

BIOPROSPECTING, ACCESS AND
BENEFIT-SHARING IN SOUTH AFRICA:
TOWARDS A STRATEGIC ASSESSMENT

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Executive Summary

This report provides a review of legal and policy instruments for bioprospecting, access and benefit-sharing (ABS) in South Africa, and their strengths and weaknesses and relevance in biodiversity conservation. The governance and institutional framework for ABS in South Africa is explored, including its efficacy at dealing with ABS issues. A description is provided of existing networks and capacities for ABS, and an overview is given of ABS programmes and projects in the country.

The report concludes that the absence of legal and administrative mechanisms to control access to South Africa's genetic resources, and to set conditions for benefit-sharing has been a key constraint towards achieving more meaningful benefit-sharing. It suggests that South African institutions have historically been short-changed with respect to benefit-sharing, but that the development of national consortia has enhanced collaboration between national research institutions and provided South Africa with a strategic advantage in this field. Little attention has been paid to the need to obtain prior informed consent from holders of traditional knowledge and this presents a major challenge for the future, more especially with implementation of the Biodiversity Act. Conservation has also received short shrift, despite the fact that bioprospecting is commonly touted as a tool for biodiversity management.

A number of recommendations are made.

1. There is a clear need for the establishment of a central focal point for ABS in South Africa. It is recommended that such a 'secretariat' be established as a matter of urgency within the Department of Environmental Affairs and Tourism to assist *inter alia* with the processing and screening of bioprospecting applications, coordination among the provinces, and the establishment of a shared ABS permitting database.
2. Clarity and guidance is needed for applicants, permit issuing authorities, and other affected government departments with respect to the practical implementation of permitting and procedural arrangements required to effect ABS provisions of the Biodiversity Act.
3. A concerted effort must be made to build ABS capacity and raise awareness about ABS issues at a variety of levels: from assisting government with analysing agreements, developing negotiating and legal drafting skills, and permit database management, through to improving awareness amongst the research community about the importance of prior informed consent. Rural communities and holders of traditional knowledge are often key stakeholders in ABS agreements and initiatives, and there are major capacity challenges at this level - to ensure that efforts are relevant to needs on the ground, that legal and strategic assistance is available when required, and that expectations are not unduly raised.
4. Weaknesses in the Biodiversity Act with respect to stakeholder involvement suggest that extra vigilance will be needed to ensure that the interests of all stakeholders are accommodated when negotiating agreements.

5. Far stronger interventions are needed on the part of government and other stakeholders to ensure that bioprospecting makes direct and indirect contributions towards conservation management.
6. Continued attention and support should be given to the development and strengthening of national research consortia on bioprospecting, and the inclusion of clear guidelines within such arrangements for benefit-sharing among all stakeholders.
7. Urgent attention needs to be given to the speedy development of legislation to protect holders of traditional knowledge and to recognise farmers' rights. A comprehensive review of South Africa's intellectual property laws is recommended, combined with a public policy process, to explore the interface between TRIPS and the CBD, to ensure consideration of ABS and traditional knowledge issues, and to review South Africa's policy approach with respect to the patenting of life.
8. Finally, there is a need for the development of a national strategy on ABS, through involvement of stakeholders in determining key strengths, weaknesses, opportunities and threats. The NBSAP provides an important opportunity to effect this strategy, and it is recommended that this document be circulated as a first step towards bringing stakeholders together for further discussion.

1. Introduction

South Africa is actively engaged in bioprospecting and the past decade has witnessed a flurry of activities in the exploration of local biodiversity for commercially valuable genetic resources and biochemicals. This is due largely to the country's extraordinarily rich and unique biodiversity¹ and well-developed research and institutional capacity, which combined provide an extremely favourable environment for bioprospecting, as well as for other approaches based on trading and using biodiversity for commercial gain.

A 1996 review of bioprospecting in South Africa, the first of its kind to be done, identified the involvement of virtually every research institution in South Africa in bioprospecting activities, some formally and others more illicitly². Since then, approaches to bioprospecting in South Africa have become far more sophisticated and transparent, although this has not been without burnt fingers. An agreement between the National Botanical Institute and Ball Horticulture, for example, raised the public ire for purportedly 'selling off the family silver'³. Use of the San's traditional knowledge of the succulent plant *Hoodia* in development of an anti-obesity drug, and the patenting by the CSIR of active constituents of the plant, captured international attention due to the neglect of the CSIR to obtain the prior informed consent of the San. It also led to one of the first benefit-sharing agreements to give indigenous communities a share of royalties from drug sales⁴. Other less controversial, but by no means less significant, agreements have also built broad understandings and capacities about how to 'do the right thing', and the key constraints which prevent bioprospecting from being a useful tool for conservation and development.

While this knowledge resides within certain institutions and individuals, there has to date there has been no strategic and systematic assessment of the country's biodiversity, its potential for commercial development, and the capacities that exist or are required both to regulate and develop these resources in an environmentally and socially appropriate manner.

This paper is a first step towards doing so, and aims:

- first, to assist the Southern Africa Biodiversity Support Programme to develop a regional biodiversity information system and network of experts on access and benefit-sharing (ABS) in South Africa (see Box 3); and
- second, to assist in the preparation of a strategic assessment of ABS in the country, in order to facilitate the development of an ABS component within South Africa's National Biodiversity Strategy and Action Plan (NBSAP).

Time and budget constraints have precluded a comprehensive review of national initiatives and capacities, but the information presented provides a start towards a more detailed inventory and

¹ In the plant kingdom alone, at least 80% of the 18-20 000 species are known to be endemic. Intraspecific genetic diversity is also unusually high, adding to the potential for developing new medicines, crops, cosmetics, ornamental plants, and other useful products.

² Laird, S. and Wynberg, R. 1996. Biodiversity prospecting in South Africa. Towards the development of equitable partnerships. Land and Agriculture Policy Centre, Johannesburg.

³ See Wynberg, R. 2003. Biodiversity prospecting and benefit-sharing in South Africa, In: *Developing Access and Benefit-Sharing Legislation in South Africa*. IUCN, Gland, Switzerland and Cambridge, UK. pp. 56-81; Henne, G. and Fakir, S. 1999. NBI-Ball Agreement: a new phase in bioprospecting? *Biotechnology and Development Monitor* **39**: 18-21.

⁴ See Wynberg, R. 2004. Use of traditional knowledge of the succulent plant *Hoodia* in development of an anti-obesity drug. *In prep.*

gives an overview of key trends and issues. Similar constraints have limited the extent to which issues pertaining to traditional knowledge, biodiversity and intellectual property have been considered outside of the context of ABS, and it is recommended that such matters form the basis for another focused paper.

Section 2, which follows, provides a review of legal and policy instruments on ABS in South Africa, including their strengths and weaknesses and relevance in biodiversity conservation. Section 3 describes the governance of ABS in South Africa, and reviews current institutional arrangements and their efficacy at dealing with ABS matters. Section 4 lists the existing networks of experts and capacities on ABS and evaluates capabilities on issues of ABS. Section 5 describes the scale and nature of bioprospecting in South Africa and includes an overview of different ABS programmes and projects and their successes and failures. Section 6 describes key trends and issues, and Section 7 concludes the paper with a set of recommendations.

Box 1. A note on terminology: What is “access and benefit-sharing?”

Throughout the world, biodiversity is found in inverse proportion to technological and industrial wealth, and therefore the biologically rich ‘South’ has argued that in order to allow companies access to its biodiversity the technologically rich ‘North’ must transfer technology and share benefits from commercialisation⁵. This is considered especially crucial given the historical accrual by colonial powers and Northern companies of benefits derived from the commercialisation of resources from the South. These sentiments underpin the Convention on Biological Diversity, and the treaty’s third objective – to share equitably benefits arising from use of genetic resources⁶.

Growing out of the Convention on Biological Diversity is the basis for a new way of treating trade in genetic resources and for regulating bioprospecting. It is commonly 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*”).

In South Africa, we tend to use the terms “access and benefit sharing” in a much broader way, referring to the political context from which we have come – where people were denied access to natural resources – and to the fact that the spoils from use of biodiversity were inequitably spread. These are crucial issues that deserve priority attention but the **focus of this paper is on the narrower interpretation of “access and benefit sharing”**, within the context of trade in genetic resources, and implementation of the CBD, the International Treaty on Plant Genetic Resources

⁵ Macilwaine, C. 1998 ‘When rhetoric hits reality in debate on bioprospecting’, *Nature* **392**:535-40; Sanchez, V. and Juma, C. 1994. *Biodiplomacy. Genetic Resources and International Relations*. African Centre for Technology Studies, Nairobi.

⁶ Convention on Biological Diversity (adopted Rio, 1992, entered into force 1993). Discussions are currently underway regarding the necessity of international instruments to achieve ABS commitments and objectives.

for Food and Agriculture, and other international policies and laws. It therefore does **not** look at the broader issues of communities, for example, needing access to biodiversity for a variety of purposes, such as medicines, foods or building material, or at ways in which tourism, for example, can enhance the livelihoods of rural communities⁷.

Box 2. What is bioprospecting?⁸

‘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 with an intention to *commercialize* 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 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.

Box 3. Terms of Reference for Study

“To collect information on ABS which will address:

- the legal instruments that are nationally available to competently deal with issues of ABS;
- to identify relevant institutions and evaluate their ability to work on issues of ABS;
- to describe the nature and functions of existing national networks of experts on ABS and their capacities to continue working on these issues;
- to describe existing efforts by relevant stakeholders that aim at dealing with issues of ABS.”

⁷ These are issues dealt with by other components of the National Biodiversity Strategy and Action Plan (NBSAP). See for example, Institute of Natural Resources, 2004, National Biodiversity Strategy and Action Plan: Stocktaking and Assessment. Sustainable use of Biodiversity. Key issues, priorities and gaps. Draft report.

⁸ From: Laird, S.A. and Wynberg, R. 2003. *Biodiversity prospecting & access and benefit-sharing. An introductory primer*. IUCN, Gland, Switzerland and Cambridge, UK. 40 pp.

2. Legal and Policy Instruments for Access and Benefit-Sharing in South Africa

2.1 *Introduction*

Access and benefit-sharing spans a wide spectrum of disciplines and areas of governance, and involves a suite of activities, some of which have not historically been regulated. This includes the rules and conditions that should apply to users and providers of genetic resources who request or facilitate access to genetic resources; the protection of traditional and indigenous knowledge; the interface between formal permitting procedures and local communities or holders of knowledge; intellectual property right protection, and its linkages to benefit-sharing; farmers' rights; and more broadly, the sharing of both monetary and non-monetary benefits arising from the use of genetic resources and traditional knowledge.

South Africa has grappled with policy discussions about these issues for several years, some in greater depth and with greater success than others. International policies and laws have played a major role in driving policy debates, and South Africa is signatory to a range of international instruments of relevance to the conservation and use of genetic resources (see Table I). At the international level, South Africa, represented by the Department of Environmental Affairs and Tourism (DEAT), is also a member of the so-called 'like-minded, megadiverse' coalition, representing 15 of the most biologically diverse countries in the world⁹. Members of the coalition are lobbying strongly for an internationally binding agreement for ABS.

What follows is a description and tabulation of key national policies and laws governing ABS in South Africa, including policies of specific institutions.

⁹ The so-called Group of Like-Minded MegaDiverse Countries comprises Bolivia, Brazil, China, Colombia, Costa Rica, Ecuador, the Philippines, India, Indonesia, Kenya, Malaysia, Mexico, Peru, South Africa and Venezuela. The Group was formally constituted through the Cancun Declaration of February 18, 2002 as a "consultation and cooperation mechanism" to promote common interests and priorities related to the conservation and sustainable use of biodiversity. The development of an international regime to promote and safeguard the fair and equitable sharing of benefits arising out of the utilisation of genetic resources has been adopted by the group in its action plan as one of five areas of priority and action. See also www.megadiverse.org

Table 1. International agreements of relevance to the conservation and use of genetic resources.

Agreement	South Africa's Status	Implementation	Responsible department
Convention on Biological Diversity	Became a party to the Convention on 2 November 1995	White Paper on the Conservation and Sustainable Use of Biological Diversity (1997); Biodiversity Act (XX of 2004) Protected Areas Act (57 of 2003) A wide range of related policies and laws already exist to implement the CBD (see Table 2)	DEAT
Cartagena Protocol on Biosafety (under the CBD)	Became a party to the Protocol on 14 August 2003	GMO Act (15 of 1997) is currently under review to enable implementation of the Protocol.	DEAT / National Department of Agriculture
International Treaty on Plant Genetic Resources for Food and Agriculture	In the process of ratifying the agreement.	Implementation of the IT in South Africa is still embryonic. However, the Biodiversity Act covers broadly access and benefit-sharing with respect to indigenous biological resources. Farmers' rights and <i>in-situ</i> conservation remain major implementation gaps.	National Department of Agriculture
TRIPS Agreement of the World Trade Organisation	South Africa is a member organisation of the WTO	Through the Plant Breeders Act, South African law is considered compliant with Article 27 3(b) of TRIPS, requiring plant variety protection. However, a number of issues relating to the interface between TRIPS and the CBD have not yet been resolved at national level. These include the disclosure of origin for patent applications; traditional knowledge protection; and approaches towards the patenting of life. The Patents Amendment Bill brings the Patents Act in line with Article 29(1) of TRIPS	Department of Trade and Industry; National Department of Agriculture; DEAT; Department of Health

International Convention for the Protection of New Varieties of Plants (UPOV Convention)	South Africa has signed but not ratified the 1991 version of this agreement. South Africa has also signed the 1978 version of UPOV, upon which current legislation is based.	UPOV 1978 is implemented through the Plant Breeders Right Act 15 of 1976 and the Plant Improvement Act 53 of 1976.	National Department of Agriculture
Patent Cooperation Treaty	South Africa became a member state of the PCT on 16 March 1999.	Intellectual Property Laws Amendment Act 38 of 1997.	Department of Trade and Industry
International Plant Protection Convention	Ratified by South Africa in 1995.	Agricultural Pests Act provides measures to control phytosanitary risks.	Department of Agriculture

2.2 *National laws and policies*

A plethora of national policies and laws have relevance for ABS, but only recently has there emerged a more coherent and specific regulatory framework for ABS, encapsulated in the newly promulgated Biodiversity Act. Indeed, the absence of a legal framework for ABS in South Africa is widely considered to have been a major reason for the failure so far of bioprospecting to deliver optimal benefits in the country¹⁰. Table 2 provides a description of policies and laws in South Africa with relevance for ABS, with key provisions described below in further detail. A key point to emphasise is that South Africa is currently in a transition with respect to ABS, and new legislation encapsulated in the Biodiversity Act has yet to be implemented. The current situation, described below, thus still holds in practice.

Constitution of the Republic of South Africa (Act 108 of 1996)

South Africa's Constitution (Act 108 of 1996) provides a central framework for biodiversity management in South Africa. Of particular importance are the respective powers of national, provincial and local spheres of government. Through the Constitution, national government and the nine provinces are accorded concurrent legislative competence in terms of most functions of relevance to biodiversity conservation¹¹. These include such areas as agriculture, environment, nature conservation, pollution control, regional planning and development, soil conservation, urban and rural development, and tourism. The Constitution also demarcates several relevant areas as being of exclusive national competence, such as national parks, botanical gardens, and marine resources; of exclusive provincial jurisdiction, such as provincial planning; and provides for the administration of certain functions at the local government level, such as beaches and municipal parks. Chapter 3 of the Constitution emphasises the notion of cooperative government and reflects a fundamental departure from the past in that the three traditional spheres of government – national, provincial and local – are no longer regarded as hierarchical tiers with national government at the helm, but rather as three “distinctive, interdependent and interrelated”

¹⁰ See, for example, Wynberg, n. 4; Glazewski, J., Meiring, A., and Fakir, S. August 2001. Report to the Chairman of the Board of the NBI on Research and License Agreement between the National Botanical Institute and the Ball Horticultural Company.

¹¹ Schedules 4 and 5 respectively.

spheres of government. The administration of these arrangements with regard to ABS is discussed in Section 3.

Genetic resources and their ownership are not explicitly considered by the Constitution, and legal clarity on this issue remains unresolved. Chishakwe and Young¹² remark that no country has yet found or developed a workable legal framework that clarifies who owns genetic resources, partly because of the difficulties of defining 'genetic resources' and the lack of legal understanding on the matter. South Africa is no exception, although the property clause in its Bill of Rights is potentially relevant, more especially because much of South Africa's biodiversity falls within private ownership. The clause provides that no one may be deprived of property unless this is in terms of a law of general application, and is not arbitrary¹³. Property may be expropriated only for a public purpose, or in the public interest, and is subject to compensation. Under South African common law, a landowner owns everything beneath and above the land. This includes plants but excludes wild animals which are considered *res nullius* (owned by nobody). South African common law does not grant a property rights holder an inherent right to compensation for denial of, or restrictions on, the use to which property is put¹⁴. It could be argued that while the state through legislation is empowered to introduce regulations to achieve biodiversity conservation and sustainable use, any regulation imposing restrictions on ownership of genetic resources would probably not require the original owners of those resources to be compensated because it would be regarded as a deprivation rather than an expropriation¹⁵.

Several categories of land ownership exist in South Africa, characterized by a broad division between freehold or Western notions of ownership, and customary approaches to land ownership. Most state land and white commercial agricultural land is held under freehold, while land under customary tenure falls within the so-called ex-homelands, which together comprise 13% of the country, and are home to some thirteen or so million inhabitants. While statutory laws apply in both circumstances, in communal areas a layer of customary law also applies, and this is frequently the system best understood and implemented by communities living in the area. In communal areas, customary laws form a central component of the practice of natural resource use. Where traditional systems are in tact, strong cultural taboos exist – and have long existed - to regulate the use of particular resources. Although certain resources are accorded different levels of protection, no distinction is made between genetic resources and natural resources.

The Biodiversity White Paper

The Biodiversity White Paper¹⁶ was the first national policy to chart South Africa's policy on access to genetic resources and benefit-sharing and emerged following a two-year period of

¹² Chishakwe, N. and Young, T.R. 2003. Access to genetic resources, and sharing the benefits of their use: international and sub-regional issues, published by IUCN in the ABS Project series.

¹³ Section 25(1)

¹⁴ Glazewski, J. 2000. 'The Bill of Rights and Environmental Law'. In: *Environmental Law in South Africa*. Butterworths, Durban.

¹⁵ Kidd, M. and Mayet, M. 2003. Access to genetic resources in South Africa. Chapter 16, In: *African Perspectives on Genetic Resources. A handbook on laws, policies and institutions*. Edited by Nnadozie, K., Lettington, R., Bruch, C., Bass, S., and King, S. Environmental Law Institute, Washington.

¹⁶ Department of Environmental Affairs and Tourism. 1997. White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity. *Government Gazette Notice 1095 of 1997*, vol. 385, no. 18163. http://www.polity.org.za/govdocs/white_papers/diversity.html

public consultation¹⁷. A comprehensive research process, led by the Land and Agriculture Policy Centre, formed the basis for the policy formulations, and included interviews with over 50 people representing a variety of sectors.

Access and benefit-sharing is included as one of six key goals of the Biodiversity White Paper, which aims to: “*Ensure that benefits derived from the use and development of South Africa’s genetic resources serve national interests.*”

Two objectives support the goal:

1. To control access to South Africa’s indigenous genetic resources through the introduction of appropriate legislation and establishment of institutional structures; and
2. To ensure continued access to sources of genetic material for food, agriculture and forestry.

Included within the first objective are certain actions, including the development of detailed guidelines and conditions for bioprospecting; the development of an efficient permitting system for the collection of resources; minimum requirements for benefit-sharing; the promotion of collaboration and cooperation between research institutions; the establishment of a system for funds disbursement; requirements to minimise impacts on the environment of collection; and the development of a system to provide legal protection for collective rights.

Included within the second objective is a commitment for South Africa to participate in the revision of the (then) International Undertaking on Plant Genetic Resources; commitments to initiate a national process to develop and implement legislation on farmers’ rights; and supporting activities for the protection of indigenous and traditional livestock breeds and plant varieties.

Importantly, the White Paper states as a priority action the need to establish legislative and administrative mechanisms to control access to South Africa’s genetic resources, and initiatives to do so are described below. Currently, a process is underway to develop South Africa’s National Biodiversity Strategy and Action Plan. This is due to be finalized in October 2004 and will likely include a focused section on ABS, located within a broader section on sustainable use and benefit-sharing.

Biodiversity Act XX of 2004

Following on from the Biodiversity White Paper, and seven years in the making, South Africa’s Biodiversity Act was finally promulgated on XXX 2004. The framework legislation broadly covers all areas of biodiversity conservation and use, with ABS comprising one of ten chapters. The objectives of the Act are, within the framework of the National Environmental Management Act, to provide for¹⁸:

- (i) *the management and conservation of biological diversity within the Republic and of the components of such biological diversity;*
- (ii) *the use of indigenous biological resources in a sustainable manner; and*

¹⁷ Wynberg, R. and Swiderska, K. 2001. *South Africa’s experience in developing a policy on biodiversity and access to genetic resources*. Participation in Access and Benefit-Sharing Policy. Case Study No. 1. International Institute for Environment and Development, London.

¹⁸ Section 2.

- (iii) *the fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving indigenous biological resources.*

An important rationale for the Biodiversity Act is to resolve the fragmented nature of biodiversity-related legislation at national and provincial levels, and to consolidate different laws¹⁹. A key aspect is to realise the management policy of the *White Paper on Environmental Management*, with its emphasis on the principle of co-operative governance to ensure that the environmental rights in the Constitution are protected and fulfilled. The Act forms part of the implementation of the overarching National Environmental Management Act 107 of 1998 (NEMA), and is to be applied in furtherance of any applicable provisions²⁰ and principles set out in NEMA²¹.

Chapter 6, entitled ‘Bioprospecting, Access and Benefit-Sharing’, sets out the framework for the regulation of ABS in South Africa. Its purpose is²²:

- (a) *to regulate bioprospecting involving indigenous biological resources;*
- (b) *to regulate the export from the Republic of indigenous biological resources for the purposes of bioprospecting or any other kind of research; and*
- (c) *to provide for a fair and equitable sharing by stakeholders in benefits arising from bioprospecting involving indigenous biological resources.*

‘Indigenous biological resources’ are interpreted widely to include derivatives, chemical compounds and products obtained through use of biotechnology. Material of human origin is excluded from the ambit of the law, as are exotic organisms and indigenous biological resources listed in terms of the ITPGRFA.

The Act requires permits to be obtained for all bioprospecting projects, and for the export of any indigenous biological resource to be used for bioprospecting or any other kind of research. Those providing access to resources or knowledge, or whose ‘traditional uses’ form part of the bioprospecting, must be consulted and their prior consent obtained before a permit is issued. This should be on the basis of all material information being disclosed.

The Act distinguishes between procedures to obtain indigenous biological resources; and those to obtain knowledge. For indigenous biological resources, a Material Transfer Agreement is required between the applicant and ‘stakeholder’, as well as a benefit-sharing agreement, prior to permit issuance. For holders of knowledge, a benefit-sharing agreement is required. Ministerial approval of all benefit-sharing or material transfer agreements is required. Those issuing permits may facilitate negotiations between the applicant and ‘stakeholder’ to ensure these are on an equal footing, or may be required by the Minister to ensure the arrangement is fair and equitable²³.

Very broad requirements for benefit-sharing agreements and material transfer agreements are set out²⁴ and a Bioprospecting Trust Fund is established into which all moneys arising from

¹⁹ Memorandum on the objects of the National Environmental Management: Biodiversity Bill.

²⁰ Section 6(1).

²¹ Section 7

²² Section 80

²³ Section 82(4b) and (4c)

²⁴ Sections 83 and 84 respectively

agreements must be paid, and from which all payments to stakeholders would be made²⁵. Benefit-sharing agreements must be in a prescribed format and must specify the type and quantity of resources to be collected, the area of collection, traditional uses of the resources, and potential uses. Agreements must set out the manner in which the resources are to be used and the extent to which stakeholders will share in benefits. Material transfer agreements must be in a prescribed format and set out the particulars of the provider and recipient, the type and quantity of resources to be provided, the area of collection, the purpose for export, potential use, and conditions for transfer to a third party.

The Act provides for the development of regulations with regard to the form, contents, requirements and criteria for benefit-sharing agreements and material transfer agreements; for moneys payable in connection with these agreements; and for the administration of the Bioprospecting Trust Fund. One year is allowed for current bioprospecting projects to develop benefit-sharing agreements as stipulated. The Act also establishes the South African National Biodiversity Institute (SANBI), which will replace the current National Botanical Institute. SANBI has a variety of functions including botanical garden management and control, ex-situ collection management, biodiversity research and information, the coordination of programmes for ecosystem rehabilitation, and invasive species management. Noteworthy is the *exclusion* of ABS from the mandate of SANBI, in response to concerns about the NBI's current involvement in bioprospecting and therefore the potential for conflicting interests.

While the new Act marks a tremendous step forward in terms of ABS regulation in South Africa, it also has some interesting nuances and some notable omissions²⁶:

- Importantly, it makes no provision for a central focal point for bioprospecting, an omission many are critical of because of the clearly stated need for such a mechanism from providers and users of genetic resources alike;
- No provision is made for stakeholder involvement in decision-making with regard to applications, ostensibly because of a concern about setting up new and costly committees whose work could feasibly be undertaken by structures such as the National Environmental Advisory Forum (established under NEMA but not yet constituted);
- Permitting and procedural arrangements are unclear, including the role of issuing authorities for permits, and most of the detail is left to subsidiary legislation;
- Provisions which require 'benefit-sharing agreements' to be developed and approved by the Minister with all providers of resources and knowledge are confusing, as they fail to recognise the different steps and stakeholders in the process of developing a benefit-sharing agreement, and the fact that benefit-sharing agreements are typically only developed once research and development is further advanced;
- Other than for export purposes, research is excluded from the purview of the law. Because of the difficulties of distinguishing between academic and commercial research, this omission will effectively exclude many bioprospecting projects from the stipulated permitting requirements;

²⁵ Section 85

²⁶ See Wynberg, R. and Burgener, M. 2003, Submission of Comments on the Biodiversity Bill by the IUCN to the Parliamentary Portfolio Committee on Environmental Affairs and Tourism. A Critical Review of Provisions relating to "Bioprospecting, Access and Benefit-Sharing" <http://www.biowatch.org.za>

➤ A requirement for Ministerial approval for all Material Transfer Agreements may lead to lengthy delays, and may well be unnecessary, given that MTAs simply represent an agreement between parties to transfer specimens and to not commercialise them without first developing a benefit-sharing agreement.

2.3 Institutional policies on access and benefit-sharing

In addition to these statutory policies and laws, several institutions have taken the initiative of drafting their own policies on access and benefit-sharing. Although most research institutions do not have formal policies that guide the activities of field researchers or set conditions for benefit-sharing²⁷, over the past five years there have been rapid developments on this front, partly in response to the CBD and pressures to respond appropriately.

The CSIR, as the most active player in bioprospecting in South Africa, was one of the first institutions in the country to develop a distinct policy on bioprospecting²⁸. The 1999 policy stipulates that the CSIR intends to “act in accordance with the CBD and all national legislation”. It makes no reference to prior informed consent but states that the institution “will only engage in bioprospecting research when provision for the fair and equitable sharing of benefits arising from their commercial or other utilisation is agreed upon”. In drawing up an agreement, the CSIR undertakes to “take account of the rights, interests and practices of indigenous peoples”. The policy is currently under review but the revised version is not yet publicly available.

The National Botanical Institute includes a comprehensive range of measures in its recently revised bioprospecting policy²⁹. It recognises the need to obtain the prior informed consent from government ‘and other stakeholders’ for the acquisition of genetic resources from *in situ* and *ex situ* conditions; it undertakes to acquire and supply genetic resources, their progeny or derivatives, under material supply / transfer agreements; it commits to sharing benefits fairly and equitably with the country of origin and other stakeholders; and it undertakes to maintain records and mechanisms to track the acquisition and supply of these resources. More detailed provisions refer to material acquisition agreements, record-keeping and tracking, supply and material transfer agreements, and benefit-sharing.

Within conservation bodies, different agencies are at different stages of policy development on ABS, reflecting to a large extent the virtually absent role played by national government in providing policy guidance and advice on these issues, and also extreme fragmentation amongst conservation bodies in the country: 13 different agencies control over 400 protected areas, which fall under 11 national and 9 provincial laws³⁰. Most of the nine provinces rely on an interim ABS policy and a Memorandum of Understanding (MOU), developed jointly through a working group on the matter. The MOU, designed for the collection of biological material for research, prohibits use of the material for commercial purposes and prevents its transfer to third parties. If commercialisation is intended, the applicant is required to develop a separate agreement with the

²⁷ See Laird, S. and Wynberg, R. 2002 Institutional policies for biodiversity research. *In: Biodiversity and Traditional Knowledge. Equitable Partnerships in Practice*. Earthscan, London. pp. 39-76.

²⁸ CSIR Policy on Bioprospecting 1999; CSIR’s Research Approach to Bioprospecting 1999; CSIR’s Policy on Partnerships for Biorospecting 1999.

²⁹ National Botanical Institute, 2004, Policy on access and benefit-sharing

³⁰ Department of Environmental Affairs and Tourism, 2001, *A Bioregional Approach to Protected Areas 2001/2002*. Pretoria.

provider of biological material. Neither the policy nor the MOU deal explicitly with the collection of material inside protected areas, but instead cover broadly all biological resources under the jurisdiction of the province. In most cases, this includes state land both within and outside of protected areas.

Ezemvelo Kwa-Zulu Natal Wildlife was the first conservation agency in South Africa to have a bioprospecting policy, and this has formed the template for other provincial policies (eg Western Cape) in the absence of national and provincial legislation. The policy, adopted in 2000³¹, recognises that traditional communities have the right to control their land and resources and to secure benefits from use of their knowledge; and that all research should contribute to conservation and development in areas in which it takes place. It stipulates that until national and provincial legislation is in place, requests to collect material in protected areas will only be considered from South African *bona fide* research institutions. A Memorandum of Understanding should accompany such collections, which should be monitored and regulated in terms of current nature conservation legislation. Any bioprospecting activities should be done in a sustainable manner, and benefits should accrue to those providing the information or material. The policy includes a commitment from KZN Wildlife to assist traditional communities and national research institutions in developing sustainable sourcing strategies for species of commercial interest, and to building agency capacity related to biodiversity commercialisation.

The South African National Parks (SANP) has also developed a specific, albeit brief, policy on bioprospecting, as part of its broader policy on resource use and plans to develop a set of protocols and procedures to implement the policy. In recognising the commercial potential of South Africa's biodiversity, SANP undertakes to "immediately and urgently" develop legal and procedural mechanisms to enable and encourage the controlled collection and analysis of all indigenous species, including and especially those in Parks. It also undertakes to develop commercial partnerships with agencies and businesses capable of collecting, analysing, patenting and developing this potential.

In addition to these policies, there have also been attempts to develop a code of ethics and set of research guidelines for researchers working on South African biodiversity and with local communities. This has largely taken place through the Indigenous Plant Use Forum, a local networking organisation for researchers working on indigenous plants in South Africa. The code of ethics and guidelines are primarily based upon those adopted by the International Society of Ethnobiology and Pew Conservation Scholars Initiative, with local adaptation. Current initiatives aim to broaden acceptance of the code by a wide range of organisations and researchers, and to ensure its uptake and implementation at a more formal level. Major challenges remain in engaging natural science researchers on this matter, and indeed in persuading them of the relevance of these issues to their work.

³¹ KZN Wildlife: Bioprospecting Policy, 1 December 2000.

Table 2. Key National and Provincial Policies and Laws of Relevance to Biodiversity Access and Benefit-Sharing

POLICY/LAW	CONTENT	RESPONSIBLE INSTITUTIONS
POLICIES		
White Paper on Environmental Management Policy (1999)	Sets out a vision, policy principles and strategic goals for environmental management and the sustainable use of natural resources in South Africa. Sectoral policies must conform to this policy.	DEAT is identified as the lead agent for environmental management.
White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997)	The policy and strategy sets out a vision, mission and principles for biodiversity management. Six goals are identified, together with supporting objectives. Goal 3 aims to "ensure that benefits derived from the use and development of South Africa's genetic resources serve national interests".	DEAT is the lead institution. Several other national, provincial, and local government departments are responsible for various aspects of implementation.
Policy for Sustainable Forest Development in South Africa (1996)	Aims to promote a thriving forest sector, to be utilised for the lasting benefit of the nation, and developed and managed to protect the environment.	DAAF; provincial environmental and conservation departments.
Marine Fisheries Policy for South Africa (1997)	Strives to improve the overall contribution from the fishing industry to a competitive fast-growing economy which creates sufficient jobs for all work sectors and a redistribution of income and opportunities in favour of the poor. Includes sustainability as one of its key objectives. Makes provision for the designation of marine protected areas.	DEAT (Marine and Coastal Management) is responsible for fisheries administration, research, and the protection of marine resources. MCM is also responsible for issuing permits relating to the collection of marine resources for bioprospecting.
LAWS		
Constitution of the Republic of South Africa (Act 108 of 1996)	Conservation and ecological sustainability are given prominence in the Bill of Rights.	National and provincial government are accorded concurrent legislative competence in terms of most functions of relevance to biodiversity conservation. National Parks, botanical gardens, and marine resources are however an exclusive national competence.
National Environmental Management Act (107 of 1998)	Gives legal effect to the Constitution and to the White Paper for Environmental Management. Sets in place procedures and mechanisms for cooperative governance.	DEAT is the lead agent. The Act establishes a National Environmental Advisory Forum (yet to be constituted) and the Committee for Environmental Coordination.
Environmental	Provides for the protection and control of	DEAT; provincial

POLICY/LAW	CONTENT	RESPONSIBLE INSTITUTIONS
Conservation Act (73 of 1989)	activities that may have a detrimental effect on the environment and is concerned primarily with environmental impact assessments.	environmental and conservation departments.
National Forests Act (84 of 1998)	Overall purposes include the sustainable use, management and development of forests; the restructuring of State forestry; the protection of certain forests and trees; the promotion of community forestry; enhanced participation. Certain activities may be licensed in State forests, including the collection of biological resources ³² .	DWAF; National Forests Advisory Council; National Forest Recreation and Access Trust; Provincial environmental and conservation departments. A National Forests Advisory Council advises the Minister on any matter related to forestry in the Republic ³³ .
The Genetically Modified Organisms Act (15 of 1997)	Controls the development, production, use and application of genetically modified organisms.	National Department of Agriculture. The Act establishes an Executive Council as the main decision-making forum, and an Advisory Committee to provide expert input.
Marine Living Resources Act (18 of 1998)	Provides for the conservation of marine ecosystems, the sustainable use of marine living resources and for orderly and equitable access to such resources. no person shall undertake commercial fishing or subsistence fishing, engage in mariculture or operate a fish processing establishment unless a right to undertake or engage in such an activity or to operate such an establishment has been granted by the Minister. ABS is not explicitly covered by the Act but existing recreational permits could allow sufficient quantities to be legally removed for analysis. Exemptions are granted for a number of activities, including research, and could be used for bioprospecting purposes.	DEAT (Marine and Coastal Management). A Consultative Advisory Forum is established to advise the Minister.
Conservation of Agricultural Resources Act (43 of 1983)	Provides for the conservation of agricultural resources. New regulations introduce strict controls for invading plant species. The Draft Sustainable Utilisation of Agricultural Resources Bill, 2003 has been compiled by the Department of Agriculture with a view to repeal CARA.	National and provincial Departments of Agriculture.
Protected Areas Act (57 of 2003)	Aims to consolidate and rationalise existing legislation dealing with protected areas, and to bring the system of protected areas in line with the new constitutional and legal order, and new policies and programmes of the Government. The Act provides for the	National Department of Environmental Affairs and Tourism; provincial conservation and environment departments

³² Section 23 (b, e, f, j and k).

³³ Ss 2(a, b, c and g).

POLICY/LAW	CONTENT	RESPONSIBLE INSTITUTIONS
	<p>establishment of a representative system of protected areas and the participation by communities in conservation and its associated benefits, and for co-operative governance in the management of protected areas³⁴.</p>	
<p>Biodiversity Act (XX of 2004)</p>	<p>Provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Act, 1998; the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting of genetic material derived from indigenous biological resources; and the establishment and functions of a South African National Biodiversity Institute.</p>	<p>National Department of Environmental Affairs and Tourism; provincial conservation and environment departments</p>
<p>Agricultural Pests Act (36 of 1983)</p>	<p>Provides for the prevention and combating of agricultural pests, and regulates the importation of controlled goods. Prohibits any person from importing into South Africa any plant without a permit. The Minister has imposed a number of controls concerning the import of seeds, for example by requiring phytosanitary certificates.</p>	<p>National Department of Agriculture</p>
<p>Patents Act 57 of 1978</p>	<p>The purpose of the act is to provide for the registration and granting of patents for inventions and for matters connected therewith. Provides for the patenting of micro-organisms and microbiological processes but prohibits the patenting of plants and animals.</p>	<p>Department of Trade and Industry</p>
<p>The Plant Breeders Rights Act 15 of 1976</p>	<p>Provides a system for the protection and registration of the rights of certain breeders to prescribed varieties of plants. The Act includes the notion of 'farmers privilege' for seed-saving but does not provide for farmers' rights.</p>	<p>National Department of Agriculture</p>
<p>Plant Improvement Act 53 of 1976</p>	<p>Provides a framework for the sale of certain plants and the cleansing, packing and sale of certain propagating material.</p>	<p>National Department of Agriculture</p>
<p>Animal Improvement Act 62 of 1998</p>	<p>Provides for the breeding, identification and utilisation of genetically superior animals in order to improve the production and performance of animals.</p>	<p>National Department of Agriculture</p>

³⁴ National Environmental Management Protected Areas Bill, general background and overview.

POLICY/LAW	CONTENT	RESPONSIBLE INSTITUTIONS
Agricultural Pests Act 36 of 1983	Includes restrictions on the importation of controlled goods, which include among them, plants, pathogens and insects ³⁵ .	National Department of Agriculture
Various Provincial Ordinances and Acts	28 legal instruments for nature conservation exist at the provincial level. In general they allow for the establishment and protection of nature reserves, for the conservation of threatened species, and for fishing and hunting. Many of these laws are outdated and the nine provinces are at different stages of phasing out old laws and developing and implementing new ones.	Provincial environmental and conservation departments.
LAWS UNDER DEVELOPMENT		
Indigenous Knowledge Draft Bill	Some 8 years in the making, earlier drafts aimed to both protect and promote indigenous knowledge. A policy process is now underway prior to the further development of the law.	Department of Science and Technology
Traditional Medicines Bill (66 of 2003)	To provide a regulatory framework to ensure the efficacy, safety and quality of traditional health care services	Department of Health

3. Governance and the Institutional Framework for Access and Benefit-Sharing in South Africa

To a large extent the institutional framework within which South Africa’s biological resources are controlled and managed reflects the fragmented legal environment described above. This is aggravated by the fact that several of South Africa’s nine provinces – and more especially those located in the erstwhile ‘homeland’ areas, are still in the process of integrating their administrations and laws. The lead institution charged with administering the CBD and in formulating national norms and standards for biodiversity management in South Africa is the national Department of Environmental Affairs and Tourism (DEAT). DEAT therefore takes a central role in setting the national framework for ABS and, as is envisaged in the Biodiversity Act, will be responsible for formulating norms and standards for benefit-sharing agreements and material transfer agreements. Historically, however, DEAT has played a near absent role in providing policy guidance in steering agreements towards an equitable and optimum outcome.

As is the case for many other countries, ABS issues typically straddle a variety of different departments such as Environmental Affairs and Tourism, Trade and Industry, Arts and Culture, Science and Technology, Health, and Agriculture. The potential for overlap of mandate thus exists, more especially in the implementation of international agreements. Of particular relevance are DEAT’s responsibilities for administration of the CBD, and the National Department of Agriculture’s responsibility for implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). While provisions of the Biodiversity Act incorporate all indigenous biological resources, including indigenous agricultural resources, a

³⁵ Section 3(1)(a).

detailed legislative and institutional audit has yet to be done in terms of implementation of the ITPGRFA. Farmers' rights in particular are a key legislative gap but, as is the case with indigenous and traditional knowledge, their protection has proved extremely complex. Although an 'in principle' intent exists to realise these rights through legal protection, in practice the process has been thwarted by a mix of capacity constraints ("the issue is too big and complex"), a poor understanding of their implementation, and difficulties in marrying the different economic and social realities of South Africa (eg a highly developed commercial plant breeding sector but an under-developed and poorly organised small-scale farming component).

Current decision-making for ABS, prior to the implementation of the Biodiversity Act, is illustrated in Figure 1, while Figure 2 describes the proposed system of ABS administration and decision-making once implementation of the Biodiversity Act commences. At a broad political and strategic level, Cabinet and the Director-General clusters remain responsible for decision-making across national departments in addition to the Committee for Environmental Coordination (CEC), established in terms of Chapter 2 of NEMA. The CEC consists of the director-generals of ten national departments, the heads of provincial environmental departments, as well as a representative from local government. Specific issues relating to biodiversity and heritage are considered by a Working Group established under MINTEC, a technical committee set up to support the work of MINMEC, which is a Ministerial forum constituted to address concurrency issues between national and provincial government. Focused committees are also constituted under the Biodiversity and Heritage Working Group.

ABS has comprised an important area of work of the Biodiversity and Heritage Working Group, with the result that several provinces have now adopted a standard Memorandum of Understanding (MOU), developed by the National Botanical Institute with assistance from Kew Botanical Gardens, to guide their negotiations with third parties requesting access to certain genetic resources. The MOU, designed for the collection of biological material for research, prohibits use of the material for commercial purposes and prevents its transfer to third parties. If commercialisation is intended, the applicant is required to develop a separate agreement with the provider of biological material.

Also of relevance is the South African National Plant Genetic Resources Committee, established by the Department of Agriculture in 1996, as a counterpart to the SADC Plant Genetic Resources Centre, and in parallel with the establishment of similar structures throughout the SADC region. The Committee has had a patchy history, and while some useful interventions have been made with respect to national genetic resources policy and the ITPGRFA, there is a general impression among members that issues of representivity, mandate and scope have hindered its work substantially. Provincial representation in particular, has been inadequate, and a lack of formal status for the committee has led to a rather *ad hoc* approach. Although the Committee has not convened for nearly three years, there are now renewed attempts within the Department of Agriculture to reconstitute the body, and to ensure adequate representation from the provinces. An ongoing debate concerns the location of the committee, and its possible placement within the DEAT³⁶. Certainly a reconstituted and reinvigorated Committee could provide a much-needed forum for ABS matters to be considered, more especially with the execution of the Biodiversity Act.

In practice, most decision-making about ABS occurs within the organisations issuing permits and transferring genetic material. Table 3 describes existing permitting arrangements for access to

³⁶ See, for example, Minutes of the third extraordinary meeting of the national Plant Genetic Resources Committee, 8 October 1999; Minutes of the 7th regular NPGRCom Meeting, 6 June 2001.

biological resources in South Africa³⁷. For *in-situ* material, permits are issued to conduct research and/or collect biological resources by the Department of Water Affairs and Forestry; DEAT Marine and Coastal Management; the South African National Parks; and provincial conservation and environmental departments and statutory boards. Additionally, a range of institutions host *ex-situ* collections and receive ongoing requests for access to material. These include the National Genebank (held by the Department of Agriculture); the botanical gardens and herbaria of the National Botanical Institute; museums; university-held collections; genebanks held by the Agricultural Research Council, including a citrus genebank and range and forage genebank; as well as private seed companies and nurseries.

Table 3. Current permitting arrangements for access to biological resources in South Africa

Administrative authority	Description of resources that are mandated for permitting	Relevant legislation
Department of Environmental Affairs and Tourism, Marine and Coastal Management	All marine resources	Marine Living Resources Act
Department of Water Affairs and Forestry	Biological resources located in state forests (note that in some instances this permitting function is devolved to the relevant province)	Forest Act
South African National Parks	Biological resources located in national parks	Protected Areas Act
National Botanical Institute	Biological resources located in national botanical gardens. Material transfer agreements are required for accessions from the NBI's herbaria.	Forest Act
National Department of Agriculture	Material transfer agreements are required for accessions from the National Gene Bank.	
National Department of Agriculture	Issues phytosanitary permits for all exports of biological material.	Agricultural Pests Act
Provincial boards and departments of environment and nature conservation	Permits are required for the collection of any biological resources located in provincial nature reserves, as well as for all listed protected species.	Various provincial ordinances and Acts

³⁷ See also Burgener, M. 2003. A review of the existing South African administrative systems for permitting and overview on benefit-sharing schemes. In: *Developing Access and Benefit-Sharing Legislation in South Africa*. IUCN, Gland, Switzerland and Cambridge, UK. pp. 82-102.

A lack of integration is evident within the different provincial and national agencies responsible for ABS management in South Africa, and an extremely diverse set of approaches to ABS has evolved amongst these bodies. In the Western Cape Province, for example, a moratorium currently exists on bioprospecting, both within and outside of protected areas, (although permits have historically been given for collections to take place). In the Northern Cape Province, a prohibition on destructive collecting within protected areas effectively precludes any biological collections from taking place, whether for commercial purposes or not. Within National Parks, proposals are generally assessed on an *ad hoc* basis, and may be referred to expert groups for opinion. In Gauteng Province, ABS applications are turned down because of a lack of administrative capacity within the department, and insufficient support from national government. Often, uneven understandings and capacities within different conservation agencies lead to inconsistent responses to the same bioprospecting application. Difficulties faced in distinguishing between applications for academic and commercial research further complicate and confuse the situation, although officials are often familiar with applicants and the nature of the research being conducted, making this distinction less fuzzy.

This spectrum of institutions represents the formal front of requests to access genetic resources, but undoubtedly, a host of activities occur outside of any legal framework. In part this is due to illicit collecting activities, but in the main it results from the lack of adequate legal protection for species outside of protected areas that are not listed as threatened or vulnerable: the vast majority of biological resources in South Africa. To some extent this gap will be addressed by the Biodiversity Act, which requires permits to be obtained for all bioprospecting projects, and for the export of any indigenous biological resource to be used for bioprospecting or any other kind of research. Difficulties remain, however, in distinguishing bioprospecting from other research activities, and this is likely to thwart efforts to effectively control access to South African biodiversity.

4. Existing Networks and Capacities on Access and Benefit-Sharing in South Africa

South Africa has varying levels of expertise on access and benefit-sharing, ranging from well-developed scientific expertise on specific technical aspects of drug discovery, through to poorly developed understandings of benefit-sharing and legal regimes to control access to genetic resources. Appendix 1 lists existing expertise on ABS in South Africa, including stakeholders that may not necessarily consider themselves to be ‘experts’ on ABS, but nonetheless have expressed interest in the issue and have attended workshops or participated in processes related to ABS. Note that for purposes of confidentiality, holders of traditional knowledge are excluded from the list.

A more comprehensive audit is necessary in order to identify specific deficiencies and strengths with regard to ABS capacities but in general the following comments can be made:

➤ Within government, national-level expertise on ABS is crucially deficient, and this has affected the outcome of benefit-sharing agreements and ABS laws. A strengthening of this role is key, more especially in light of provisions of the Biodiversity Act requiring benefit-sharing agreements for all bioprospecting initiatives. Key needs include contract negotiating skills, legal drafting skills, and technical skills to enhance inventory and biodiversity assessment work. Assistance is also needed to train officials to enforce and implement laws. While training is crucial, equally important is for learning to be translated into experience and for this experience

to be maintained as part of a dedicated body of expertise, rather than it being diverted to other tasks.

➤ For most provincial authorities, ABS issues fall low on the priority list, and a reduction in applications for bioprospecting has also reduced the urgency with which these organisations view the matter. Resources allocated for conservation have declined across the board, and frustration and disillusionment have caused a mass exodus of highly trained managers and scientists from conservation departments. Capacity constraints dictate that management is often based on reactive responses, rather than through the proactive planning required to develop ABS policies and procedures. Nature conservation agencies lack the capacity to deliver on *existing* policies, let alone to develop and implement *new* policies on issue such as ABS that may not appear to be an immediate priority.

➤ Having said this, it is interesting to observe that in the absence of national oversight, many conservation agencies have built up expertise and capacity rapidly to deal with ABS issues, often through self-initiative. However, this capacity is unevenly spread through the different provinces. It is important to note that the Constitution imposes a duty on national government to assist provinces in developing the administrative capacity necessary to implement national legislation. Certain aspects of the Biodiversity Act such as bioprospecting permitting can only be effectively regulated at a provincial level and national government is thus required to build capacity within provincial conservation departments to ensure that they are able to carry out their duties effectively³⁸.

➤ A key issue, raised by many government officials, is for career-pathing to be developed for officials that may not have the skills or interest to become managers, but who may have excellent competencies in specific fields of expertise such as ABS. Current systems of career development force such experts to become managers (or to leave their positions), because of the absence of equivalent systems of promotion for scientific endeavours. This is a crucial deficiency that requires redress, both for addressing capacity deficiencies in ABS and for broader biodiversity management within government.

➤ Within government, skills training on ABS is needed for a variety of purposes including for analysis of benefit-sharing agreements; negotiation and mediation; legal drafting; policy and legislative frameworks; monitoring and assessment; increased understanding as to the commercial pathways of natural product development; database management for permits; and improved understanding and clarity as to implementation of prior informed consent at different levels.

➤ There are also urgent gaps that require redress within government. While substantial scientific and technical expertise exists on ABS, there are crucial deficiencies with regard to the assessment, inventory and monitoring of genetic resources; the valuation of genetic resources; the development of information systems at national and regional levels to enable improved coordination; and understanding and awareness with respect to benefit-sharing and the protection and recognition of traditional knowledge about biodiversity. Legal understandings with respect to ownership of genetic resources and the protection of traditional knowledge and farmers' rights are still very poorly developed and conservation aspects of bioprospecting have not received adequate attention. Although much effort has been placed on the 'discovery' phase and associated techniques of screening, DNA sequencing, and characterisation, marketing and product development remain critical gaps, with implications for the extent to which value can be added to local biodiversity products.

³⁸ *Ibid.*

➤ The development of consortia to integrate the strengths of microbiology, chemistry, pharmacology, and botany has been a forte of bioprospecting initiatives in South Africa over the past five years. Not only have the technical competencies of these disciplines been complemented, but so too have the initiatives of a number of different research councils and universities. This strategic outlook has led to several bioprospecting projects involving consortium members and foreign organisations.

➤ Rural communities and holders of traditional knowledge are often key stakeholders in ABS agreements and initiatives and there are major capacity challenges at this level. Broad awareness-raising on ABS is important, but must be tailored to needs on the ground, and to a realism that bioprospecting in most instances delivers only limited developmental benefits. Some headway has been made through recent projects of the NBI and IUCN, and through the publication of a local primer on access and benefit-sharing³⁹, but ongoing support and attention is needed to further enhance awareness. In particular, greater attention needs to be given to building organisational support for communities entering into agreements, and to strengthening understandings as to their rights, and ways in which they can best engage with outside parties to enable benefits from use of their knowledge and resources.

5. Bioprospecting Initiatives in South Africa

5.1 *The nature and scale of bioprospecting in South Africa*

Bioprospecting is practiced at many different levels in South Africa, among many different sectors, and through a variety of different approaches. Historically, it has involved local intermediaries such as universities, botanical gardens, research institutions, parastatals, genebanks, herbaria, museums and private collectors providing collection and scientific services to companies or to foreign intermediaries. Traditional healers and communities have also been approached for their knowledge about the properties of certain organisms, although a substantial part of South Africa's ethnobotanical knowledge is already recorded in scientific publications and colonial records. More recently, concerted efforts have been made to streamline and coordinate such efforts through the development of national consortia comprising state-based research institutions pooling their expertise and knowledge.

A review of applications to collect biological material in South Africa for bioprospecting and research purposes is summarised in Table 4. In many cases, the information is patchy and open to different interpretations, but it does enable an overview of activities over the past 5-10 years on public land and for protected species. Most importantly, it suggests that bioprospecting in South Africa is not nearly as widespread as is popularly believed. Various reasons can be suggested for this trend, including (a) the fact that the vast majority of useful genetic resources have already left the country over the years, and are located in foreign repositories accessible to those wishing to further explore South African genetic resources; (b) there is declining interest in natural product development; (c) South Africa's legislative vacuum for ABS has provided a disabling environment for bioprospecting; and (d) the development of national consortia has streamlined the process through which permits are granted and reduced the number of individual permits issued. While all of these reasons are likely valid, it is noteworthy that *national* efforts on

³⁹ Laird, S.A. and Wynberg, R. 2003. *Biodiversity prospecting & access and benefit sharing*. IUCN, Gland, Switzerland and Cambridge, UK. 40 pp.

bioprospecting have increased over this same period, most especially through the development of consortia. What this implies is that greater collaboration between national institutions is likely to have reduced the number of external agreements struck up between individual institutions and third parties.

Table 4. Applications to collect biological material for bioprospecting and research purposes in South Africa over the past 5-10 years

Administrative authority	Description of permits issued	Conditions and benefits
DEAT: Marine and Coastal Management	Only one permit issued for bioprospecting (to Rhodes University) but bioprospecting likely takes place using recreational permits or through permit exemptions for research.	
Department of Water Affairs and Forestry	Since 1986, 93 permits issued for research-related collections in state forests. Only 2 of these have been issued to foreign research institutions, and only 2 are explicitly for bioprospecting purposes (although DWAF itself has not recognised this).	Stated benefits include research reports.
South African National Parks	[Awaiting information]	[Awaiting information]
National Botanical Institute	The NBI is comprised of three herbaria and eight botanical gardens. The institute both applies for permits <i>to collect</i> outside of botanical gardens, and <i>supplies</i> material to third parties from its ex-situ and living collections. Since 1992 more than 33 900 specimens have been sent from the herbaria to both foreign and local institutions. Most specimens have been sent from the national herbarium, which since 1992 has received 200 requests, 77 of them from foreign research institutions. Incomplete records have been collected for botanical gardens but Lowveld and Pretoria record 8 and 19 requests respectively over a number of years, some being for bioprospecting-related research projects. The vast majority of herbaria requests	A standard MTA accompanies specimens for access to material both in the gardens and herbaria. This aims to prevent commercialisation without further agreement. CITES documents and permits are needed for particular species. Stated benefits of providing material include training, co-authorship of papers, species lists, field trip funding, and reciprocal exchanges from other herbaria and gardens. Stated policy is not to make herbaria specimens available for DNA research.

<p>National Department of Agriculture: National Genebank</p>	<p>are for plant systematics research.</p> <p>15 requests since 2000, 8 of which are from foreign institutions and virtually all of which are for commercial application. About 20-30 species requested.</p>	<p>A standard MTA is used that excludes commercialisation.</p>
<p>Gauteng Province</p>	<p>Only one commercial request (that was refused), for pharmaceutical development of spider anti-venom. [obtain research information]</p>	
<p>KwaZulu Natal</p>	<p>671 permits issued from 1996-2003 for the collection of biological material (but not only for research purposes). Only 1 bioprospecting permit issued (to the CSIR). Others have been turned down because applicants were foreign.</p>	<p>In terms of organisational policy, requests to collect material in protected areas will only be considered from South African <i>bona fide</i> research institutions. A MOU should accompany such collections, which should be monitored and regulated in terms of current nature conservation legislation. Benefits include species distribution information.</p>
<p>Northwest</p>	<p>[Awaiting information]</p>	
<p>Limpopo</p>	<p>60 research-related permits issued since 2002. (these exclude permits issued for use). Included amongst these permits are applications for the bioprospecting programme of the CSIR, the anti-malarial consortium, and the Nitrogen Fixation Unit of the Plant Protection Institution of the ARC.</p>	<p>A standard MOU accompanies the permit.</p>
<p>Western Cape</p>	<p>Since 2002 a moratorium has been placed on all bioprospecting-related research. [obtain historical information]</p>	<p>A standard MOU accompanies the permit.</p>
<p>Free State</p>	<p>26 applications received and approved over the period 1996-2004 to collect material for research purposes. None are explicitly or obviously for</p>	<p>A standard MOU accompanies the permit. Research findings must be made available to the Department. Restrictions</p>

	bioprospecting purposes. Seven applicants intended to export the material for research in other countries.	on the amounts and species collected pertain to certain permits.
Eastern Cape	[Awaiting information]	[Awaiting information]
Mpumalanga	[Awaiting information]	[Awaiting information]
Northern Cape	52 permits issued to collect material for research purposes, including 4-5 permits explicitly for bioprospecting / commercial research and 23 for research based in other countries.	

5.2 Overview of bioprospecting initiatives in South Africa

Key ABS agreements concluded by South African institutions and/or individuals over the past ten years are summarized in Table 5. What follows is a description of some of the most recent bioprospecting initiatives in the country.

5.2.1 The Council for Scientific and Industrial Research

The Council for Scientific and Industrial Research (CSIR), a South African statutory Board, is undoubtedly the most active and prominent bioprospecting player in South Africa⁴⁰. Through CSIR Food, Biological and Chemical Technologies (CSIR Bio/Chemtek), a major programme on bioprospecting has developed, which aims to evaluate the pharmaceutical potential of the 18 000 – 20 000 species of vascular plants native to South Africa. In 2002, more than 10 000 plant species had been collected, and in excess of 2 000 microorganisms⁴¹. Some 22 postgraduate and professional staff are involved in the programme, mostly focused on drug lead discovery. The organization includes three core competencies in the programme:

- drug lead discovery, through isolation and structural elucidation of novel active ingredients in medicinal and pesticidal plants and micro-organisms;
- development of minimally processed herbal remedies based on traditional medicines;
- establishment of community-based essential oil and medicinal plant cultivation and processing businesses.

Facilities include a high-throughput plant and micro-organism extraction facility; an anti-cancer screening laboratory; liquid chromatography-mass spectrometry to identify unknown active ingredients in medicinal plant extracts; the world's first GMP botanical extracts facility for the

⁴⁰ The CSIR represents one of the largest research organizations in Africa, accounting for about 10% of the entire African research and development budget. It operates under the following mandate: "In the national interest, the CSIR, through directed and multi-disciplinary research and technological innovation, should foster industrial and scientific development, either by itself, or in partnership with public and private sector institutions, to contribute to the improvement of the quality of life of the people of South Africa". About 40% of its annual budget is derived from the state.

⁴¹ Bio/Chemtek Annual Review 2001/2002.

<http://www.csir.co.za/websource/pt10002/Annualreviews/biochemtek/biopro.html>

supply of plant extracts to be tested in clinical trials; distillation units for the production of essential oils and herb drying facilities.

Key initiatives include:

➤ The establishment of a **national bioprospecting consortium**, comprising major scientific research institutions and universities throughout the country. The consortium's focus is the discovery of drugs from indigenous plants, and is considered to "bring together the potential to integrate the strengths of microbiology, chemistry, pharmacology and botany so as to make a considerable and unique contribution to the search for novel drugs in southern Africa and more widely on the African continent". Key partner organizations include the Medical Research Council, National Botanical Institute, and Agricultural Research Council. Funding has been obtained from the National Research Foundation's Innovation Fund for a major project focused on anti-malarial drugs (see below).

➤ The **development of an appetite suppressant drug** (dubbed "P57") derived from a species of *Hoodia*, a succulent plant indigenous to southern Africa and long used by the San to assuage hunger and thirst⁴². The appetite suppressant is considered to have the potential to become the first blockbuster drug to be derived from an African plant and is to be commercialised into a prescription medicine with an estimated market potential of more than US\$6 billion. The active components of the plant have been patented by the CSIR who, in 1997 signed a licensing agreement with Phytopharm plc, a small UK research-based pharmaceutical company. Phytopharm in turn 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 (but that has recently withdrawn from the agreement).

At the time no arrangement was in place to benefit the San for their traditional knowledge but through lobbying from NGOs and San-affiliated organisations the case became a high-profile story in the media. In 2003, agreement was reached between the CSIR and San 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. The initiative has received wide acclaim although there are concerns with respect to the limited benefits received by the San, and the restriction on their use of knowledge of *Hoodia* in any other commercial application.

➤ The signing of an **agreement between the CSIR and the US-based Diversa Corporation** giving Diversa the rights to obtain microbial samples from South Africa and to commercialise products. In exchange, Diversa will support the ongoing bioprospecting activities of the CSIR and its collaborators and pay royalties on revenues from any products developed from samples provided;

➤ **An agreement with a group of ten traditional healers**, whereby knowledge is collected by healers for the CSIR, and benefits arising from commercial use of the knowledge are paid into a Trust administered by the healers;

➤ A three year project with an undisclosed partner, focused on **animal health**;

⁴² See Wynberg, 2004, n. 4.

- **Development of a mosquito repellent**, based on local knowledge of a local plant species. A South African patent has been granted for the active constituents of the plant and investigations are underway with respect to its cultivation.
- Establishment of **community-based essential oil and plant extraction** businesses.
- Establishment of a **bioprospecting platform for Africa**. Negotiations are currently underway with neighbouring countries to obtain access to genetic resources and to build ABS competence in these countries.

5.2.2 *The National Botanical Institute*

The National Botanical Institute is a public institution that aims to “promote the utilisation and conservation of, and knowledge and services in connection with Southern African flora”, and also to promote the economic use and potential of indigenous plants⁴³. This it does through, *inter alia*, managing the various botanical gardens and herbaria in South Africa, conducting environmental education and outreach programmes, undertaking scientific research on plants, and maintaining and developing databases about southern African flora. The organisation employs over 600 people and manages an operating budget of some \$11 million (2002), 55% of which it receives from Parliament. A senior manager within the institute is the central contact point for all access and benefit-sharing issues, and this has assisted in streamlining ABS policies and practice.

The NBI is involved both as a player and partner in bioprospecting, and as a decision-making body, responsible for ex-situ and garden collections, and engaged in several policy fora representing government. The organization is involved in a number of ABS-related initiatives:

- **NBI and Ball Horticulture**⁴⁴. In 1999, the NBI entered into a Research and Licensing Agreement with the Chicago-based Ball Horticulture, one of the world’s largest horticultural companies. The five-year agreement, which is the first North-South bioprospecting agreement in the horti- and flori-culture sector, entails the NBI using its expertise to select South African plants of horticultural interest to Ball, both from its living collections and from the wild. Ball will patent any selected or hybridised varieties of these plants, and the NBI will receive a cut of profits for 20 years following the plant’s introduction to the market. Profits generated by the Agreement will be placed in a specific account administered by the NBI Board, to be used for capacity building in botany and horticulture (although this will likely become redundant with the establishment by the Biodiversity Act of a Bioprospecting Fund).

Other benefits include staff training and the building of greenhouse facilities, where plants will be propagated before being sent to America. The first plant to be successfully commercialised as part of the agreement is a hybrid of two *Plectranthus* species, developed by the NBI and thus securing a 10% royalty for the Institute. “Mono Lavender”, the resulting variety, is now commercially available throughout Europe, the US, Japan, and South Africa. Plant Breeder’s Rights have been granted worldwide for the variety, and application has also been made in South Africa. Such applications have been made by Ball on behalf of the NBI. The agreement, due for renewal and

⁴³ Forest Act 122 of 1984, and Forest Amendment Act 53 of 1991.

⁴⁴ See Glazewski, J., Meiring, A. and Fakir, S. August 2001. Final Report. Report to the Chairman of the Board of the NBI on Research and Licence Agreement between the National Botanical Institute and the Ball Horticultural Company; Wynberg (2003), see n. 3; Henne, G. and Fakir, S. 1999. NBI-Ball Agreement: A New Phase in Bioprospecting? *Biotechnology and Development Monitor*. 39: 18-21;

renegotiation in 2004, represents a significant effort by South Africa to control the use of indigenous genetic resources in the global horticultural trade but has met with heated controversy from stakeholders who perceive it to be too wide in scope, weak in benefit-sharing arrangements and technology transfer, and inadequate in terms of job creation and local economic development.

➤ **The Millenium Seedbank.** The NBI is the South African partner in the Millennium Seed Bank Project of the Royal Botanic Gardens, Kew. This is an international collaborative plant conservation initiative which aims to safeguard 24 000 plant species from around the globe against extinction. An emphasis is placed on dryland plant species and on strengthening in-country capacity for seed banking. The collection of threatened and endemic species forms a major part of the project in South Africa. Although commercialization of the seed is not intended, a legally binding ABS agreement governs the relationship between Kew and the NBI and requires a separate commercial agreement to be developed in the event of commercial interest.

➤ **DNA Banking.** In another collaboration with Kew, the NBI has set up a DNA bank to archive the genetic material from at least one species of all 2 200 South African flowering plant genera. The objective is to allow researchers to have access to plant DNA extracts and to produce a phylogenetic ‘tree of life’ of South African plant genera. A MTA restricts commercial use of the material supplied.

➤ **Mellon Foundation.** A project of the Mellon Foundation aims to digitize type specimens in a number of African countries and to make research, education, and public domain information more readily available;

➤ **Southern African Biodiversity Support Programme.** Access and benefit-sharing forms a key focus area of the Southern African Biodiversity Support Programme, which aims to contribute to the development of national institutional capacity to implement ABS laws; to facilitate integration of lessons learnt into policy and strategy development; to contribute to cross sectoral and regional collaboration; and to adapt the *OAU Model Law on the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources* to national realities.

5.2.3 Medical Research Council

The Medical Research Council, as the Science Council charged with facilitating and coordinating health and medical research⁴⁵, is strongly involved in bioprospecting through drug research and development.

Key projects include:

➤ **Anti-malarial medicines from the medicinal plants of southern Africa project⁴⁶.** A project on anti-malarial medicines from medicinal plants has recently been completed by a consortium comprising the South African Medical Research Council (MRC) (Lead agency), University of Cape Town (UCT), Council for Scientific and Industrial Research (CSIR), National Botanical Institute (NBI), University of Western Cape and University of Pretoria (UP). The project was funded by the Department of Arts, Culture, Science and Technology (DACST)

⁴⁵ MRC Act 58 of 1991

⁴⁶ See also www.sahealthinfo.org

through the Innovation Fund and had a budget of R6,7 million extending over 3 years (2001 - 2003). The consortium owns a database containing 2 300 records of 700 plants claimed to be used in the treatment or prevention of malaria.

The aim of the project was to develop new medicines, based on indigenous plants and indigenous knowledge, for the treatment of malaria. The project was expected to lead to the establishment of new agro-processing businesses for the supply of extracted plant material that will be used in new anti-malarial drugs. A focus was placed on two plants shown to have potential to combat chloroquine resistance of certain malaria strains. The project intended to: create multidisciplinary scientific capability to derive anti-malarial medicines; create jobs through cultivation and agroprocessing; develop a technology platform for South Africa, comprising all the elements of the “value chain” for drug discovery; and create economic benefits for South Africa through product innovation and royalty earnings. Any financial benefits generated as a result of the project are to be divided in half - with 50% of benefits being shared equally by partners of the consortium, and the remaining 50% deposited into a Trust Fund to share with ‘stakeholders’ that have contributed to the project.

➤ **A national research and development platform for novel drug development from indigenous medicinal plants**⁴⁷. This three-year project includes the Agricultural Research Council (Post Harvest), the CSIR (Bio/Chemtek), the Medical Research Council (Business Development; Diabetes Management; IKS; TB Research; Malaria Research); the National Botanical Institute (Ethnobotany, Research and Education, National Herbarium), the Rand Afrikaans University (Botany; Chemistry); University of Cape Town (Chemistry; Immunology; Medical Microbiology; Pharmacology; Surgery); University of the North (Pharmacology); University of Natal, Durban (Chemistry); and University of Pretoria (Biochemistry, Botany).

The project aims to develop (1) new medicines, effective against tuberculosis, malaria, diabetes mellitus and for immune modulation and (2) tonics from indigenous southern African plants and local knowledge. Successful conclusion of the project is expected to make possible the discovery of novel drugs and tonics, to the point of proof of principle, ready for early clinical studies, patenting, and further development in conjunction with an industrial partner, the World Health Organization, or other collaborative arrangements. An important feature of the project is its consortium approach, based exclusively on South African institutions working on southern African indigenous plants. Benefit-sharing arrangements are at this stage unclear.

➤ **South African Traditional Medicines Research Group**. In addition to the anti-malarial project described above, the Medical Research Council also has a Traditional Medicines Research Unit, founded in 1997 in collaboration with the Department of Pharmacology at the University of Cape Town. Its objectives are:

- to establish a research culture, and to introduce modern research methodologies around the use and understanding of traditional medicines;
- to create an environment that will attract young scientists and potential leaders in the field;
- to develop a series of patents for promising new entities derived from medicinal plants by developing potential new drugs to the point of proof of concept;
- to create special opportunities for the development of this scientific field in South Africa.

⁴⁷ For further information see www.sahealthinfo.org

One key project is the establishment of a ‘virtual’ traditional medicine centre, which is managed jointly by the MRC and the CSIR, with the aim of boosting scientific research into the validity of scientific claims about traditional medicine. It will host a database of traditional medicines, and act as a clearing-house for this information.

5.2.4 *Agricultural Research Council*

The Agricultural Research Council⁴⁸ (ARC) is a statutory body, formed under the Agricultural Research Act of 1990 with a mandate to conduct and undertake research, development and technology transfer. The ARC manages several *ex situ* collections of plant material within the country and is engaged actively as a partner in various bioprospecting-related initiatives.

One of the ARC’s key projects is a focused effort by its Plant Protection Research Institute (PPRI) to identify novel pesticides from indigenous plants. In terms of a 1998 Agreement with the CSIR, the ARC tests CSIR plant extracts for potential activity against major agricultural insect pests and fungal and bacterial plant pathogens. The project forms part of a broader consortium led by the CSIR and is also linked to laboratories at IACR-Rothamsted in the United Kingdom. Through laboratory screening procedures the project has thus far yielded 16 ‘hits’ showing insecticidal activity, 12 hits with anti-bacterial activity and 30 hits with anti-fungal activity. A selected number of these hits are being investigated further by the CSIR, using fractionation procedures. The project has also established three bioassay screens of international standards, capable of detecting specific pesticidal activity. The establishment of a screen for detecting herbicidal activities in extracts is under consideration. The stated aim of the project is for the ARC-PPRI to generate jointly, with the CSIR, financial gain through patenting, out-licensing, and royalties of any pesticidal compounds discovered.

5.2.5 *The New York Botanical Garden and Free State University*⁴⁹

This project involves a collaboration between the New York Botanical Garden (NYBG) and the University of the Free State (UFS) in Bloemfontein, initiated through Letters of Agreement, signed in 1998 and renewed in 2001 for a further three years. Through these agreements, South African plant material is collected by the NYBG, in collaboration with (a) the Department of Botany at the UFS, which provides botanical support and expertise to the project, and (b) the Department of Agronomy at the UFS, which tests phytochemical compounds for potential agronomic application and supplies extracts to Merck Research Laboratories in the United States.

The goals of the research programme, as articulated in the Letters of Agreement are:

1. “Establishment of research on plant biodiversity within the Republic of South Africa, through linkages to modern phytochemistry, as a means of promoting its conservation and use;
2. Discovery of new therapeutic compounds that have potential application to modern natural products chemistry as well as veterinary and agricultural practices by a plant collection, laboratory extraction, and screening program;
3. Strengthening of conservation efforts through botany, horticulture, public education programs, and the search for alternative agronomic crops at UFS through infrastructure development;
4. Establishment of a collaborative inter-institutional relationship for research in basic, applied, and conservation biology, as well as phytochemistry, between collaborating institutions”⁵⁰.

⁴⁸ www.arc.org.za

⁴⁹ For a comprehensive review of this initiative see Wynberg, R. 2003, n. 3.

These goals form part of a long-term Global Systematic Phytochemical Survey, initiated by NYBG in 1986 in an endeavour to systematically collect representatives of every vascular plant family in the world. The main intention is to conduct phytochemical screening to discover where biological activity occurs in the plant kingdom, and to develop novel compounds that show promise of new pharmaceutical and agricultural/veterinarian products. No information is obtained from healers, sangomas, or other holders of traditional knowledge, although plants collected may well be documented as having particular applications based on traditional knowledge and use. Primary clients of NYBG include the National Cancer Institute, Pfizer, and Merck, although Merck is the only client receiving South African material. To date, some 700-750 South African genera have been collected by NYBG, with about 80-100 of these genera representing introduced exotics⁵¹. Thus far no commercial applications have been developed from either the South African material or from species occurring elsewhere in the world⁵². Three species are however considered to show good promise for agricultural application and commercial rights for their development will remain in South Africa⁵³.

In terms of benefits, the project has led to significant spin-offs for the UFS that would not have been realized without external support, especially in light of financial difficulties faced by the university. The NYBG has benefited by dint of a full research grant from Merck to support its global phytochemical survey and the possibility of deriving royalties from the development of commercial products. Despite these benefits, those critical of the project point to its lack of substantial value-adding within South Africa – especially with regard to commercial research and development, its weak provisions with regard to maintaining IPRs in South Africa, and the difficulties of holding NYBG accountable when benefits are possibly realized in ten or twenty years time.

5.2.6 Strathclyde Institute for Drug Research, Glasgow, and an independent plant collector: Random screening for South African plants for drug development

This project started in 1999 and involves an agreement between the Glasgow-based Strathclyde Institute for Drug Research (SIDR) and an independent plant collector. Thus far up to 300 South African species have been supplied to SIDR in the form of dried plant material, with the SIDR undertaking random screening, and identifying early-stage commercial opportunities for drug development. The collector is paid a 'handling charge' per sample as well as 60% of any fees obtained from third parties that access extracts for evaluation purposes. An 'Ethnobotany Fund' has been established by the collector at the University of Stellenbosch in anticipation of successful commercialization, but thus far no monies have been deposited into the fund.

In Glasgow, samples are maintained in a library of natural products held by SIDR, purported to be one of the most diverse collections commercially available, and including examples of more than 70% of the plant families of the world. Access to SIDR's natural product library is available under license to industry, and agreed quantities of extracts are provided with exclusivity for an agreed period, with guaranteed taxonomic identification and resupply. South African material has

⁵⁰ Letter of Agreement between Department of Agronomy, UFS and NYBG, 31 January 2003; Letter of Agreement between Department of Botany and Genetics, UFS and NYBG, 31 January 2003.

⁵¹ R. Brand, NYBG, pers. comm., December 2002.

⁵² *Ibid*

⁵³ Letter to R. Wynberg from Professor J. Venter, Dr A. Venter, Professor S. Pretorius and R. Brand, on behalf of the University of the Free State, November 2002.

been included in two industry contracts with the SIDR, but little interest has been expressed to date in this material⁵⁴.

A recent analysis of the case⁵⁵ points to the pitfalls of operating in a legal vacuum, evidenced by the extremely weak benefit-sharing provisions of the agreement, and lack of commitment to add value to resources for national benefit.

5.2.7 Department of Biochemistry and Microbiology, Rhodes University: Fungal bioprospecting

This project involves the isolation of a laccase enzyme with industrial application from a South African fungus, discovered in the Eastern Cape. Applications include the detoxification of industrial effluent from paper, pulp and petrochemical industries, use as a tool for medical diagnostics, and use as a bioremediation agent to clean up herbicides, pesticides, and certain explosives in soil. It is also used as a cleaning agent for certain water purification systems, as a catalyst for the manufacture of anti-cancer drugs, and an ingredient in cosmetics. It is considered to be the first fungus of its kind to be isolated internationally⁵⁶.

5.2.8 Rhodes University, Department of Chemistry: marine bioprospecting

The Department of Chemistry at Rhodes University is actively involved in natural product development using South African marine organisms. Past projects have entailed a collaboration between Rhodes University and SmithKline Beecham in the mid-1990s, and from 1998-2000, between Rhodes University, the US-based National Cancer Institute, and the Coral Reef Research Foundation from Micronesia⁵⁷. Neither of these projects led to commercial developments, but both have contributed substantially to the building of South African capacity in marine invertebrate taxonomy and natural products chemistry and have enabled the purchase of equipment⁵⁸. The Department is currently involved in a National Institutes of Health sponsored collaboration with the Scripps Institute of Oceanography, looking for new anti-cancer drugs from South African marine organisms. No commercial developments have arisen from this programme, but it has yielded benefits through student training. An important library of extracts made from South African marine invertebrates is housed at Rhodes University, obtained from SmithKline Beecham following the closure of its natural products-based drug discovery programme and from ongoing projects in this field.

5.2.9 Rand Afrikaans University

The department of Botany the RAU is actively involved in various ethnobotanical and bioprospecting initiatives. Individual scientists are involved in new crop development and new product development but the precise nature of these activities is unknown.

⁵⁴ Alan Harvey, SIDR Director, pers. comm., December 2001.

⁵⁵ Wynberg, R. 2003, n. 4.

⁵⁶ <http://www.scienceinafrica.co.za/2004/january/fungus.htm>

⁵⁷ See also, Wynberg, R. 2002. Institutional responses to benefit-sharing in South Africa. In: *Biodiversity and Traditional Knowledge. Equitable partnerships in practice*. Edited by S.A. Laird, Earthscan. London, pp. 60-70.

⁵⁸ E-mail communication to Rachel Wynberg from M. Davies-Coleman, 9 March 2004.

5.2.10 *University of Cape Town Plant Stress Research Unit: The ‘resurrection plant’.*

Scientists at UCT are researching ways of genetically manipulating a plant's ability to cope with drought. In the mountain-top habitats of Lesotho and South Africa, the resurrection plant *Xerophyta viscosa*, is able to survive for long periods without water, and is also highly tolerant of temperature extremes and high winds. Most remarkable is the plant's ability to rehydrate completely and resume its full metabolic functions within 24 to 72 hours of rain⁵⁹. Scientists at the University of Cape Town in South Africa are using *X. viscosa* as a source of genes that code for proteins responsible for this resurrection phenomenon. The ultimate intention is to engineer stress-tolerant crop plants for sub-Saharan Africa⁶⁰.

5.2.11 *University of Natal Durban*

Various initiatives are underway in the School of Pure and Applied Chemistry, which has a research group investigating natural products. One project includes the isolation and characterization of biologically active natural products from the marine organism Palythoa.

5.2.12 *University of the Western Cape*

A new Herbal Science and Medicine Institute has recently been established at the University of the Western Cape, with a mission to “scientifically and clinically unlock the value of indigenous medicinal and nutritional plants”. The Institute is a collaborative venture with the Departments of Medical Biosciences, Biodiversity and Conservation Biology, Chemistry, Oral Pathology and Oral Medicine, as well as the Schools of Pharmacy and Natural Medicine. Within the School of Pharmacy monographs are being compiled from new and available information obtained from macroscopical, microscopical, chemical analyses of these plants and their pharmacological actions. These monographs will characterize all medicinal plants in South Africa and then develop standards for them,

5.2.13 *‘Informal’ Initiatives and Agreements with Individuals*

In addition to these formal projects, there are also other projects that take place informally within universities, other research institutions, or through private contacts, based on informal requests, or individual research interests. In some cases researchers may be approached by intermediaries acting on behalf of companies; in other cases individual researchers may actively pursue links that result in their research interests finding commercial application.

⁵⁹ Farrant, J.M., 2000, A comparison of mechanisms of desiccation tolerance among three angiosperm resurrection plant species, *Plant Ecol.* 151: 29-39.

⁶⁰ Peters, S. (2003) “Resurrecting hope: drought tolerant crops,” *Science in Africa* (October 2003). <http://www.scienceinAfrica.co.za/2003/october/drought.htm>

Table 5. ABS agreements in South Africa

Agreement	Resources used	Field of Application	Date
CSIR and major South African scientific research institutions and universities	Indigenous medicinal plants	Drug discovery; Agriculture	1998 onwards
CSIR – Phytopharm	Hoodia and related succulent plant species	Health: Anti-obesity drug development	1997 - present
CSIR – San			March 2003
CSIR – Diversa	Microorganisms	Health: Pharmaceuticals	2002
CSIR – traditional healers	Traditional knowledge	Drug discovery	2003 – ongoing
NBI – Ball	Indigenous plants	Horticulture	1999 – 2004
NBI – Kew	Indigenous plants	Conservation through Millenium Seedbank	2000 – ongoing
NBI – Kew	South African flowering plants	Conservation / research. Development of a phylogenetic ' tree of life'	Ongoing
Medical Research Council in collaboration with other national research institutions	Medicinal plants	Health. Anti-malarial medicines	2001 – 2003
CSIR – ARC	Indigenous plants	Agriculture: pesticide development	1998
New York Botanical Gardens - Free State University NYBG - Merck	Indigenous plants	Health Agriculture	1998 – 2001
Strathclyde Institute for Drug Research – independent collector			2001 – 2004
Rhodes University – SmithKline Beecham	Indigenous plants	Health: drug development	1999 – 2002 (current status unknown)
Rhodes University – National Cancer Institute and Coral Reef Research Foundation	Marine invertebrates	Health: drug development	mid 1990s
Rhodes University – National Cancer Institute and Coral Reef Research Foundation	Marine invertebrates	Health: anti-cancer drugs	1998 – 2000
Rhodes University – Scripps Institute of Oceanography	Marine invertebrates	Health: anti-cancer drugs	Until 2005

6. Key Trends and Issues

The projects described above have very different objectives and represent a mixed bag of experiences, but combined with a recent analysis⁶¹, illustrate a number of themes common to ABS in South Africa. What follows is a brief analysis of these factors, and a set of recommendations to identify future actions.

6.1 *Legislation, policy and the role of government*

The absence of legal and administrative mechanisms to control access to South Africa's genetic resources, and to set conditions for benefit-sharing, has been a key constraint towards achieving more meaningful benefit-sharing arrangements in South Africa. New legislation to regulate ABS will change this significantly but may be hindered in implementation by the lack of a central focal point and 'secretariat' for bioprospecting and unclear permitting and procedural arrangements.

As described above, national government has played a near-absent role in developing ABS agreements: both in terms of its lack of administrative support and role as a central focal point and clearing house, and through its lack of leadership in providing support, advice and facilitation. Generally, complex and difficult negotiations have been left to develop in a policy and administrative vacuum, at the whim of individual scientists who have had neither the skill nor expertise required to develop appropriate agreements. Largely as a result of this lack of national oversight, many agreements fall short of including requirements to satisfy national social, economic and environmental imperatives. At the provincial level, different approaches are taken by different provinces which have uneven understandings and capacities to deal with the issue, leading to inconsistent responses, often to the same bioprospecting application.

The scope of access, and lack of clarity on definitional and ownership issues are likely to be hurdles in implementing ABS laws. The 'grey' area between research and commercial development is not well recognised by ABS laws and, other than for export purposes, research is currently excluded from legal purview. Because of the difficulties of distinguishing between academic and commercial research, this omission will effectively exclude many bioprospecting projects from stipulated permitting requirements. The broad definition used for bioprospecting and 'indigenous biological resources' within the newly promulgated Biodiversity Act will likely require further consideration and scrutiny with respect to implementation.

6.2 *Unequal power*

Historically, bioprospecting has been initiated by foreign partners intending to pursue a range of different objectives. It would appear that the bargaining arm of local institutions or individuals has been far weaker than that of their international collaborators. Unfortunately, South Africa's isolation through the apartheid years is still reflected in the naivety with which local institutions receive foreign commercial collaborations, and the lack of capacity of local institutions to engage with and comprehend the very powerful interests that tend to drive such partnerships. In the absence of other options, local chemists or biologists involved in doing the research have been left to fumble through highly complex and legally challenging agreements, the full implications of which were perhaps poorly comprehended and thought through. This is clearly a situation that requires redress. For South Africa to glean significant benefits from her biological resources,

⁶¹ Wynberg, 2003, n. 3.

urgent efforts must be made to build appropriate capacity, to allow scientists to “stick to their knitting”, and to establish legal parameters to both guide foreign collaborators and strengthen the bargaining powers of local institutions.

6.3 *Obtaining prior informed consent from holders of traditional knowledge.*

Little attention has been paid historically to the need to obtain prior informed consent from holders of traditional knowledge. This is best illustrated through the case of the San, who only recently learned about the patenting of their knowledge on Hoodia by the CSIR, for use in an anti-obesity drug. Although the San have now retrospectively been included in a benefit-sharing agreement with the CSIR, many questions remain: Who qualifies as the rightful community or group from whom consent should be obtained? Can knowledge be attributed to a single group or individual? Is the privatisation of traditional knowledge through IPRs not contrary to the belief of many communities that such knowledge is collectively held, for the benefit of the broader community? And what happens – as in the case of the San – when consent is only obtained after the fact? Communities clearly require legal and strategic assistance in dealing with these issues, combined with active and ongoing vigilance of patent applications for ‘prior art’, or knowledge already recorded. A supportive legislative environment is also critical – especially given the difficulties and inappropriateness of using existing intellectual property systems to protect community and indigenous rights.

6.4 *Avoidance of community-owned areas*

A noticeable trend in South Africa is that bioprospectors seem to be intentionally avoiding community-owned areas and are instead opting to collect on state-owned land (often protected areas) or privately held farms, where prior informed consent is a simple procedure that does not require lengthy and complex negotiations with a community. The same applies for traditional knowledge about South African plants, much of which is already publicly available. Alternatively, a select few individuals are identified to represent the interests of holders of traditional knowledge – with the underlying but unwritten assumption that these individuals will obtain prior informed consent and spread benefits more broadly among the community⁶². This is obviously a far from satisfactory arrangement.

6.5 *Stakeholder involvement*

Several bioprospecting initiatives in South Africa have floundered because of the limited attention they have paid to involving different roleplayers, and because of the often-confidential nature of agreements. Bioprospecting, more than many other biodiversity issues, raises charged emotions because of its historical tendency to over-ride equity and social justice considerations. It is for these reasons that the majority of countries that have legislated for bioprospecting have instituted some kind of formal structure to enable stakeholder involvement in decision-making with regard to bioprospecting applications. However, no provision is made in the Biodiversity Act for stakeholder involvement in decision-making and this, combined with a discretionary clause for the Minister to intervene to ensure fair and equitable benefit-sharing, suggests that those

⁶² See, for example, an agreement between the CSIR and a ‘traditional healers committee’, representing eight traditional healers from eight of South Africa’s nine provinces.

actively engaged in bioprospecting need to take extra care in ensuring that the interests of all stakeholders are accommodated when negotiating agreements.

6.6 *Limited benefit-sharing but strengthened collaboration*

Overall, experiences in South Africa suggest that opportunities arising from bioprospecting have not been optimised. Having said this, it is important to note that bioprospecting throughout the world brings with it only a limited set of benefits, and on its own is unlikely to solve national conservation and development problems, nor play a significant role in poverty alleviation. Nonetheless, when done right bioprospecting can play an important role in strengthening scientific institutions and building the capacity of researchers. However, it would seem that local institutions are poorly equipped to see through provisions of the CBD, which require access to and transfer of technology to developing countries under fair and favourable terms⁶³. Assistance is required to redress these inadequacies both through legal and other strategic interventions. The development of national research consortia on bioprospecting has played an important role in creating a more strategic approach to bioprospecting, and in reducing the number of external agreements struck up between individual institutions and third parties, but needs continued strengthening and greater clarity with respect to benefit-sharing arrangements.

Provisions in the Biodiversity Act which require ‘benefit-sharing agreements’ to be developed and approved by the Minister with all providers of resources and knowledge are confusing, as they fail to recognise the different steps and stakeholders in the process of developing a benefit-sharing agreement, and the fact that benefit-sharing agreements are typically only developed once research and development is further advanced. Clarity and guidance will be needed for applicants and permit issuing authorities with respect to the practical implementation of these provisions. A requirement in the Biodiversity Act for Ministerial approval for all Material Transfer Agreements may lead to lengthy delays, and may well be unnecessary, given that MTAs simply represent an agreement between parties to transfer specimens and to not commercialise them without first developing a benefit-sharing agreement.

6.7 *Intellectual property rights*

With some exceptions, intellectual property issues have also been poorly thought through and conceptualised. Because of the low probability of commercialisation and the long-term nature of future royalties, local research institutions tend to disregard the importance of intellectual property provisions in contracts with foreign collaborators, resulting in a hodge-podge of poorly enforceable and unclear benefits. Important policy choices need to be made to stimulate local innovation, to enable local innovators to advance ahead of their competitors, and to build understanding among South African research institutions as to the nature of IPRs and options available. Policy mechanisms also need to be introduced to develop and to improve the leverage of South African pharmaceutical, horticultural and other biodiversity-based enterprises in these globally competitive industries.

A crucial debate that has yet to unfold in South Africa is whether patents over life forms and biological processes should be recognised and upheld. Moreover, a number of issues relating to the interface between TRIPS and the CBD have not yet been resolved at national level. These include the disclosure of origin for patent applications; and approaches towards the patenting of

⁶³ Article 16

life. A crucial legal gap remains with respect to the recognition and protection of traditional knowledge. Farmers' rights also remain unrecognised and there is little consensus as to how this matter should be legally resolved⁶⁴. Forthcoming and long-promised legislation on indigenous knowledge should partly assist to address these questions, although implementation is still far off. Aligning procedures and definitions between different authorities and laws provides an enormous challenge to authorities and legislators.

6.8 *Limited benefits for biodiversity conservation*

Although bioprospecting is commonly touted as a tool for conservation, this has not materialised in any concrete terms. Increasing pressures are being placed on conservation to 'pay its way' in South Africa, resulting in commercialisation strategies on the part of many provincial and national conservation agencies. Bioprospecting agreements should at the least make a financial and in-kind contribution to promote conservation in the area of collection, and should cover the operating costs of conservation authorities. The scientific information obtained from such agreements should also be tailored towards meeting the management objectives of the particular biome or reserve in which collection takes place and national conservation imperatives.

6.9 *Social justice*

In general, inadequate attention has been given in bioprospecting initiatives to poverty alleviation, job creation, and the reconstruction and development of the country – all areas that historically have not been tackled by scientific institutions in South Africa. Although opportunities to address development needs present themselves these are often not stipulated as requirements in the agreements. A question that must be asked is whether bioprospecting can in fact deliver development benefits. The commercialisation of South Africa's phenomenal biodiversity has seen greatest success with approaches that are less sophisticated than those of bioprospecting – through for example the development of industries based on phytomedicines (herbal medicines), personal care products and food supplements. This option offers fewer risks and delays, the use of technologies more appropriate to South Africa, and also a far greater chance of benefits reaching the ground.

6.10 *Increased recognition of the importance of biodiversity*

There has been growing recognition in South Africa of the economic importance of adding value to natural resources. This is in contrast to previous approaches that disregarded the importance of indigenous genetic resources. The Innovation Fund, for example, an initiative of the Department of Arts, Culture, Science and Technology (DACST), identifies value addition with respect to biodiversity as a key focal area warranting the allocation of scarce government funds. The Biodiversity Sector of the National Research and Technology Foresight Project identified "the development of techniques to add economic value at local level to harvested or cultivated

⁶⁴ South Africa, which is one of the few African countries to have a plant variety protection regime in place, is a party to the 1978 UPOV Act and is considering ratification of the 1991 version. This is in keeping with the country's history of industrial agriculture, and the presence of a strong commercial breeding sector. However, little supportive legislation currently exists to broaden the system to include farmers and communities that have traditionally bred and developed crops and that have in some instances, provided knowledge and resources to commercial breeders.

products” as the most important activity to South Africa in respect of biodiversity, wealth creation and quality of life⁶⁵. Such initiatives mark an important turning of the tide: historically, most research and development on South African species has been done outside of the country.

7. Recommendations

A number of key recommendations emerge from this discussion

- 7.1 There is a clear need for the establishment of a central focal point for ABS in South Africa. It is recommended that such a ‘secretariat’ be established as a matter of urgency within the Department of Environmental Affairs and Tourism to assist *inter alia* with the processing and screening of bioprospecting applications, coordination among the provinces, and the establishment of a shared ABS permitting database.
- 7.2 Clarity and guidance is needed for applicants, permit issuing authorities, and other affected government departments with respect to the practical implementation of permitting and procedural arrangements required to effect ABS provisions of the Biodiversity Act.
- 7.3 A concerted effort must be made to build ABS capacity and raise awareness about ABS issues at a variety of levels: from assisting government with analysing agreements, developing negotiating and legal drafting skills, and permit database management, through to improving awareness amongst the research community about the importance of prior informed consent. Rural communities and holders of traditional knowledge are often key stakeholders in ABS agreements and initiatives, and there are major capacity challenges at this level - to ensure that efforts are relevant to needs on the ground, that legal and strategic assistance is available when required, and that expectations are not unduly raised.
- 7.4 Weaknesses in the Biodiversity Act with respect to stakeholder involvement suggest that extra vigilance will be needed to ensure that the interests of all stakeholders are accommodated when negotiating agreements.
- 7.5 Far stronger interventions are needed on the part of government and other stakeholders to ensure that bioprospecting makes direct and indirect contributions towards conservation management
- 7.6 Continued attention and support should be given to the development and strengthening of national research consortia on bioprospecting, and the inclusion of clear guidelines within such arrangements for benefit-sharing among all stakeholders.
- 7.7 Urgent attention needs to be given to the speedy development of legislation to protect holders of traditional knowledge and to recognise farmers’ rights. A comprehensive review of South Africa’s intellectual property laws is recommended, combined with a public policy process, to explore the interface between TRIPS and the CBD, to ensure consideration of ABS and traditional knowledge issues, and to review South Africa’s policy approach with respect to the patenting of life.

⁶⁵ Department of Arts, Culture, Science and Technology (1999)

- 7.8 Finally, there is a need for the development of a national strategy on ABS, through involvement of stakeholders in determining key strengths, weaknesses, opportunities and threats. The NBSAP provides an important opportunity to effect this strategy, and it is recommended that this document be circulated as a first step towards bringing stakeholders together for further discussion.

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Appendix 1. ABS Capacity in South Africa

Appendix 2. Glossary of terms

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.

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 micro-organism 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. Some understand the term to imply that the different parties to an agreement have agreed to mutually acceptable certain terms. Others point out that different parties often have unequal negotiating powers (eg an indigenous community and a powerful multinational corporation).

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 colonization, 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 organization 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 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.

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: 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 recognized 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 exchanging genes or interbreeding.

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 industrialized 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 associated 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.