricultural purposes). Considering that the highly specialised species in tropical regions often consist of only very few populations, it is estimated that up to 40,000 species per year, or up to 109 per day (or 4 every hour) disappear forever. Most of these species disappear before they can be scientifically described and be given a scientific name. This holds true for all tropical forests combined, mostly the large forest areas in Central Africa (the Congo basin), South America (the Amazon), and South-East Asia (Hughes et al., 1997).

What are the effects of climate change on northern pine forests? Will they grow more or become more susceptible to pests such as beetles that are normally killed off by harsh winters?

These forests will die off in large areas, and probably be replaced in most cases by other coniferous species, or deciduous species, while pine trees will extend their range northward. Already, the pine forests in British Columbia in Canada have suffered die backs of almost 50% of their territory, and this is expected to increase to 80% by 2013, due to the extended range and higher winter survival rates of the mountain pine beetle. This damage is causing estimated losses of 30 billion Canadian dollars. This massive die back increases the risk of forest fires, which in turn can release large amounts of carbon dioxide into the atmosphere, creating a potentially dangerous self-reinforcing “feedback loop” between the impacts of climate change and its causes. Many insects, in particular in temperate regions, are benefiting from climate change, because they are poikilothermic (cold-blooded), have high reproductive rates, are good dispersers to increase their range, and benefit from droughts (Canadian Forest Service, 2007, personal communication).

Are carbon credits a good idea to help slow the rate of deforestation?

Yes. Already, the voluntary market has shown that carbon offsets can generate considerable funds for the conservation of forests, thus creating an alternative income to logging or land conversion. Both the UNFCCC and the CBD have recognized the usefulness of reducing emissions from deforestation, and in turn, the potential benefits of these activities for biodiversity. And while there is some justified criticism that forest offsets are not permanent, they provide a useful temporary alternative while national economies make the necessary transition to low-carbon economies. Recently, also the



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private sector started to invest in forest conservation and other forest related carbon offsets (Taiyab, 2006).

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INVASIVE ALIEN SPECIES

In today’s global world, is it really possible to stop the spread of such species?

If we apply the precautionary approach, the spread of invasive alien species can be limited. Preventing international movement of potentially invasive living organisms and rapid detection at borders are less costly than control and eradication. When non-native species are introduced, early detection and control is the key to prevent the threats from invasive alien species. Building capacity to conduct risk assessments prior to introductions of such species and appropriate control for preventing the establishment of the species in the environment is urged.

What can be done to limit the spread of invasive species due to climate change?

Early detection and monitoring of introduced species can prevent or limit the spread of invasive alien species caused by changes in the climate. However, the root of the problem should also be addressed through mitigation of climate change.

Isn’t this the true biodiversity crisis – ignored but a lot more important than all the other issues put together?

The causes of biodiversity loss are multiple. Invasive alien species and climate change are both considered major causes of biodiversity loss by the Millennium Ecosystem Assessment, a global assessment on ecosystems conducted between 2001 and 2005.



However, to truly address the loss of biodiversity, one must consider all the factors leading to such loss. The threats of invasive alien species, when added to existing stressors and compounded by climate change, represent a real challenge for biodiversity conservation.

How is climate change helping the spread of invasive species?

As the climate changes, the opportunities for tropical invasive alien species to extend to new ranges may increase. In addition, climatically-induced stress can negatively affect native plants. The vegetation gap caused by such stress may quickly be occupied by invasive alien species. Both droughts and freezing are likely to increase in frequency and intensity due to climate change. This may reduce the resistance of plants and trees to insect and pest attacks. For example, in Australia "sensitive plant" (*Mimosa pigra*), a woody legume, escaped from the Darwin Botanical Gardens during a major flood. The seeds were transported into the Adelaide River, which transverses the sensitive Kakadu National Park. The spread of *Mimosa pigra* has now become a significant problem in the region and in other areas of the world.

Which are the worst invasive species? -- rabbits in Australia, zebra mussels in the Great Lakes, etc

The following examples are taken from:

Source: Lowe S., Browne M., Boudjelas S., De Poorter M. (2000) *100 of the World's Worst Invasive Alien Species A selection from the Global Invasive Species Database*. Published by The Invasive Species Specialist Group (ISSG), a specialist group of the Species Survival Commission (SSC) of the World Conservation Union (IUCN), 12pp. First published as special lift-out in *Aliens 12*, December 2000. Updated and reprinted version: November 2004.

Feral Pig (*Sus scrofa*)

Feral pigs are escaped or released domestic animals. Introduced to many parts of the world, they damage crops, stock and property, and transmit many diseases such as Leptospirosis and foot and mouth disease. Rotting pigs dig up large areas of native vegetation and spread weeds, disrupting ecological processes such as succession and species composition. They are omnivorous and their diet can include juvenile land tortoises, sea turtles, sea birds and endemic reptiles. Management of this invasive species is complicated by the fact that complete eradication is often not acceptable to communities that value feral pigs for hunting and food.



Strawberry Guava (*Psidium cattleianum*)

The strawberry guava is native to Brazil, but has been naturalised in Florida, Hawai'i, tropical Polynesia, Norfolk Island and Mauritius for its edible fruit. It forms thickets and shades out native vegetation in tropical forests and woodlands. It has had a devastating effect on native habitats in Mauritius and is considered the worst plant pest in Hawai'i, where it has invaded a variety of natural areas. It benefits from feral pigs (*Sus scrofa*) which, by feeding on its fruit, serve as a dispersal agent for its seeds. In turn, the guava provides favourable conditions for feral pigs, facilitating further habitat degradation.

Miconia (*Miconia calvescens*)

A highly ornamental tree from South America, Miconia was introduced to a botanical garden on the island of Tahiti in 1937. Its huge red and purple leaves made it highly desirable for gardeners. It was spread into the wild by fruit-eating birds and today, more than half the island is heavily invaded by this plant. It has a superficial and tentacular rooting system that contributes to landslides and has become the dominant canopy tree over large areas of Tahiti, shading out the entire forest under-story. Scientists estimate that several of the island's endemic species are threatened with extinction as a result of habitat loss due to Miconia. It has been introduced to other Pacific islands, including Hawaii where it was introduced as an ornamental in the 1960s. The plant has since been found in many locations on the Hawaiian islands. It is still sold as an ornamental plant in the tropics.

Western Mosquito fish (*Gambusia affinis*)

The mosquito fish is a small, harmless-looking fish native to the fresh waters of the eastern and southern United States. It has become a pest in many waterways around the world following initial introductions early last century as a biological control of mosquito. In general, it is considered to be no more effective than native predators of mosquitoes. The highly predatory mosquito fish eats the eggs of economically desirable fish and preys on and endangers rare indigenous fish and invertebrate species. Mosquito fish are difficult to eliminate once established, so the best way to reduce their effects is to control their further spread. One of the main avenues of spread is continued, intentional release by mosquito-control agencies

Small Indian Mongoose (*Herpestes javanicus (auro-punctatus)*)

This voracious and opportunistic predator is native to areas from Iran, through India to Myanmar and the Malay Peninsula. It was introduced to Mauritius and Fiji and to the West Indies and Hawaii in the late 1800s to control rats. Unfortunately, this early attempt



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at biological control has had disastrous impacts. Island populations of native fauna, which had evolved without the threat of a fast moving, mammalian predator, were no match for the mongoose. It has caused the local extinction of several endemic birds, reptiles and amphibians and threatens others including the rare Japanese Amami rabbit (*Pentalagus furnessi*). The small Indian mongoose is also a vector of rabies.

Rosy wolf snail (*Euglandina rosea*)

Native to the southeastern United States, the predatory rosy wolf snail was introduced to islands in the Pacific and Indian Oceans from the 1950s onwards as a biological control agent for another alien species, the giant African snail (*Achatina fulica*). The giant African snail was intended as a food source for humans but became an agricultural pest. In French Polynesia, the fast moving rosy wolf snail rapidly eliminated local endemic species. One group threatened by the rosy wolf snail is the Partulid tree snails, which evolved separately from each other in isolated valleys and exhibit a variety of unique characteristics. Many Partulid tree snails have been lost already and today the survivors exist in zoos and in the world's first wildlife reserves for snails. This invasion by a biological control agent has caused a significant loss of biodiversity.

Water Hyacinth (*Eichhornia crassipes*)

This South American native is one of the worst aquatic weeds in the world. Its beautiful, large purple and violet flowers make it a popular ornamental plant for ponds. It is now found in more than 50 countries on five continents. Water hyacinth is a very fast growing plant, with populations known to double in as little as 12 days. Infestations of this weed block waterways, limiting boat traffic, swimming and fishing. Water hyacinths also prevent sunlight and oxygen from reaching the water column and submerged plants. Its shading and crowding of native aquatic plants dramatically reduces biological diversity in aquatic ecosystems.

Nile Perch (*Lates niloticus*)

The Nile perch was introduced to Lake Victoria, Africa in 1954 to counteract the drastic drop in native fish stocks caused by over-fishing. It has contributed to the extinction of more than 200 endemic fish species through predation and competition for food. The flesh of Nile perch is oilier than that of the local fish, so more trees were felled to fuel fires to dry the catch. The subsequent erosion and runoff contributed to increased nutrient levels, opening the lake up to invasions by algae and water hyacinth (*Eichhornia*



crassipes). These invasions in turn led to oxygen depletion in the lake, which resulted in the death of more fish. Commercial exploitation of the Nile perch has displaced local men and women from their traditional fishing and processing work. The far-reaching impacts of this introduction have been devastating for the environment as well as for communities that depend on the lake.

What can shipping companies do to stop invasive species in ballast water tanks?

The main solution for shipping companies to prevent the transport of invasive alien species in ballast water tanks is to follow the International Maritime Organization (IMO) “Guidelines for the Control and Management of Ship’s Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens”.

These include:

- 1) Minimizing uptake of harmful aquatic organisms, pathogens and sediments,
- 2) Removing ballast sediment on a timely basis
- 3) Avoiding unnecessary discharge of ballast water
- 4) Conducting ballast exchange in deep sea where the organisms from shallow water do not generally survive
- 5) Non-release or minimal release of ballast water
- 6) Discharge the ballast to reception facilities provided by port

ISLAND BIODIVERSITY

Is it true to say that the invasion of alien species is the greatest global threat to island water diversity?

It is difficult to assess the relative weight of the many environmental pressures on islands – climate change, invasive alien species, pollution and coastal degradation. Furthermore, they are often inter-related. However, it is true that the complex impacts of invasive alien species are among the top concerns. Just recently, the nine Pacific island Parties to the Convention on Biological Diversity issued a statement for COP 9 that says “invasive species remain our most critical threat to achieving the CBD objectives and one that may be more difficult to combat given the impacts of climate change and climate change responses”. Please see more on this issue at: <http://www.cbd.int/island/invasive.shtml> .

What can you do to protect island animals and plants to ensure they do not go the way of the dodo in Mauritius?

It is true that islands are a particularly sensitive ecosystem. Of the 724 recorded animal extinctions in the last 400 years, about half were of island species. At least 90% of the



bird species that have become extinct in that period were island-dwellers. It is, however, possible to avoid this fate, and progress has been made recently. The Convention on Biological Diversity adopted a specific programme of work on island biodiversity at COP 8 in 2006. It sets out almost 50 priority actions for Parties, organized under seven focal areas, including the protection of biodiversity and promotion of its sustainable use, maintaining ecosystem goods and services, fostering traditional knowledge systems, and ensuring appropriate funding for the implementation of the programme of work. Recent breakthroughs include the Micronesia and Caribbean Challenges, the Coral Triangle initiative, and the commitment by the Global Environmental Facility to allocate over 100 million US dollars to the implementation of the programme. At the CBD's COP 9, Parties will discuss this issue on Monday 19 May, under agenda item 4.10. A document highlighting what Parties are doing on islands is available as UNEP/CBD/COP/9/19, at www.cbd.int/doc/meetings/cop/cop-09/official/cop-09-19-en.doc. You can also learn more about what is being done at <http://www.cbd.int/island/casestudies.shtml>.

Can you get rid of invaders such as rats if they manage to get a foothold?

Definitely yes, and the recovery of the original ecosystems is relatively quick. Many Parties to the Convention, such as New Zealand, have achieved remarkable success at this. Close to Auckland, various islands have been freed of invasive species such as rodents (Rangitoto, Motutapu, Motuora, Kawau, Tiritiri Matangi Islands), and are already in various stages of invasive species control and recovery of its original endemic flora and fauna. Some protected areas such as Tawharanui Regional Park display pest-proof fences and are a showcase of ecosystem restoration. Karori Sanctuary in Wellington is a successful example of a public-private partnership to control invasive species resulting in rapid recovery of indigenous fauna (tuatara, amphibians, and birds). IUCN's Invasive Species Specialist Group records a number of successful experiences (www.issg.org/). The Pacific Invasives Initiative (PII) of the Cooperative Islands Initiative, supported by New Zealand, was launched in 2004 and has recently secured another five-year funding arrangement (see www.issg.org/cii/PII/).

How is biodiversity at risk on islands from climate change (rising seas, nowhere to go if the climate becomes unsuitable)?

Islands suffer different effects from climate change: the onset and duration of wet and dry seasons change, affecting natural ecosystems and traditional agro-forestry systems, phenomena of severe and extreme weather become more pronounced, coral reef bleaching and degradation will in turn reduce protection against wave and weather impacts, and the sea level may rise, which also affects freshwater levels and erosion of



coastal landscapes. As the microclimate changes, several species cannot adapt by migrating upwards or pole-wards to find suitable habitats. What can be done involves adaptation to climate change and mitigation (i.e. reducing the carbon emissions). Islanders can, for instance, choose climate-resilient species (those that can adapt to the changes) for cultivation and restoration, can set up networks of protected areas for species mobility, and can start reforestation programmes with mangroves, coral reef protection and ecosystem restoration (endemic species are often quite resilient). You can find more information on what can be done at www.cbd.int/climate/done.shtml.

PROTECTED AREAS

Do protected areas help the livelihoods of the people who live near them?

Protected areas, when carefully designed and managed, can contribute to poverty reduction, sustainable development including the achievement of the Millennium Development Goals. The provisioning services (food, fuel, fresh water and herbal medicines) of protected areas have direct use value to rural communities. Many poor people in rural areas depend on protected forests, pastures, wetlands and marine areas for their livelihoods. There is increasing recognition that conservation efforts supporting protected area creation and management are essential to achieving the Millennium Development Goals, since these areas maintain healthy ecosystems and their services.

- Studies have shown that nearly 1.1 billion people worldwide depend on forest protected areas for their livelihoods, and that forest-related income provides a significant share of total household income.
- Marine and inland water protected areas serve as an excellent source of substantial income and food security from fishing for poverty-stricken households. A study in Cambodia has shown that fuel wood, fishing and other resources, provided by mangrove protected areas, constituted 20 to 58% of household incomes, with heavier reliance among poorer households.
- The 50,000 residents of Lupande Game Management Area in Zambia raise annual revenue of US\$ 230,000 (representing 80% of the total revenue) from two hunting concessions.
- The Maya Biosphere Reserve in Guatemala generates an annual income of approximately US\$ 47 million and provides employment to 7000 people.
- Pollination services of protected areas in Cape Region in South Africa are worth approximately US\$ 400 million annually.



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- Wetland and woodland products from the community –managed Mtanza-Msona Village Forest Reserve, adjacent to the Selous Game reserve in Tanzania, are worth almost eight times as much as all other sources of farm production and off-farm income of the poorest household in the village. The value of the wide range of wild foods harvested from wetlands is more than 14 times that of household's average annual expenditures on food from market.
 - Marine protected areas (MPAs) help empower women economically and, in some cases, socially. In Navakavu MPA in Fiji, women are the reef gleaners and benefit financially by collecting and selling the bountiful shellfish from just outside the marine protected area. In MPAs of Bunaken in Indonesia and Apo Islands in the Philippines, diving tourism created more high-income job opportunities for women, improving their lives. In the Arnavons MPA in Solomon Islands, women gained a stronger voice in community meetings when they became involved in income earning activities of seaweed farming and traditional clothes making.

For further information: CBD Technical series number 36 - [Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet](http://www.cbd.int/doc/publications/cbd-ts-36-en.pdf)
www.cbd.int/doc/publications/cbd-ts-36-en.pdf

The value of nature: ecological, economic, cultural and social benefits of protected areas.
www.cbd.int/doc/publications/cbd-value-nature-en.pdf

Are there enough protected areas? About 11% of the world's land area?

Globally, the number of protected areas has been increasing significantly over the last decade, and there are now more than 100,000 protected sites worldwide covering 11.6% of the Earth's land surface, making them one of the Earth's most significant land uses. However, while the number and size of protected areas have been increasing, biological diversity loss continues unabated. Moreover, there are substantial differences in coverage between different biomes, ecosystems and habitats. Only 5% of the world's temperate needle-leaf forests and woodlands, 4.4% of temperate grasslands and 2.2% of lake systems are protected. Furthermore, marine coverage lags far behind terrestrial coverage, with approximately 0.6% of the ocean's surface area and about 1.4% of the coastal shelf areas protected. A more detailed analysis of the 825 terrestrial ecoregions and 64 large marine ecosystems shows that for a large percentage of these ecosystems, which are characterized by distinct populations of species, the target of 10% protected area coverage is yet to be achieved.



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However, many protected areas are ineffective for a number of reasons, including: (i) insufficient financial and technical resources to develop and implement management plans or lack of trained staff; (ii) lack of scientific data and information for management decisions, including information on the impacts of resource use and on the status of biological resources; (iii) lack of public support and unwillingness of users to follow management rules, often because users have not been involved in establishing such rules; (iv) inadequate commitment to enforcing management rules and regulations; (v) unsustainable use of resources occurring within protected areas, including impacts of human settlement, illegal harvesting, unsustainable tourism, and introduced invasive alien species; (vi) contribution to poverty where local people are excluded; (vii) impacts from activities in land and sea areas outside the boundaries of protected areas, including pollution and overexploitation; (viii) poor governance or lack of clear organizational responsibilities for management and absence of coordination between agencies with responsibilities relevant to protected areas; and (ix) conflicting objectives of the protected areas. These issues were discussed at length at the fifth World's Parks Congress, held in 2003 in Durban, South Africa and reviewed in CBD Technical Series No 15.

Should there be more marine protected areas? (Currently less than 1% of oceans protected)

Yes there is a need for more marine protected areas. Recent research has shown that Marine Protected Areas (MPAs) can contribute to the conservation of ocean species and habitat, and aid in the development of sustainable fisheries. MPAs protect exploited species during critical stages of their life, and act as insurance against poor and inadequate fishery management. They protect sedentary species such as shellfish, reef fish, and rockfish; they can also help protect migratory species such as salmon and cod through protection of key spawning, rearing grounds, and migration corridors. MPAs have been shown to increase the average size of organisms, as well as their density within their boundaries. They enhance the fish populations outside of the reserve by spillover into adjacent areas. Yet, only a mere 0.5% of the oceans are protected through MPAs against 12% of the terrestrial lands, and marine waters beyond national jurisdiction have nearly no MPA to support deep-sea fisheries and the “global marine commons.

The implementation of MPAs for fisheries management has increased recently due to the role of MPAs in conserving biodiversity, increasing fish stocks, and enhancing the food security of coastal communities.



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How do you fund protected areas -- persuade people to keep out and see the benefits from safeguarding nature?

Establishing and managing protected areas costs money. There are significant running costs associated with ensuring that protected areas are effectively protected, that local communities benefit from them and that the value of protected areas are maintained in perpetuity. Three separate studies estimated the total annual cost for effective management of the existing protected areas in developing countries ranges from US \$1.1 billion to \$2.5 billion per year and the funding shortfall (total cost minus current funding) between US \$1 and 1.7 billion per year.

Governments are conscious of these estimated shortfalls and, in adopting the programme of work on protected areas, called for increased financing, including external financial assistance for developing countries and countries with economies in transition. The Conference of the Parties therefore urged Parties, other Governments and funding organizations to “mobilize as a matter of urgency through different mechanisms adequate and timely financial resources for the implementation of the programme of work by developing countries, particularly in the least developed and the small island developing States amongst them, and countries with economies in transition, in accordance with Article 20 of the Convention, with special emphasis on those elements of the programme of work requiring early action” (paragraph 9 of decision VII/28). The Conference of the Parties also called on Parties and development agencies to integrate protected area objectives into their development strategies (paragraph 11 of decision VII/28).

Implementation of the programme of work needs enhanced funding. Since the Convention came into force in 1993, the world’s protected areas grew by almost 100% in number and 60% in size, yet in the same period, international financing for biodiversity conservation grew only 38%. How are we to meet the additional resource requirements? There is no one-size-fits-all solution. We need an open-minded, pragmatic and flexible approach. Expanded public funding will be fundamental to financial sustainability. Building strong institutional arrangements for financing the implementation of the programme of work is essential. Institutions, including governments, donors, international NGOs and the private sector, should seek opportunities to create synergies and partnerships, and approach the lack of funding through concerted efforts. There is a need for developing a diversified financial portfolio of both traditional and innovative financial mechanisms and a need for development and implementation of innovative financial mechanisms.



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Isn't one of the greatest threats to all this talk by indigenous people that the colonialists 'stole' land from them and turned it into protected areas?

For over a century, protected areas in the form of government notified sites for wildlife conservation have been managed through centralized bureaucracies in ways that totally or largely excluded local communities. Given that most Protected Areas (PAs) have traditionally had people living inside or adjacent to them, dependent on their resources and often with associated age-old beliefs and practices, such management has alienated communities. There is also increasing evidence that PAs have often caused further impoverishment of already economically marginal communities, through loss of access to livelihood resources, physical displacement, and other impacts. One of the common features of many recent innovations is the notion of participatory or community based governance. Simply put, the focus is on greater involvement of local communities, with net benefits for both conservation and people.

Ecological, economic and social benefits of protected areas can only be enhanced and sustained when they are effectively managed through good governance. Participatory decision-making and management processes that incorporate and respond to the rights and interests of a broader range of stakeholders – particularly the indigenous and local communities living in and around protected areas are essential ingredients of good governance. Participatory and equitable conservation, with involvement of indigenous and local communities, can enhance net benefits for both conservation and people. Collaboratively Managed Protected Areas and Community Conserved Areas are the two broad categories of participatory conservation that incorporate several principles of 'good governance' and there are now many documented examples of these areas around the world.

Is a wetland, a forest or a mangrove worth more left alone or converted to anything from farmland to aquaculture? Some studies show that intact ecosystems are worth far more

Land use change and conversion is one of the major drivers of biodiversity loss. The value of intact ecosystems is far more than the benefits accrued from their conversion. Over the last 40 years there has been a paradigm shift in the role of protected areas from "national parks and reserves" to a broader conceptual and practical approach, including sustainable use areas. Currently, it is recognized that protected areas contribute, besides



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their conservation function, to human welfare, poverty alleviation and sustainable development. The goods and services that protected areas provide include, *inter alia*, protection of species and genetic diversity; maintenance of ecosystem services, such as watershed and storm protection; carbon sequestration; products for livelihoods of local people (for example, improvement of fishery and forestry yields); and other socioeconomic benefits, such as in relation to tourism and recreation. Protected intact ecosystems, possessing and protecting both material and non-material riches, play key role in economic and social welfare of humanity and the ecological health of the planet. Protected areas provide valuable and numerous benefits to:

- Protect biological diversity, and ecological and evolutionary processes
- Prevent and reduce poverty by supporting livelihoods, providing social and cultural governance and subsistence values, and maintaining ecosystem services
- Ensure breeding grounds for wildlife and fish, critical to the food security of hundreds of millions of people
- Protect commercial fisheries from collapse
- Provide medicinal plants, biochemical components for the pharmaceutical industry and ecological balance that controls and acts as a barrier for diseases (e.g. malaria) and epidemics
- Hold important plant genetic resources for food and agriculture, including endemic and threatened wild crop relatives as well as land races for food production
- Filter and supply freshwater for both rural and urban populations around the world
- Mitigate the effects of natural disasters by acting as barriers and buffer zones for storms, floods, and drought
- Provide capacity to adapt to climate change
- Act as enormous natural carbon sinks and play a key role in global climate regulation
- Generate tremendous direct economic benefits, and serve as a key asset for the tourism industry -- critical to the economies of the majority of less developed, developing and island states, and one of the world's largest economic engines
- Offer space for people to enjoy recreation as well as spiritual and physical renewal
- Hold irreplaceable and immeasurable spiritual value for particular communities and faiths



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- Protect the territories and rights of indigenous and local communities providing them the resources and space to continue traditional lifestyles and retain control of their destinies
 - Facilitate governance mechanisms that enhance social capital and bring together a diversity of stakeholders at different levels, from transboundary conservation areas and peace parks, to local and municipal areas managed by collections of stakeholders

The benefits of protected areas extend spatially far beyond their boundaries.

The CBD process

What are the main negotiating blocks?

The main negotiating groups are the same as in other United Nations fora, that is five main regional groups: Asia and the Pacific, Africa, Latin America and the Caribbean (GRULAC), the Western and others Group (WEOG), which itself is subdivided in two main components (the European Union and the JUSCANZ). In addition, from time to time the developing countries speak as one voice through the "Group of 77 and China".

Other groups, cutting across regional groups, also exist and/or are created from time-to-time in connection with specific issues. For example, the "Group of Like-minded Megadiverse Countries" brings together 17 States from Africa, Asia and the Pacific and Latin America and the Caribbean in the context of the negotiation of the international regime on access and benefit-sharing. Also, the Group of Small Island Developing Countries (known as SIDS) speaks on the issue of biodiversity and climate change, as well as other issues of special interest to this group of countries. In the framework of discussions on the Cartagena Protocol on Biosafety, the "Group of Like-minded countries" has defended the interests of the main exporters of genetically modified organisms.

What are the main obstacles to progress at the talks?



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How does the CBD relate to the UNFCCC and the UNCCD?



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TRADITIONAL KNOWLEDGE 8(J)

Isn't it the case that as soon as any group has a chance to dump its so-called traditional knowledge it does so?

Traditional knowledge is actually quite valuable.

In fact 80% of humanity uses traditional knowledge for their health needs – something that many people in the occidental world forget. Many western medicines discovered and developed and fast-tracked by using traditional knowledge – as such many medicines are derived from traditional knowledge.

Traditional knowledge is locally based and based on practice and passed on through countless generations (usually orally) and as such is a valuable and useful heritage in managing the local area. In fact indigenous peoples have accumulated an encyclopedic knowledge of their traditional territories and this is necessary for effective environmental management. Indigenous peoples have the on-going and historic experience that their traditional knowledge has been taken and used without their consent. Much money has been made from derivatives of traditional knowledge with little return to the knowledge holders/owners and often those same communities do not have access to those products including medicines derived from their traditional knowledge.

At this time traditional knowledge is not adequately protected by many national or international law because of its collective nature (these legal systems are based on individual rights and largely ignore collective rights), making it vulnerable to unauthorised use.



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