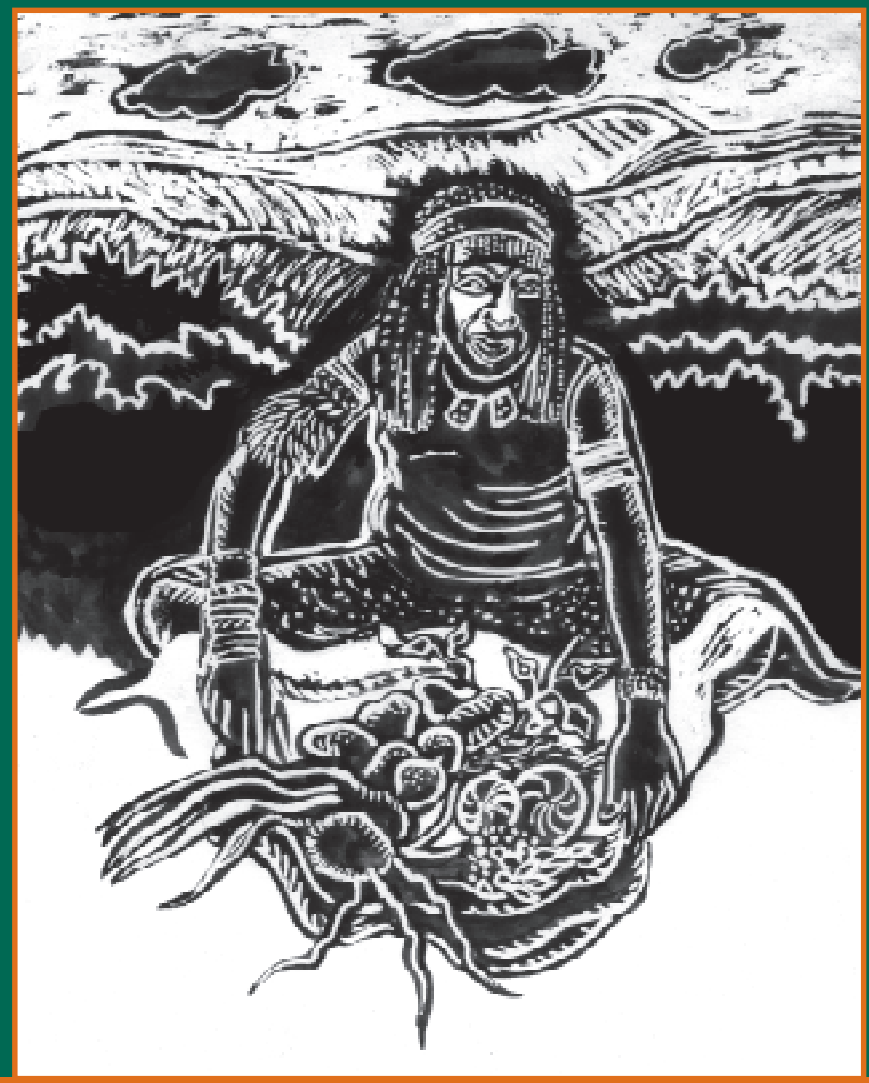
Biodiversity prospecting & access and benefit-sharing

An introductory primer

Sarah A Laird & Rachel Wynberg



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Preface and reader's guide

A need has long been recognised for increased capacity and knowledge about biodiversity prospecting – the search for commercially interesting genes and chemicals from nature. While the issue is receiving increasing attention, both at international and national levels, many of the people whom bioprospecting most affects remain confused about what it involves, and how best to ensure that benefits received from it are fairly shared. In many cases, there is poor understanding about some of the basic elements involved, and steps that can be taken to protect the rights of biologically rich countries, and of communities who nurture biodiversity and have special knowledge about plants and animals.

This primer was developed to meet some of these needs, and was conceptualised after repeated requests from groups working in southern Africa on these difficult issues. The authors wrote initial drafts as part of their involvement in a DFID-funded project in South Africa and Guyana entitled *Winners and Losers in the Commercialisation of Non-Timber Forest Products,* a research project focused on the impacts of commercialising products from marula and crabwood trees. The intention was to develop a generic draft that could be adapted by groups throughout the world to suit local circumstances, by means of local examples, relevant illustrations, and appropriate translation. This version for South Africa represents the first attempt to do this.

We hope this primer will be a useful guide, both for those just starting to grapple with the thorny issues associated with bioprospecting, as well as those who may have some knowledge on the issue, but who are looking for a quick and accessible reference. The target audience is wide, ranging from traditional healers and community members, through to non-governmental organisations and policy-makers. For those less familiar with the topic, a basic introductory guide to biodiversity (Chapters 1 and 2) and biodiversity prospecting (Chapter 3) is provided at the beginning of the primer. The text builds on this understanding and describes the different industries involved (Chapter 3), the use of traditional knowledge (Chapter 4), and ways in which such knowledge can be protected. It also tracks the way in which genetic resources and traditional knowledge have been used over the years (Chapter 4), international agreements that deal with these issues, and new ways to make the exchange of knowledge and resources fairer and more equitable (Chapters 5, 6 and 7). Those wanting more technical and detailed information are referred to the boxes with green borders (Boxes A–E), which can be conveniently skipped by those preferring to focus on the basics. A set of illustrations accompanies the text, in many cases providing stand-alone material that can easily be utilised for educational purposes.

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This booklet is available in English, Zulu and Southern Sotho.

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1 What is biodiversity?

Biodiversity is all the things that live in nature – plants, trees, insects, fishes, big animals and animals that are so small that you cannot easily see them (called microorganisms). Scientists use 'biodiversity', which is short for 'biological diversity', to describe the number and variety of living organisms on Earth and divide biodiversity into three main parts:

- *genetic diversity*, which is the variation of genes within species;
- *species diversity*, which is the variety and abundance of species within a certain area;
- *ecosystem diversity*, which is the variety of ecosystems – communities of plants, animals and microorganisms, and the soil, water, and air on which they depend – within a certain area, or the variety of species within different ecosystems.

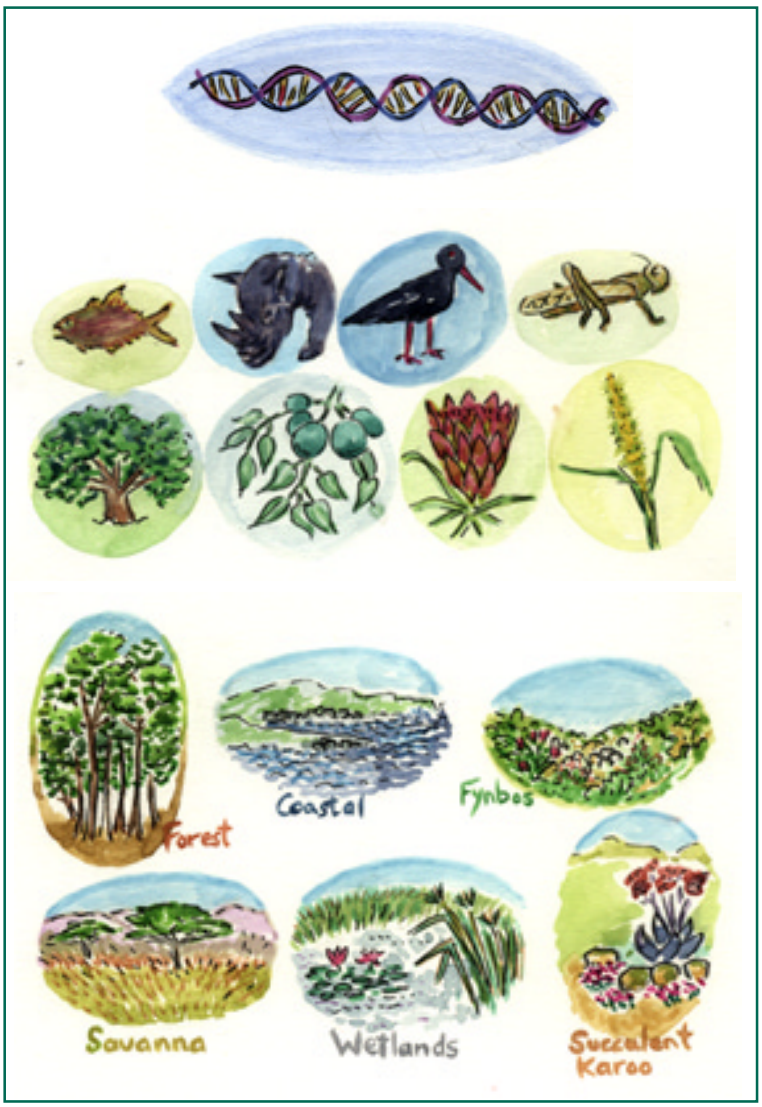

Figure 1. Biological diversity is made up of all species of plants and animals, their genetic material, and the ecosystems of which they are part.

Figure 2. A biologically diverse place is where you find many kinds of plants and animals living in many different natural habitats, as compared to a maize plantation where you find only a few types of plants and animals in a very similar environment.

Biodiversity is also about differences between things, and what is unique and changing about life on our planet. It describes many different kinds of things living together in the same space, often sharing complex relationships with each other. A biologically diverse place is not one where you find one kind of tree, or a few kinds of plants growing – it is where you find many, even hundreds, of kinds of plants. Living on and with these plants might be thousands of kinds of insects, and dozens of birds and animals that specialise in eating the fruit of only a few of the trees.

South Africa is a particularly special place for biodiversity and is the third most biologically diverse country in the world, containing between 250 000 and 1 000 000 species, many of which occur nowhere else. It has a rich and spectacular set of ecosystems and landscapes, ranging from desert to subtropical forest, and also a great diversity of marine and coastal systems. Nearly 10% of the world's plants are found in South Africa and about 7% of the birds, reptiles and mammals. But South African biodiversity is also highly threatened – by alien invasive species, habitat changes, climate change, and the overuse of resources.

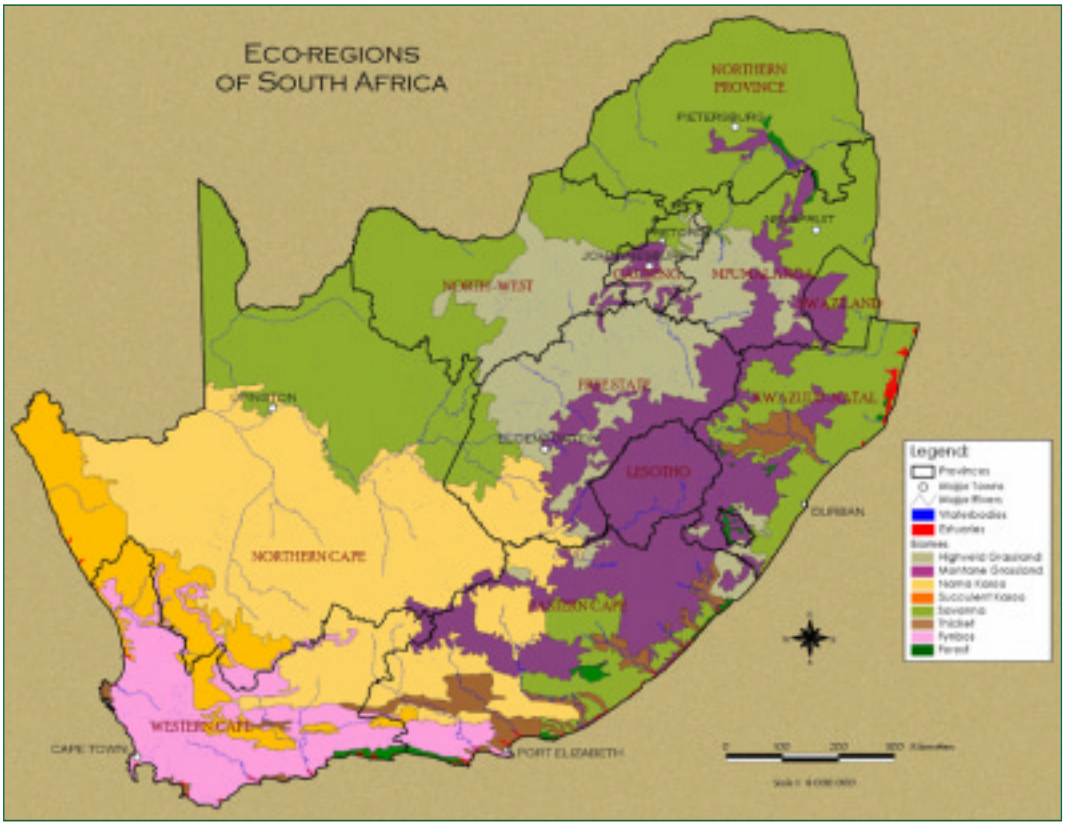

Figure 3. Ecoregions of South Africa. Map provided courtesy of WWF-South Africa.

2 Biodiversity as the basis for useful products

In biologically diverse places the many different kinds of things, squeezed into the same space, often depend upon each other for survival. For example, in the forests of Central Africa, only elephants can crack the seed casings of some trees, releasing seeds and allowing small trees to grow up. In the Amazon, enormous brazil nut trees need agouti and other local rodents to do the same. Bats are critical seed dispersers in many parts of the world. In South Africa, the rooibos plant, well-known for its delicious tea, requires ants to help break the skin of the seed and allow it to germinate. In the fynbos ecoregion, the Cape Sugarbird is uniquely adapted to feed upon nectar and insects from *Protea* shrubs, and also is an important pollinator of these plants. South Africa's marine environment provides equally unique relationships. Some limpets, for example, are found only on the species of kelp where the limpet's larvae will attach. Algae occurring within a coral's tissues are able to use the waste products of the coral and help to form the coral's skeleton.

Biologically diverse areas are like villages, or a very close neighbourhood, with many complicated and mutually dependent relationships. Each member of the group is highly specialised in ways that reflect its relationships with its neighbours, as well as the wider environment in which they live, including water, sunshine, soil, and important features such as mountains or rivers. As a result, species or groups of plants or animals or insects, become specialised and different from their close relatives living in another place. This means that for agricultural crops, and other useful products, it is often a good thing to search in different places for the wild relatives of – say – potato, maize, rice, or cocoa plants. These wild relatives often have unique qualities that were previously unknown but that, when bred with domesticated crops, make them much more useful to people as food, or easier to grow.

Biologically diverse places are not only home to cooperation, however. They are also sites of a great deal of competition for limited resources. Many plants, as well as poisonous frogs and spiders, microorganisms, and other animals develop chemical defenses to protect themselves from being eaten by predators. These chemicals – known as secondary compounds – are often very useful medicines. This is one reason why biologically diverse places are useful places to search for new drugs.

People have known this for thousands of years, and have developed many valuable medicines and other useful products. Some traditional medicines have also found their way into pharmaceutical drugs (see the table below). In fact, it has been shown that cultural diversity often matches biological diversity (see the map on page 3), and researchers wishing to understand the useful values of local plants almost always consult local peoples' traditional

knowledge of these species. Sometimes this may be formalised through agreements. For example, the CSIR, a semi-state research institution in South Africa, has launched a programme to evaluate the commercial potential of indigenous plants, and has entered into an agreement with a group of ten traditional healers. However, because more than 300 000 healers exist in the country, it is not always easy to identify the right people who should benefit from use of their knowledge.

Figure 4. In biologically diverse places animals and plants often depend upon each other for survival. For example, more than 3000 fynbos plant species have seeds that are dispersed by ants; in some *Erica* species the corolla tubes are curved to match the sunbird's bill; long-proboscid flies are important pollinators of many tubular-flowered species; and seed-eating rodents play a major role in controlling the regeneration of many shrub species.

Table: Some pharmaceutical drugs developed from traditional knowledge			
Plant name	**Active compound**	**Origin**	**Use**
May apple *Podophyllum spp*	Etoposide and teniposide	North America and Asia	Cancer
Pareira root, tubocurarine *Chondodenrdon tomentosum*	d-tubocurarine	South America	Anesthetic in surgery; used as an arrow poison known as curare by indigenous peoples
Snakeroot *Rauwolfia serpentina*	Reserpine	India	Hypertension
Quinine *Cinchona spp.*	Quinine	South America	Anti-malarial
Xhoba *Hoodia sp.*		Southern Africa	Anti-obesity (still under development)

3 Biodiversity prospecting

What is bioprospecting?

Biodiversity prospecting, sometimes shortened to 'bioprospecting', is the exploration of biodiversity for commercially valuable genetic resources and biochemicals. It describes a *search* for resources, and the *collection* of resources

Figure 5. Bioprospecting typically involves researchers collecting many different kinds of plants and animals from their natural habitats, often guided by local knowledge about the location and use of these resources.

with an intention to *commercialise* the resources. Bioprospecting can also include the collection from local communities of traditional knowledge relating to the use of these resources. When biodiversity or knowledge about biodiversity is collected without permission from the owners of these resources, and is then patented, it is often called 'biopiracy'.

Bioprospecting does not include all research on biodiversity. In particular, it does not include academic or conservation research (although these may have commercial applications in the future). It also does not include any commercial use of natural resources – for example it does not include the trade in commodities, even if they are medicinal plants (most medicinal plants are traded around the world today as bulk commodities). It does not include logging or mining or commercial agriculture, or even the local collection and sale of non-timber forest or veld products.

Bioprospecting refers to a small group of activities undertaken by a small number of commercial sectors. As a result, and because bioprospecting usually involves taking small samples of material, its impact on the environment is much less than many other more destructive practices – like large-scale clearing for commercial agriculture, or unsustainable logging. But it is important to make sure that bioprospecting is done right – that means that it is sustainable, ethical, and results in benefits for local people. We will discuss these points in the next sections.

Which industries are involved?

It is common today to believe that scientists can make anything we need in a laboratory, far from nature. But because nature – especially in biologically diverse places – makes so many unique and interesting genes and biochemicals, scientists and companies continue to seek out new ideas and new products from nature, or continue to 'bioprospect'. Some of the industries that do this include the pharmaceutical, seed, crop protection, cosmetic and personal care, botanical medicine, biotechnology, and horticulture industries. These are very different industries, however, and it is difficult to generalise in terms of how they use the genetic resources they collect, their research strategies, and even their size.

The sales figures in the illustration on page 10 reflect only sales of natural products. Some industries use 100% natural products, including the seed, botanical medicine, and horticultural industries. For others, natural products form only a small part of the products sold. The other products might be, for example, wholly synthesised, or derived from petrochemicals. For example, in the pharmaceutical industry natural products contribute 25–50% of total sales; in the cosmetic industry, less than 10% of sales come from natural products.

How do industries use traditional knowledge?

The ways these industries use traditional knowledge varies a great deal. Some, such as cosmetic, pharmaceutical, and botanical medicine companies, send researchers into the

Figure 6. Bioprospecting can include the collection of traditional knowledge about biodiversity, and the collection of plant samples and preparation of extracts from these plants for further analysis, but does not include all types of biodiversity use. For example, the bulk selling of medicinal plants in muti markets, the collection of firewood, or the export of cut flowers are not bioprospecting activities.

Figure 7. The industries involved in bioprospecting are very different in size and use biodiversity in very different ways.

field, or ask research institutions like botanical gardens and universities to talk directly with local communities about how they use biodiversity. Others get all the information they need from publications and databases (not usually compiled by companies, but rather by academic researchers). This is the most common way for companies to gain access to traditional knowledge. Some industries – like horticulture and biotech – appear to use very little or no traditional knowledge in their research and development, although biotech companies may use the *genes* of indigenous peoples in chemical prospecting and screening.

In general, traditional knowledge is not a central part of most companies' research programs today. But even if less important than in previous years, traditional knowledge continues to play a role. And as we see in the case of *Hoodia* in southern Africa (see pages 12–13), where traditional knowledge of the San was used to identify appetite-suppressing properties of the plant, it can lead companies directly to new products.

How can holders of traditional knowledge be protected from exploitation by these companies?

Companies can patent the active compounds they find in plants, or can use traditional knowledge without either the consent of holders of such knowledge, or their involvement in any benefits derived from the knowledge. How can holders of traditional knowledge be protected from such exploitation? Some believe that the existing intellectual property right (IPR) system can be used to help protect traditional knowledge, for example by giving benefits to holders of traditional knowledge from royalties, or by setting up systems where they can also obtain IPRs. But many traditional communities, civil society organisations and developing countries are resisting this idea. They point to the fundamental difference between traditional knowledge systems – which are typically collective and based on prior use – versus the western IPR system, which is based on privately-held monopoly rights and 'innovations' or 'discoveries'. Also, the high cost of patent applications and their enforcement, and the technical difficulties of obtaining IPRs, make them out of reach for most developing countries and virtually all holders of traditional knowledge. So what other mechanisms exist to protect traditional knowledge? Some countries have developed special laws, and these are important tools. General awareness-raising is also crucial, to inform people about their rights to say no and to demand equity and fairness when they choose to enter into commercial partnerships.

In South Africa, there is currently no legislation that protects holders of traditional knowledge. However, two new laws are likely to change this situation. A Biodiversity Bill is presently before Parliament, and aims to ensure the fair and equitable sharing of benefits arising from traditional use or knowledge of biodiversity. An Indigenous Knowledge Systems Bill is also planned, and it is hoped that this will help to protect all forms of indigenous knowledge. It is important that communities and holders of traditional knowledge become familiar with these new laws, and try to influence them to meet their needs.

Commercialisation of *Hoodia* based on San traditional knowledge

For thousands of years, the San of the Kalahari, numbering some 100 000 across South Africa, Botswana, Namibia and Angola, have used species of the succulent *Hoodia* genus (of the family Asclepiadaceae) to stave off hunger and thirst. In the 1960s, as part of wider research into the use of local species as food, the South African Council for Scientific and Industrial Research (CSIR) collected and began investigating *Hoodia*. At the time of collections, the CSIR did not sign an agreement with the San. Nor did they do so in 1997 after CSIR patented an appetite-suppressing compound known as P57 from the plant and signed a licensing agreement with Phytopharm plc, a small UK research-based pharmaceutical company. Soon after, Phytopharm sold the rights to an exclusive global license for P57 to Pfizer, a US pharmaceutical company better equipped to take promising leads through the development phase. Although the CSIR received benefits in the form of laboratory facilities and milestone payments, and will receive royalties if the product is successful, no arrangement was in place to benefit the San for their traditional knowledge.

The San were unaware of these developments, but through lobbying from Biowatch and other NGOs, the case became a high-profile story in the media. As a result, the San publicly spoke out against the commercial use of their knowledge without their consent, and hired a lawyer to defend their rights to benefit from the use of their knowledge. They then entered into a Memorandum of Understanding with the CSIR, which acknowledges the need to provide benefits for the use of their traditional knowledge should a commercial product be developed, but does not include specific details of this benefit-sharing package. The MOU acted as the basis for future negotiation and most importantly recognised the San as the originators and

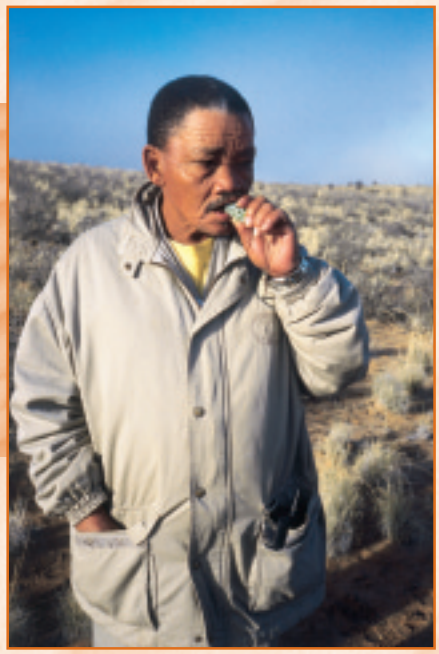

Figure 8. *Hoodia* has long been used by the San to stave off hunger and thirst. Vet Piet Kleinman of the !Khomani San demonstrates use of the plant.

custodians of traditional knowledge associated with the use of *Hoodia*.

In March 2003, agreement was finally reached on a financial benefit-sharing agreement, which – if the product is successful - will see the San receiving 6% of all royalties received by the CSIR, and 8% of the CSIR's milestone income received when certain targets are reached. Money will be paid into a Trust set up by the CSIR and the South African San Council to uplift the standard of living and well-being of the San peoples of southern Africa.

Figure 9. The CSIR explain to the San at a Kalahari workshop how they obtained knowledge of *Hoodia*.

The case is extremely important because of the precedent it sets for other holders of traditional knowledge. However, even though the San may receive many millions of Rands, this amounts to less than 0.003% of net sales of the product, and most money will go to Pfizer and Phytopharm.

There is currently no legislation to guide such agreements – an important way to ensure that any future such commercialisation benefits local groups - but the current development of a Biodiversity Bill and Indigenous Knowledge Systems Bill will help address these concerns.

Figure 10. Petrus Vaalbooi, member of the !Khomani San and chairperson of the South African San Council demonstrates the preparation and use of *Hoodia gordonii*.

4 How people view and exchange genetic resources and traditional knowledge

Changes in the last decade

For much of human history, genetic resources have moved around the world, passed between traders, been provided as gifts and been smuggled out in the dark of night. Most of our major crops are now grown in regions far from the plant's origin: Cocoa (*Theobroma cacao*) comes from South America, and while still produced there, it is also widely grown in Africa and Asia. Rubber (*Hevea brasiliensis*) is from the Amazon, but is now mainly grown commercially in SE Asia; and maize (*Zea mays*) from Mexico is popularly grown around the globe. Quinine (*Chincona* spp.) was smuggled out of the Andes to provide anti-malarial drugs to expanding tropical empires in the mid-1800s; breadfruit has a similarly eventful history of expansion (eg The Bounty). Many species were also exported from South Africa, mostly by colonial botanists, including many of the geraniums and gladioli that adorn gardens and houses throughout Europe and elsewhere.

By the 1980s, it was clear that with scientific and technological advances genetic resources were a valuable starting point for research and development in extremely profitable industries. At the same time, the rights of companies to claim ownership over products were expanding, alongside global intellectual property rights systems, and as part of an increasingly globalised economy.

Although germplasm of valuable species has long been smuggled to and from different parts of the world, until recently there did not exist formal international recognition of the rights of countries, or indigenous peoples holding knowledge about useful species, to control and benefit from their genetic resources. Many in high-biodiversity countries (which are largely concentrated in what is called the 'South' versus the more technologically advanced 'North') began to feel that the historical patterns of exchanging genetic resources – always inequitable – had become even more so. They pushed in various fora to have this issue addressed. It finally took shape in the Convention on Biological Diversity (CBD) and other documents adopted at the 1992 United Nations Conference on the Environment and Development (the 'Earth Summit'), held in Rio de Janeiro. The CBD created fundamental changes in the way genetic resources are exchanged and viewed: no longer are biological resources seen as the 'common heritage' of humankind. Instead, countries have sovereign rights over their biological resources and control over their access (see Box A).

Box A. The Convention on Biological Diversity

The objectives of the **Convention on Biological Diversity (CBD)** are:

- the conservation of biodiversity
- the sustainable use of its components, and
- the fair and equitable sharing of benefits arising out of the use of genetic resources.

Growing out of this combination of objectives, and the CBD's recognition of national sovereignty over genetic resources, is the basis for a new way of treating the trade in genetic resources. It is referred to as 'access and benefit-sharing' (or ABS for short) because in order to gain access to resources a user must provide benefits, and in order to receive benefits a provider must facilitate access to resources.

This means that as of December 1993, when the Convention entered into force, companies and signatory countries have an obligation:

- to get permission before they collect resources and knowledge (*Prior Informed Consent*),
- to agree on the terms for exchange (*Mutually Agreed Terms*), and
- to share benefits fairly with local providers and countries (*Fair and Equitable Benefit-Sharing*).

There are other important international agreements related to the CBD and the issues it deals with. The International Treaty on Plant Genetic Resources for Food and Agriculture – or the 'Law of the Seed' – adopted in 2001 after seven years of negotiation, puts in place a system to ensure that access to seed and germplasm is not restricted for the most common food crops of the world, and that there is fair sharing of benefits arising from their use. It also prevents companies from claiming ownership of these crops and supports the rights of farmers to save and exchange seeds.

Another important agreement is the Union for the Protection of New Varieties of Plants (UPOV) which provides common rules to protect new varieties of plants, for example a new type of fruit developed through cross-breeding. The system, which was first adopted in 1961 and amended in 1978 and 1991, has been developed mainly for commercial breeders and gives them powerful rights over the use of the material. This means that farmers growing protected varieties must pay the breeder to use them, and are not allowed to sell any seeds from the crop. In some cases farmers are not even allowed to save the seed for their own use, or to swap seeds with their neighbours. Sometimes, the breeder has used the knowledge of farmers to develop the variety, but the farmers get no benefits for their knowledge, and may even have to pay to use the material once the breeder has ownership through intellectual property rights (IPRs). This has led many to believe that UPOV is an unfair system that only protects commercial interests.

The 1995 Trade-Related Intellectual Property Rights Agreement (TRIPS), which is one of several agreements of the World Trade Organisation, has also been attacked for

Figure 11. Genetic resources and knowledge are often taken illegally but the Convention on Biological Diversity has introduced a new way of doing things. Those collecting biodiversity and associated knowledge are now required to get the permission from governments and communities that provide these resources *before* collection takes place.

protecting companies at the expense of farmers and communities in developing countries. TRIPs makes it compulsory for countries to protect plant varieties using IPRs. The agreement has been criticised for opening the door to the patenting of life, and raises deep moral issues about the privatisation of life by big multinational companies and monopoly control of knowledge, while inadequately protecting the rights of holders of traditional knowledge.

Mostly in response to these pressures, and in a strong stand against the patenting of life, a 'Model Law' has been adopted by the Organisation of African Unity (now the African Union) to protect the rights of local communities, farmers and breeders, and to regulate access to genetic resources. This Model Law, adopted in 1999, is meant to help African governments to develop their own legislation to protect biodiversity and livelihoods. It aims to provide an alternative system to protect community rights that is in keeping with African cultures and traditions and does not rely on monopoly control. The law has a strong focus on agriculture.

These and other international laws provide an extremely important backdrop for the local management and use of biodiversity, especially as the world gets smaller through globalisation. It is critical, however, that these international, as well as national and local level laws and actions, bring fairness, social justice, and ecological sustainability into the biodiversity equation.

5 Making things 'fair and equitable'

It has been only ten years since this change of thinking was formalised in international law. This follows thousands of years in which genetic resources were viewed and traded without restriction or obligation. It will take time to adapt to this new approach, but significant progress has been made, as we will discuss in the next section. Here we will talk about some of the challenges that must be overcome in order to achieve fairness and equity in practice.

Some of the difficulties encountered thus far include the lack of working definitions for what constitutes '*fair and equitable*'. Each group may interpret this in a different way. In the case of the San, for example, even four years following entry into force of the CBD, the intermediary research institution CSIR thought that the 'fair' approach was one in which they waited until a commercial product was developed and only then negotiated with the San to share benefits. The San disagreed, and demanded something in writing before that time (see pages 12 and 13).

In many countries, there are no laws or regulations guiding these activities, and so institutions and local groups make up the rules as they go along, often with little experience or expertise. Some even negotiate agreements with sophisticated companies that, as the illustration below shows, may be larger than the economies of the countries with whom they negotiate. Indigenous and rural peoples are particularly disadvantaged in negotiating with companies, and need outside support and assistance to do so effectively.

Despite a wide range of existing and potential problems, through a process of trial and error, a great deal has been learned about 'access and benefit-sharing' over the last decade. As a result, we are well on the road to developing both the frameworks, and the practical means, to make the exchange of genetic resources fairer and more equitable.

Figure 12. Discrepancies in wealth and negotiating power between large pharmaceutical companies and some biologically diverse countries in southern Africa. Figures are for 2001/2002 in US$ millions.

6 New ways to make the genetic resource exchange fairer and more equitable

What is the new framework for fair and equitable exchange and partnerships?

The new framework for fair and equitable exchange and partnerships is made up of a combination of complementary legal and ethical tools. This package of approaches includes international and national law and policy, contractual agreements, researcher codes of ethics, institutional policies, indigenous peoples' declarations, and corporate policies.

International treaties and 'soft law'

The CBD is one of a number of international treaties that have come to define the scope of new partnerships for exchange of genetic resources and traditional knowledge. More recently, parties to the CBD adopted what are known as the **Bonn Guidelines**, a voluntary set of standards to guide the development of access and benefit-sharing agreements. Some countries are urging that this be developed into a legally-binding international agreement. The **Johannesburg Plan of Action**, an outcome of the 2002 World Summit on Sustainable Development, includes a commitment by governments to negotiate 'an international regime to promote and safeguard the fair and equitable sharing of benefits arising out of the utilisation of genetic resources'. In addition to the CBD, other international treaties which address issues of prior informed consent, intellectual property rights, traditional resource rights, and benefit-sharing include the **UN Convention to Combat Desertification** (1994), and the **International Labor Organization (ILO) Convention 169 Concerning Indigenous Peoples** (1989). Non-legally binding laws – or 'soft laws' – with moral weight include the **Rio Declaration**, **Agenda 21** and **Forest Principles** which came out of the 1992 UNCED, and the **Universal Draft Declaration of Human Rights** (1948) and **UN Draft Declaration on the Rights of Indigenous Peoples** (1994).

National and regional laws

The CBD leaves the right to determine access and benefit-sharing to national governments. Around 100 countries have already introduced, or are developing laws and other policy measure to regulate access and benefit-sharing (Box D), and two countries – the Philippines (through its 1997 **Indigenous Peoples Rights Act**, IPRA) and Peru – have developed laws to protect

and control access to indigenous knowledge. The first access and benefit-sharing measures included those of the Philippines (the **Philippines Executive Order 247 on Access to Genetic Resources**) and the **Andean Community's Decision 391**, which establishes a common regime on access in Bolivia, Colombia, Ecuador, Peru and Venezuela. Recent additions include the **Biological Diversity Bill** (No. 93 of 2000) in India and the Brazilian ***Medida Provisoria*** (No 2, 186–16, 23 August 2001).

In southern Africa the development of legislation to regulate access and benefit-sharing and protect indigenous knowledge has been slow. In South Africa the process to develop this legislation has taken five years, and legislation has still not been tabled for public comment. In other southern African countries proposals have been made to base new legislation on the African Model law, but no countries have yet promulgated relevant legislation. In the interim, there is a policy vacuum and an unregulated free-for-all.

Box B. Key elements of access and benefit-sharing legislation

Elements most often found within national and regional legislative measures include:

- Principles, objectives, and definitions
- Scope of application of the law and the legal status of genetic resources (includes type of resources to be covered, coverage of traditional knowledge, geographic limits, and activities and actors to be covered)
- Institutions to oversee access to genetic resources
- The access determination process (application, review of application, access determination by a competent authority, appeal)
- Implementation and enforcement provisions

Box C. Following a good consultation process

In order to draft ABS measures, a process of national consultation with a wide range of stakeholders is necessary. A good consultation process includes the following steps:

- Establish a plan for participation and involve stakeholders in this plan from the start
- Engage stakeholders actively in decision-making and secure their trust and understanding
- Secure official commitment to the process and its output
- Provide incentives for participation
- Involve a wide spectrum of stakeholders, including government agencies from national to local level
- Be democratic, transparent and accessible
- Build the capacity of participants to make informed decisions
- Work at national, provincial and local levels
- Engage indigenous and local communities through representative organisations
- Respect traditional decision-making processes
- Ensure lessons from the process are learnt and institutionalised

Box D. Countries that regulate access to genetic resources or plan to do so

Countries and regional groups **already regulating access to genetic resources** to ensure prior informed consent and benefit-sharing include:

- the Andean Pact (Bolivia, Colombia, Ecuador, Peru, Venezuela)
- Australia (the States of Western Australia and Queensland)
- Brazil (at the Federal level and the States of Acre and Amapa)
- Cameroon
- Costa Rica
- the Republic of Korea
- Malaysia (the State of Sarawak)
- Mexico
- the United States of America (within Yellowstone and other national parks)
- the Philippines

Those **planning to regulate access to genetic resources** to ensure prior informed consent and benefit-sharing include:

- the member countries of the Association of South-East Asian Nations (ASEAN)
- Australia (the Commonwealth)
- Ivory Coast
- Cuba
- Ethiopia
- Eritrea
- Fiji
- the Gambia
- Guatemala
- India
- Indonesia
- Kenya
- Lao PDR
- Lesotho
- Malawi
- Malaysia (at the national level and the State of Sabah)
- Mozambique
- Namibia
- Nicaragua
- Nigeria
- the Organisation of African Unity;
- Pakistan
- Papua New Guinea
- Samoa
- the Seychelles
- the Solomon Islands
- South Africa
- Sri Lanka
- Tanzania
- Thailand
- Uganda
- Vanuatu
- Vietnam
- Yemen

Those who **may also be planning to regulate access to genetic resources** in the near future include:

- Belize
- China
- El Salvador
- Ghana
- Guyana
- Hungary
- Iceland
- Panama
- the Russian Federation
- Zimbabwe

Contracts/agreements/letters of intent/memoranda of understanding

A new style of agreement has grown out of changes in bioprospecting and the exchange of genetic resources over the last ten years. These bioprospecting agreements between commercial partners and a local research institution, community, company, or other group,

tend to follow principles of existing commercial contracts, but contain provisions related to access to genetic resources, sovereign rights, prior informed consent, traditional knowledge, benefit-sharing and intellectual property rights. Some of the questions that can be asked, to help decide if an agreement follows what has become 'best practice' are listed in Box D.

Indigenous peoples' declarations and statements

Over the last twenty years, indigenous peoples' organisations have issued a range of declarations and statements with very clear demands in terms of bioprospecting. These include ownership and inalienable rights over their knowledge and resources, requirements for their prior informed consent, right of veto over research and/or access to their land, knowledge or resources, and benefit-sharing. In some cases, these have included calls for a moratorium on bioprospecting until the legal framework is established to allow for equitable partnerships (www.biodiv.org/socio-eco/traditional/art8j.asp and http://users.ox.ac.uk/~wgtrr/decin.htm).

Box E. Assessing an agreement for "best practice"

1. What procedures were followed to obtain **prior informed consent** from (a) national government; (b) provincial government; (c) holders of knowledge about the plant or product; and (d) landowners where collecting took place?
2. What process was followed to reach agreement among **stakeholders**? Was the process successful? How transparent was the process? How transparent were the agreements?
3. How have **decisions** been made about the specific bioprospecting agreements – at the international level, within national government, within the provinces, within specific research institutions, at local level? Are the terms in the agreement acceptable to all parties?
4. What monetary benefits were derived from the collaboration by the various parties involved?
5. What non-monetary benefits resulted from the agreement? (eg research and development, technology transfer, education and training, institutional capacity building etc)?
6. What **mechanisms** have been put in place to implement benefit-sharing schemes?
7. How has **technology transfer** been effected by the initiative – has the providing country's scientific and technical capacity been strengthened by the project?
8. Have any patents or other forms of **intellectual property** been assigned for the product or related processes and how do these benefit the providing country and/or holders of traditional knowledge?
9. How have broader **environmental impacts** been considered?
10. How has **biodiversity conservation** been strengthened?
11. Does the agreement promote **social justice and equity** in the use of the providing country's biodiversity?

Codes of ethics and research guidelines

Researchers have developed a number of codes of ethics and research guidelines through professional societies like the International Society of Ethnobiology, the American Society of Pharmacognosy and the Society of Economic Botany. These lay out general principles for research partnerships, obligations of the partners, and sometimes include recommended guidelines for researcher behaviour in the field. A code of ethics and set of research guidelines is also under development by the Indigenous Plant Use Forum, a local networking organisation for researchers working on indigenous plants in South Africa. This provides a set of principles for those working on indigenous plants and with holders of knowledge, and aims to help researchers to work in an ethically responsible way (http://www.nrf.ac.za).

Institutional policies

A range of research organisations have developed institutional policies that establish general principles for their employees and associates. An example is the set of Principles for Participating Institutions, in which 28 botanic gardens and herbaria from 21 countries developed common standards on access to genetic resources and benefit-sharing (www.rbgkew.org/conservation). The Limbe Botanic Garden in Cameroon and other institutions working with indigenous peoples and local communities have endorsed these Principles, and then developed in more detail their own policies to translate them into action. These address practical issues confronted on a daily basis by the institution concerned, including the nature of their relationship with local communities (www.rbgkew.org/peopleplants/manual). Within South Africa, local institutions have been slow to develop institutional policies on bioprospecting, although the CSIR does have a general policy on how it approaches these issues (http://www.csir.co.za). In most cases, however, institutions tend to work in a policy vacuum, adapting as circumstances and pressures demand.

Corporate policies

A number of companies have developed corporate policies setting out their approach to compliance with the CBD. These generally describe the scope of resources covered by the policy, the standard to which the company means to be held accountable (eg absolute commitments, or commitments to make reasonable or best efforts), an undertaking to obtain prior informed consent and ensure genetic resources and information are obtained legally, and commitments to obtain clear legal title to the materials and information acquired, to share benefits fairly and equitably and to support conservation through environmentally sustainable sourcing. Some corporate policies describe the process followed to develop them and indicators to gauge success in their implementation.

Figure 13. The new framework for fair and equitable exchange and partnerships is made up of a range of different but complementary laws, policies, agreements, codes of ethics and declarations that operate at many different levels.

7 It takes time, but it also takes work

In order for access and benefit sharing to work in practice, a great deal of groundwork must be done first. As we have seen, many countries are trying to develop access and benefit sharing measures that will provide the legal basis for fair exchange on a national level. As part of this process, and in order to draft the most effective laws, national consultations must take place, capacity must be built and strategies for access and benefit sharing developed. Governments should also be realistic about implementing these measures, and should allocate funds to do so. However, the allocation of human and financial resources for the administration of bioprospecting needs to be weighed against the benefits which bioprospecting can realistically deliver. This is especially the case in developing countries, where there are many other pressing development and conservation problems that need the immediate attention of government.

Researchers and companies still need to better articulate their approaches in policies, codes, and research guidelines, and communicate these to countries where they collect and to communities with whom they work. For their part, local producer associations, indigenous peoples groups, community cooperatives, and others should become aware of the new terms for access and benefit-sharing, and should draft documents which can act as the basis for research agreements and communicate their concerns and priorities to others. Many rural groups will not be able to do this for themselves, but might seek assistance from local organisations that can advise and otherwise assist them. In South Africa, the San have used the services of a lawyer through the South African San Institute to help them negotiate an agreement with the CSIR. Other communities who feel their rights are being infringed may want to consult legal assistance organisations such as the Legal Resources Centre. Biowatch South Africa can also help to put communities in touch with the right people to defend their cause.

There are many levels on which current practices must be changed, and it requires an investment of time and energy, as well as consensus that it will be a process of trial and error. Some individuals and groups intentionally try to avoid the new terms for exchange laid out in the CBD and elsewhere, and believe that a system of sanctions should apply. But if someone's intentions are good, there is no need to alienate them if they take a bad step. Although it is necessary to correct and improve at every stage, it is still too early to shut out people who have yet to catch up. Collaboration and communication are critical elements of this new framework for fairer and more equitable partnerships.

Figure 14. Reaching terms that are fair and equitable takes a lot of work, requiring much consultation, strategising and information sharing between the different parties involved, as well as the allocation of sufficient resources to ensure the proper implementation of agreements.

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Key websites

Biowatch South Africa: http://www.biowatch.org.za

Convention on Biological Diversity: http://www.biodiv.org

CSIR: http://www.csir.co.za

Department of Arts, Culture, Science and Technology: http://www.dst.gov.za

Department of Environmental Affairs and Tourism: http://www.environment.gov.za

ETC Group: http://www.etcgroup.org

Genetic Resources Action International (GRAIN): http://www.grain.org

Indigenous Knowledge and Development Monitor: http://nuffic.nl/ciran/ikdm/index.html

Indigenous Peoples Council on Biocolonialism: http://www.ipcb.org

Legal Resources Centre: http://www.lrc.org.za

National Botanical Institute: http://www.nbi.ac.za

Third World Network: http://www.twnside.org.sg

Glossary

Access to genetic resources: To obtain samples of biological or other material containing genetic material from within a country's borders for purposes of research, conservation, commercial or industrial application.

Biodiversity prospecting: The exploration of biodiversity for commercially valuable biological and genetic resources.

Biological diversity (biodiversity): The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Biotechnology: Any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes to provide goods and services. Biotechnology includes ancient techniques such as crop selection, the selective breeding of livestock, beer-brewing, and more recently, developing vaccines and antibiotics or using tissue culture to breed disease-free plants. Genetic engineering, or 'modern biotechnology', is a new form of biotechnology because it can involve the transfer of genes between species unrelated in nature, resulting in transgenic organisms or crops.

Code of ethics: A public moral system developed to encourage certain types of behavior, and establish rules which should be followed. They include general principles that underlie and pre-date all equitable research activities, as well as those that specifically guide the research process.

Community controlled research: Research in which communities set research agendas and the terms for research projects, including collaborations with outside researchers.

Consultation: A dynamic process of engaging affected people and other interested parties in open dialogue through which a range of views and concerns can be expressed in order to inform decision-making and help build consensus.

Contract: An agreement between two or more parties to a set of lawful promises that make up a legal obligation resulting from the parties' agreement or understanding, where there is a duty of performance and a remedy of law in the event of a breach or non-performance.

Customary law: Rules and norms of conduct, usually unwritten, existing within and applying to an indigenous group or other local community. These rules are typically distinct from the dominant legal system of the state within whose territory the community resides.

Ecosystem: A dynamic complex of plant, animal and microorganism communities and the soil, water and air on which they depend.

Fair and equitable benefit-sharing: The CBD (Article 15(7)) requires each Contracting Party to take 'legislative, administrative or policy measures...with the aim of sharing in a fair and equitable way the results of research and development and the benefits arising from the commercial and other utilization of genetic resources with the Contracting Party providing such resources...upon mutually agreed terms'. The CBD does not define 'fair and equitable' and the term can mean different things to different groups.

Gene: A small section of DNA which contains information for making one protein molecule; a unit of hereditary information that can be passed from one generation to another.

Genetic material: Material of plants, animal, microbial or other origin containing functional units of heredity.

Habitat: The place or type of site where an organism or population naturally occurs.

Horticulture: The cultivation of ornamental and vegetable plants in gardens or smallholdings (market gardens). *Hortus* = garden (Latin).

Indigenous peoples: People regarded as indigenous on account of their descent from the populations which inhabited a country, or geographic region to which the country belongs, at the time of conquest or colonisation, or the establishment of present state boundaries, and who – irrespective of their legal status – retain some or all of their own social, economic, cultural, and political institutions (ILO Convention 169).

Letter of Intent (LOI): a document signed prior to drafting a contract, in which the parties involved in negotiations determine and broadly outline the basic terms and conditions for an agreement.

Local communities: A group of people having a long-standing social organisation that binds them together, often in a defined area.

Material Transfer Agreement (MTA): A special type of contract defining the rights and obligations of all parties, including third parties, during the transfer of biological material from a provider to a recipient. They are used widely in academic, governmental, and corporate research.

Memorandum of Understanding (MOU): A document elaborated in the preliminary phase of a negotiation process, where the parties may set down the general framework for a future agreement, and which may include references to the agenda and rules for future negotiations, the scope of the proposed discussions and the parties involved.

Microorganisms: Groups of microscopic organisms, some of which cannot be detected without the aid of a light or electron microscope, including the viruses, the prokaryotes (bacteria and archaea), and eukaryotic life forms, such as protozoa, filamentous fungi, yeasts and microalgae.

Mutually agreed terms: The CBD (Article 15(4)) states that 'Access, where granted, shall be on mutually agreed terms...'. This means that there must be an agreement – formal or informal – that is acceptable to both the country or group giving access to their genetic resources and the group desiring access to these resources. Providers and users of genetic resources may interpret the term very differently because different parties often have unequal negotiating powers (eg an indigenous community and a powerful multinational corporation).

Natural product drugs: Drugs of natural origin classified as original natural products, products derived semi-synthetically from natural products, or synthetic products based on natural product models.

Prior Informed Consent (PIC): This is a term used in law, and in the context of the CBD means that the owner of knowledge or resources must agree to the collection or use of their knowledge or biodiversity *before* the activity takes place. Whoever is requesting this information or material must provide all necessary information about *why* they are collecting or using the information or resources, *how* they would collect or use it, risks involved, and implications, so that the provider of resources or knowledge can make an informed decision whether or not to grant access. The CBD only requires the PIC of CBD Contracting Parties (states that have ratified the CBD), but national legislation may extend PIC requirements to others, such as provincial or local governments, local and indigenous communities, or research institutions holding collections of genetic resources.

Research agreement: An agreement stating the scope and terms of research on and collection of biological or genetic resources; subsequent uses of the resources; and the sharing of expected or potential benefits from their use.

Research guidelines: Documents drafted to provide practical detail and guidance on current standards of best practice in research. These are often appended to codes of ethics.

Sovereignty over genetic resources: The right of states to determine access to genetic resources occurring in their boundaries. State sovereignty was first explicitly recognised in the CBD (Article 15). Sovereignty does not, however, imply ownership, which must be determined by national legislation.

Species: A taxonomic rank below a genus, consisting of closely-related, morphologically similar individuals capable of producing fertile offspring.

Sustainable use: The use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

Technology transfer: The transfer of knowledge or equipment to enable the manufacture of a product, the application of a process, or the rendering of a service. Often this term is used in the context of an industrialised nation, or institutions or companies in the North, transferring technology to a developing country or institutions in the South.

Traditional environmental or ecological knowledge: a body of knowledge and beliefs transmitted through oral tradition and first-hand observation. It includes a system of classification, first-hand observations about the local environment, and a system of self-management that governs resource use. In the CBD context, traditional knowledge refers to knowledge, innovations and practices of indigenous and local communities deriving from customary uses of biological resources and associate cultural practices and traditions (Article 8j).

Traditional resources: Tangible and intangible assets and attributes of value to indigenous and local communities, including the spiritual, aesthetic, cultural, and economic. Includes plants, animals and other material objects that have sacred, ceremonial, heritage, or aesthetic and religious qualities, as well as economic and social values.

Variety: A taxonomic rank below subspecies in botany, varieties are usually the result of selective breeding and diverge from the parent species or subspecies in distinct but relatively minor ways. Usage varies in different countries. In zoology, the term 'breed' is used to describe a similar rank below subspecies.