

**MECHANISMS FOR BENEFIT SHARING:**

**Nigerian Case Study for the  
Convention on Biological Diversity**

Katy Moran, Executive Director  
The Healing Forest Conservancy  
3521 S Street, N.W.  
Washington, DC 20007-2243  
USA  
202.333.3438  
<MoranHFC@aol.com>  
March 21, 1998

# **MECHANISMS FOR BENEFIT SHARING: Nigerian Case Study**

## **INTRODUCTION**

Those concerned with the development of bioresources for human health recognize that when local custodians of biodiversity benefit from its sustainable use by others, conservation opportunities increase. The Convention on Biological Diversity (CBD) codifies this benefit-sharing principle (1992), but the absence of applicable models to equitably compensate all stakeholders within a country leaves it largely untested and short of achieving its goals.

Trust funds have been proposed as potential mechanisms to receive and disburse long-term revenues generated from the commercial use of bioresources to a variety of stakeholders whose representatives serve as board members. Trust funds have a precedent in the five years' experience with environmental funds established to finance environmental programs in countries that participate in "debt-for-nature swaps" (Moran, 1991; The Nature Conservancy, 1997). In the form of a foundation, non-profit corporation or common-law trust, such trusts are financial mechanisms created to receive and transfer funds. They can operate as permanent endowments, revolving or sinking trust funds, in hard currency to avoid inflation shrinkage, and either off-shore or in the country of origin. Accounts within standing trust funds can target finances, or trust funds can be created within existing environmental funds under a separate account. More important, trust funds offer the added value of managing sources of finance from other NGOs, foundations or corporations attracted by a stable, participatory and transparent funding mechanism.

Critical to the success of a fund is a constitution, which serves as the general operative document establishing the goals, objectives, rights and duties of the fund. A constitution also supplies a legally enforceable mechanism, under domestic law, for a trust fund. Trustees of the fund, as a collective entity, may institute legal proceedings in their capacity to achieve trust fund objectives. This case study presents such a Constitution, developed out of a pilot project to test the efficiency and efficacy of the trust fund process. The Constitution is presented here as an instrument that may also be useful to others for long-term benefit sharing at the community level under the CBD.

The pilot project, held in Nigeria, was initiated by the Healing Forest Conservancy (the Conservancy), a U.S. NGO that focuses specifically on the development and implementation of a process to return long-term benefits to countries and culture groups that contribute to the commercialization of therapeutics for human health. The Conservancy will deliver long-term funding to several different countries and culture groups, so the means to do this must be replicable to ensure an equitable distribution of benefits. Monetary resources, targeted for a variety of stakeholders, will finance programs in a consistent manner, while maintaining the flexibility to respond to local needs.

Nigeria offered an ideal situation to develop and test the feasibility of such a Constitution through a \$40,000 (forty thousand dollars) donation by the Conservancy to a recently established trust fund. The Bioresources Development and Conservation Programme (BDCP), a Nigerian NGO, launched the Fund for Integrated Rural Development and Traditional Medicine (FIRD-TM). The FIRD-TM has an independent board composed of leaders of traditional healers' associations, senior government officials, representatives of village councils and technical experts from scientific institutions. Its objective is to receive funds that can be used to build technical skills in Nigeria so that bioresources are a viable vehicle for sustainable development and improved health care. The predominance of traditional solidarity systems in Nigeria, such as tribal associations and professional guilds of healers, supplies a social structure to ensure participation at the local level.

## I OVERVIEW

### A Main actors involved

#### Benefit Providers

**NGO —The Healing Forest Conservancy (the Conservancy)**, is a non-profit organization created to promote the long-term survival of the biological diversity of tropical forests, particularly medicinal plants, and the cultural diversity of tropical forest peoples, particularly their traditional knowledge of medicinal plant usage. The NGO was founded in 1990 by Shaman Pharmaceuticals, Inc., with a specific focus on developing and implementing a process to return long-term benefits, after a product is commercialized, to countries and cultures that chose to contribute to the company's drug discovery process (Moran, 1997).

**PRIVATE SECTOR —Shaman Pharmaceuticals, Inc.**, is a company located in South San Francisco, Calif., that uses ethnobotany, as well as isolation and natural products chemistry, to discover and develop novel pharmaceuticals. Agreements with culture groups and countries that Shaman works with secure benefits for the use of plant resources and traditional knowledge, both during the drug discovery process and after a product is commercialized (Conte, 1994). At the beginning and during research expeditions, Shaman provides specific up-front compensation that responds to immediate needs of country and indigenous collaborators. Long-term compensation will be available through the Healing Forest Conservancy when a product is commercialized. Although the young company, incorporated in 1990, is close to securing regulatory approval, at the present time Shaman has no product and, consequently, no revenues. When a product is marketed, Shaman will channel a percentage of profits for benefit sharing through the Conservancy, equally, to all collaborating countries and culture groups (King and Carlson, 1995).

#### Benefit Recipients

**NGO — The Bioresources Development and Conservation Programme (BDCP)** is an international NGO based in Nigeria that builds technical skills so that bioresources are a viable vehicle for improved health care and sustainable development. The BDCP views science and technology as useful tools to be adapted to the local cultural framework of productive activities, rather than as a modern alternative to the contributions of community members. One of the objectives of the BDCP is to generate pharmaceutical leads that target therapeutic categories for tropical diseases suffered in Nigeria such as malaria, leishmaniasis, and trypanosomiasis. It is estimated, for example, that malaria affects nearly every Nigerian older than six months, with 50% of the entire population suffering at least one acute attack each year. Resistance to chloroquine is a growing problem, increasing the need for alternative antimalarial drugs to combat the low levels of life expectancy and high rates of infant and child mortality in Nigeria.

At the local level, technical skills help to standardize phytomedicines, actions that benefit traditional healers and the health of the communities they serve. The BDCP strategy is based on capacity building at all levels of Nigerian society through the establishment of strategic partnerships with organizations such as Shaman Pharmaceuticals, with whom it collaborates in the development of therapeutics based on ethnomedical leads. The arrangement provides for joint efforts in all aspects of drug development. A team of Shaman staff and Nigerian scientists, for example, is engaged in a field ethnobiomedical survey, working with culture groups and traditional healers.

To address specific development concerns of rural communities, support of social forestry projects is a major effort of the BDCP. The NGO assists communities in cultivating tree crops for food, fuel, wood and as farm barriers to check erosion and land degradation. The BDCP proposes forest farms for selected plants found useful as possible raw materials for industrial use. It also cultivates medicinal plants as fallow crops and seeds others, such as the Calabar bean (*Physostigma venosuma*), on farms with

minimal ecosystem disturbance. Annuals and vines are suitable, since farmers return to the land for food crop cultivation every few years (Iwu, 1995).

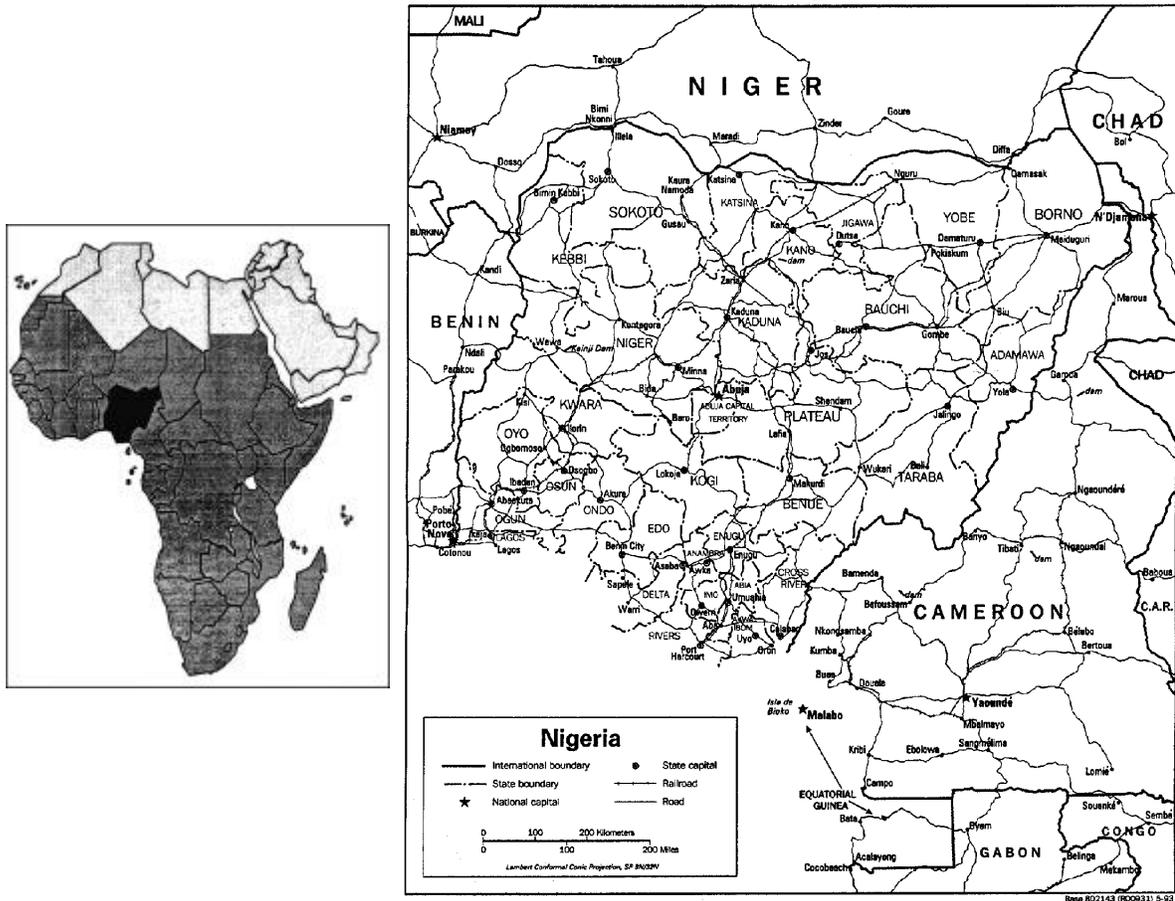
**UNIVERSITIES/ RESEARCH TRAINING INSTITUTES** — Three of Nigeria's first-generation universities were land grant institutions built from proceeds of specific crops. Today, Nigeria's 33 universities and 18 other tertiary educational institutions work with government-funded research institutes, all of which are legislated to conduct research and develop biological resources. Institutions conduct active medicinal plant research to verify ethnomedical claims by herbalists, to isolate active molecules and to standardize the crude extracts used in traditional medicines. For example, the University of Nigeria, Nsukka, Department of Pharmacognosy, offers mandatory courses in African traditional medicine at the undergraduate level in pharmacy training. Such interdisciplinary work has led to joint research in which social scientists, biologists and botanists collaborate in the critical evaluation of ethnobiological information for the selection of medicinal plants as sources of biologically active compounds. Results find the correlation between traditional use and experimental biological activity is as high as 80%. Ethnomedical uses, chemical constituents and biological activities of major Nigerian medicinal plants are included in *The Handbook of Nigerian Medicinal Plants* (Iwu, 1993).

**CULTURE GROUPS** — Modern Nigeria is a mixture of various distinct culture groups that were lumped together under British colonial rule. The colonial system disregarded cultural differences among the area's peoples and placed all territories under a single administration, creating an artificial state that has yet to attain national unity. Today, tension remains between federal and tribal governments, with control remaining largely in the hands of traditional rulers. The Nigerian population includes over 250 distinct ethnic groups, some numbering fewer than 10,000 people. Most are concentrated in specific geographic areas. The Hausa and Fulani (or Peul) in the north, the Yoruba in the southwest, and the Igbo in the southeast comprise about 65% of the population. Other sizable groups include the Kurani in the north, the Efik, Edo and Urhobo in the south and the Tiv in the center. Of these groups' religions, Christians make up over 40% of the population; the rest, thought to be Moslem, are primarily located in the north. English is the official language, but Hausa, Yoruba, Igbo and Fulani are widely spoken in their respective areas. Most people are concentrated in the south and in a northern area of dense settlement around Kano. Between them both is the sparsely populated "Middle Belt" (Center for International Health Information, 1996).

**TRADITIONAL HEALERS** — The oldest component of the Nigerian health sector consists of traditional healers and birth attendants, who are the *de facto* providers of primary health care in Nigeria. Little quantitative data are available to illustrate the enormous role of traditional practitioners, but they are estimated to serve about 80% of the population. Healers provide client-centered, personalized health care that is culturally appropriate, holistic and tailored to meet the needs and expectations of the patient.

Since healers share the cognitive understandings and cultural values of those they treat, they serve a function broader and more complex than their medical counterparts in the modern sector. Nigerian healers are not strictly "traditional," however. The term "traditional," in this case, refers to healing practices that have endured over time because of their continuing usefulness. Traditional healers in Nigeria are adaptive, incorporating into their healing repertoire modern components that adhere to their cultural values. Most healers want to learn how to treat illness more effectively, so they are highly motivated to cooperate with the modern health sector (Green, 1996).

**GOVERNMENT** — Located in West Africa, the Federal Republic of Nigeria is Africa's most populous nation and the largest single black population in the world. The estimated total of over 100 million inhabitants in 1995 represents roughly 14% of the entire population of sub-Saharan Africa living on less than 4% of the region's land area. Nigeria is administered as a federation of 30 states and the federal capital territory of Abuja (map, p. 4). The multi-state structure allows for negotiations to be conducted mainly at the level of state government departments, which are responsible for forest resources, and the federal government, which provides the necessary policy guidelines and regulations. Each state and the federal government have departments of agriculture and natural resources, which are responsible for managing forest resources. States, in turn, are made up of local government areas (Iwu, 1996a).



## B Ecosystem

The land area of Nigeria is 923,768 km<sup>2</sup> (356,669 mi<sup>2</sup>), with a coastline about 830 km long, placing it eleventh in size among sub-Saharan countries. It is a predominantly low-lying, river-laden country stretching from the semi-arid Sahel region in the north to more humid, tropical forest areas in the south. Mangrove and rain forests in the south occupy about 20% of Nigeria's land area, while grasslands of various types occupy the rest.

## C Type of benefit-sharing arrangements and the expected results

On October 20, 1997, in Abuja, Nigeria, the BDCP launched the Fund for Integrated Rural Development and Traditional Medicine (FIRD-TM) during an international workshop on medicinal plants. The BDCP facilitated the establishment of the Fund and is its sponsoring entity. The Fund, however, has an independent board composed of leaders of traditional healers' associations, senior government officials, representatives of village councils and technical experts from scientific institutions.

The Healing Forest Conservancy donated \$40,000 to the FIRD-TM for a pilot project at the Fund's inauguration, whereupon the Association of Indigenous Pharmaceutical Manufacturers and the Orange Drug Company of Nigeria pledged additional monies to complement the HFC donation. Diverse culture groups in Nigeria will receive resources from the Fund through traditional healers' organizations and villages consistent with their governing customs. Town associations, village heads and professional guilds of healers are empowered to make decisions regarding use of the funds for projects in their localities. Those funded will follow the criteria of promoting conservation of biodiversity and drug development, as well as the socioeconomic well-being of rural cultures.

## **D Time frame addressed**

Two time frames respond to the needs of two different stakeholders:

- 1 The FIRD-TM was designed as a long-term Fund that will last until its dissolution, as described in the Fund's Constitution.
- 2 The duration of the Conservancy pilot project is approximately one year—enough time to test the efficacy and efficiency of the trust fund process and to develop a model Constitution that can be replicated for future use by other Shaman collaborators.

## **E Relevance to the Convention**

The Nigerian trust fund project directly relates to Article 8(j), but as noted in COPIII Decision III/14, recognizes the linkages between Article 8(j) and related issues including: Article 16: technology transfer; Article 15: access to genetic resources; as well as Article 16: ownership, intellectual property rights and alternative systems of protection of knowledge, innovations and practices and Article 11: incentive measures.

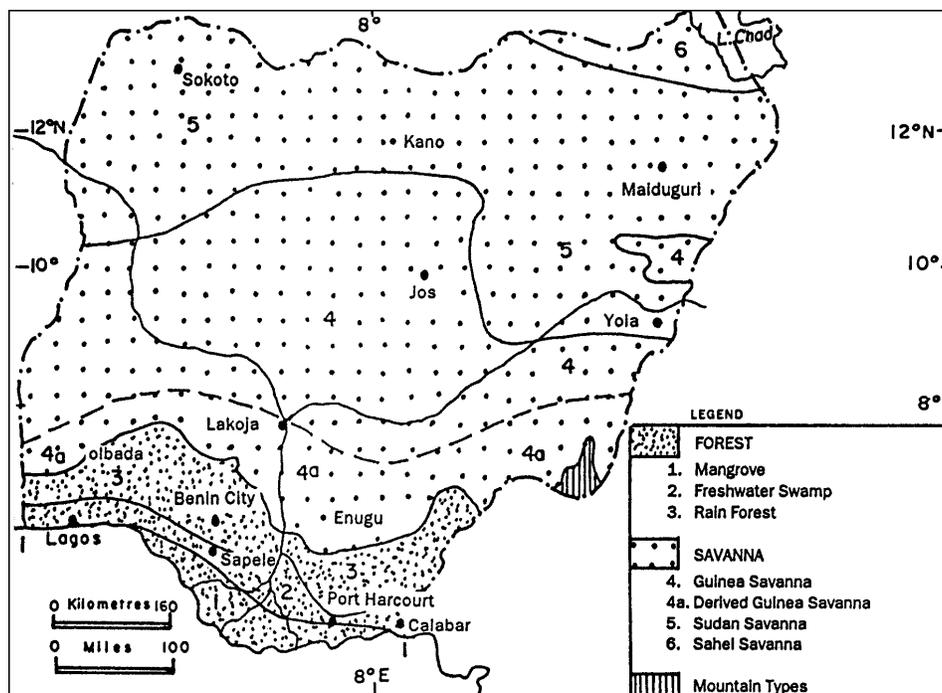
## **II DESCRIPTION OF THE CONTEXT**

### **A Underlying causes of threats to resources**

From the point of view of many Africans, the greatest threats to the protection of biodiversity are continuing international policies that increase the poverty of the developing world. These mainly include habitat conversion due to the demand for cash crops and the use of monocultures to replace subsistence farming. The policies increase pressure on land to produce greater quantities of major crops for the world market. Two centuries of agricultural commodity trade left Africa with few benefits. Commodities produced in Africa—palm oil, ground nuts, cocoa, ginger and vanilla—brought low prices on international markets. European countries, however, accrued huge profits from processing these commodities because the price of finished products was high.

Low prices led to conversion of forest habitats for increased production and left Africa with one of the highest rates of deforestation in the world. Today, the continent is estimated to have about 216,634,000 ha. of closed forest areas and an annual deforestation rate calculated at about 1%. In Nigeria, the annual deforestation rate is 5.0%, compared to a global rate of 0.6%.

Reliable census figures in Nigeria are difficult to obtain, but the estimated rapid population growth (2.9% a year) and limited economic development mean that more and more Nigerians live in poverty, accompanied by poor education, environmental degradation and limited health care. Although endowed with fertile lands and vast mineral riches, Nigeria is a low-income country, with per capita Gross National Product estimated around \$300 in 1994. The underlying causes of biodiversity loss are part of a complex interaction of forces. They can be solved only within a framework of adding value to bioresources within Nigeria through products also useful to Nigerians (McNamara, 1991).



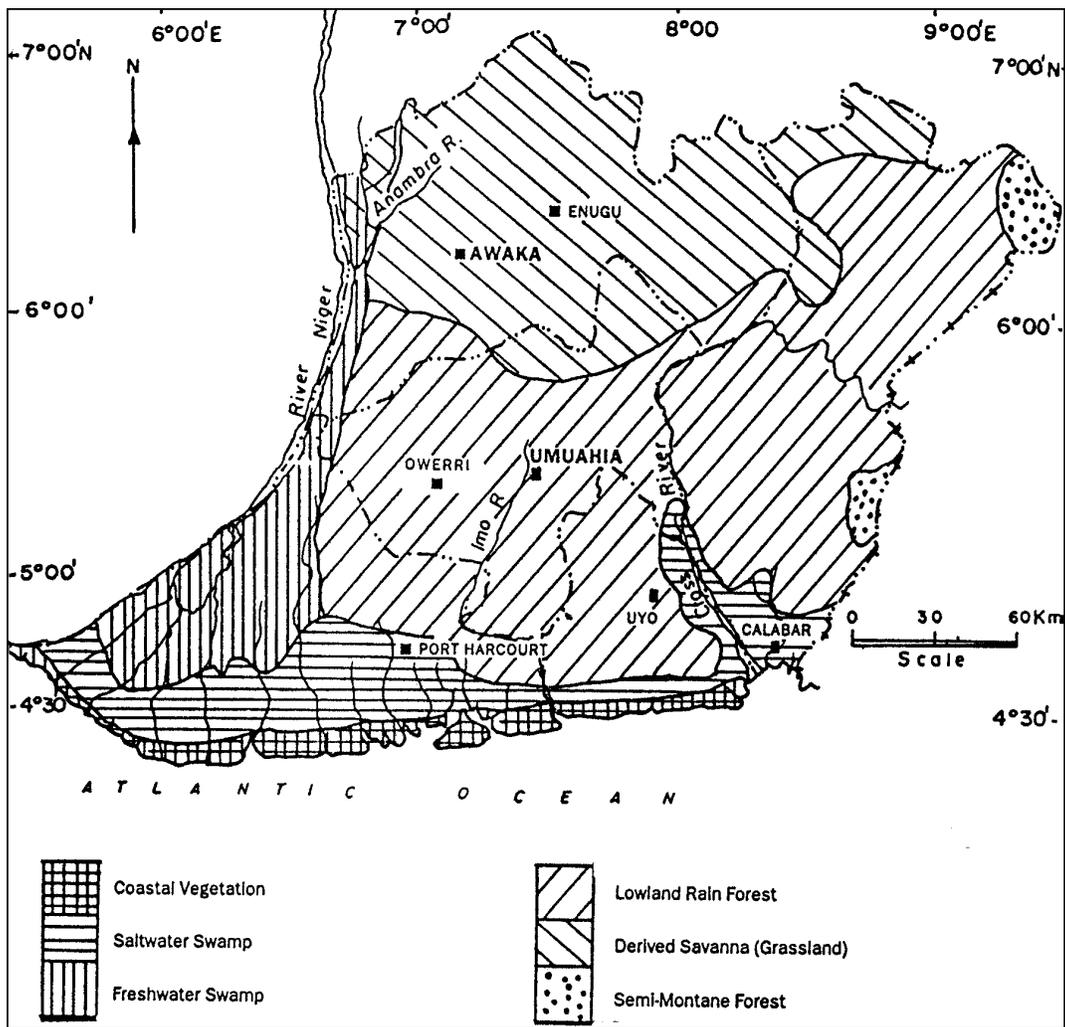
**Figure 1. Nigeria: ecological zones** (from Iwu, 1996, Page 246)

### **B Physical environment of biological resources**

The BDCP projects focus on the southeastern rain forest region of Nigeria in the Cross-River/ Niger/ Imo river basin, which is composed of varied ecological zones. It is the western boundary of a contiguous rain forest range that stretches up central Africa, including the rain forests of Cameroon, Gabon, Equatorial Guinea and Congo. By maintaining biodiversity plots in varied regions of a diverse ecosystem, BDCP hopes to have access to a variety of plant species for future drug development work.

### **C Institutional and organizational structures**

**CULTURE GROUPS** — During 1982, the Institute of African Studies, the Faculty of Arts and the Department of Pharmacognosy initiated a project on the ethnography of the Igbo people. Human interaction with the environment was among the areas of inquiry, since there is a long and venerable tradition of a balanced relationship embedded in the culture. Social values and religious restrictions, such as totems, taboos and other prohibitions, protect and sanction non-destructive ways to both conserve and exploit local resources sustainably. In nearly all cases of taboos, for example, species conservation was a major factor. Proscriptions are based on the collective decision of the elders, who are respected for their wisdom gained over time through accumulated knowledge. Traditional leaders, such as chiefs, healers, clan and lineage heads, are a major social force in communities, and lack of a unifying central government increases their power. Typically, each community or village state is autonomous, with its own chief and government. The community decision-making process involves the village chief, his advisors, traditional healers and the elders. A strong sense of communal responsibility requires the subjugation of individual needs for those of the larger group, and meaningful community participation is essential. Numerous community development associations provide fora for citizens to identify, discuss and prioritize problems and to seek means to solve them (Iwu, 1996 b).



**Figure 2. Eastern Nigeria: ecological zones** (from Iwu, 1996, Page 248)

**TRADITIONAL HEALERS' ASSOCIATIONS** — Recently, healers in Nigeria have organized themselves into professional associations based in and from specific geographical areas. A healer well known and regarded in the area assumes leadership, and novice healers apprentice under their seniors. Physicians and university professors advise associations. Such formal recognition of healers provides an implicit sanction and legitimization of the social contribution of the healers' role. Some common elements in associations' constitutions, as stated in their official documents, include: a legal definition of a traditional healer; minimal entry qualifications for the profession; official recognition and registration of healers; a code of ethics; sanctions against unethical practices; membership fees; and their qualification as NGOs.

#### **D Relevant regional, national and local framework**

**INTERNATIONAL** — Nigeria is a signator to the following international treaties aimed at conservation of natural resources:

- 1 African Conservation Convention for the Conservation of Nature and Natural Resources (Algeria, 1968; Depository: OAU Secretariat, Addis Ababa)

- 2 Convention for the Protection of World Cultural and Natural Heritage (Paris, 1972; Depository: UNESCO Headquarters, Paris)
- 3 Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, DC, 1973; Depository: Swiss Ministry of Foreign Affairs, Berne) (CITES)
- 4 Convention on Migratory Species of Wild Animals (Bonn, 1979; Depository: Bonn)
- 5 UN Convention on Biodiversity, Rio de Janeiro (Brazil, 1992; Depository: UNEP)

**REGIONAL** — The Scientific, Technical and Research Commission (STRC) of the Organization of African Unity (OAU) is charged with informing member states on all matters relating to the application of science and technology, such as is contained in the CBD. To that end, the OAU/STRC held a workshop titled *Medicinal Plants and Herbal Medicines in Africa: Policy Issues on Ownership, Access and Conservation* from 14-17 April, 1997, in Nairobi. Apart from the better understanding of the specific issues dealing with ownership, access and conservation of medicinal plants and herbal medicines, the workshop aimed to draw up concrete proposals of follow-up actions for a policy on development of bioresources within the OAU, to establish a permanent working group and to initiate a bioresources network system.

**NATIONAL** — In 1989, Nigeria initiated an elaborate and comprehensive National Policy on the Environment. The section that deals with biodiversity, specifically bioresources, has three stages:

- 1 Conduct an inventory of national natural resources, including:
  - a their conservation status
  - b sites and species that require urgent action
- 2 Design an action plan for sustainable use of resources
  - a decrease the rate of forest conversion
  - b national agencies involved:
    - i Natural Resources Conservation Council (NARESCON)
    - ii National Agricultural Land Development Agency (NALDA)
    - iii National Agency for Science and Engineering Infrastructure (NASeni) Office of the President of Nigeria
    - iv Federal Minister of Agriculture, Water Resources and Rural Development
    - v Directorate of Food, Roads and Rural Infrastructure (DFRRI)
    - vi Research Institutes (18 total) and Universities (33 total)
- 3 Establish the National Advisory Committee on Conservation and Renewable Resources (NACCRR 1992) to:
  - a mobilize financial resources for conservation within Nigeria and advise the committee on ways and means of generating revenue
  - b compile and maintain lists of wild species with economic and cultural significance
  - c monitor and implement conservation recommendations
  - d report all conservation activities to the council and advise them on permanent solutions to conservation problems

### **III PURPOSE AND OBJECTIVES OF BENEFIT-SHARING ARRANGEMENTS**

#### **A Primary motivations and objectives**

##### **Benefit Providers**

**The Healing Forest Conservancy** donated funds to the FIRD-TM to test the trust fund process and experience exactly how such a mechanism operates. Results include a draft trust fund Constitution (Appendix 1) that many different countries and culture groups can use to share financial profits gained from commercial contracts with companies interested in drug discovery. The model Constitution places decisions on benefit sharing into the hands of a representative body of stakeholders with clearly defined operating principles, a process sought by Shaman Pharmaceuticals, Inc. For access to bioresources and traditional knowledge, the company will return a percentage of company profits, through the Healing Forest Conservancy, to all the culture groups and countries with which it has worked, regardless of where the actual plant sample or traditional knowledge originated. This provision results in less risk of not receiving benefits for a commercialized product in individual countries or communities that did not contribute directly to product discovery. In a financially unpredictable industry, spreading the benefits and risks among all Shaman collaborators increases opportunities and speeds the return of benefits. All Shaman collaborators benefit equally from risk-sharing provisions, for as long as the company shows a profit, acknowledging the spirit of the Biodiversity Convention (King, 1996).

### **Benefit Recipients**

Objectives of the Fund for Integrated Rural Development and Traditional Medicine (FIRD-TM) include building technical skills in Nigeria so that bioresources are a viable vehicle for sustainable development. Improved skills from technology transfer add value to bioresources locally and generate pharmaceutical leads that target therapeutic categories for tropical diseases suffered in Nigeria such as malaria, leishmaniasis, and trypanosomiasis. At the local level, technical skills gained from benefit sharing help standardize phytomedicines, information that benefits traditional healers and the health of the communities they serve.

### **B Contributions to long-term social and economic objectives**

Eventually, commercial agents developed through the use of traditional knowledge and based upon biological materials from Nigeria will generate FIRD-TM funding. Fund activities, such as building scientific capacity and further supporting education and training, will be sustained through royalties accruing from its patents and result in the direct and equitable sharing of benefits with culture groups and traditional healers. In this manner, intellectual property protection of innovations and discoveries will further commercialization and promote the sharing of benefits. The project will promote recognition and respect for traditional knowledge and practices and will conserve biological materials and use them in a sustainable manner consistent with traditional practices.

### **C Compliance with the CBD**

The underlying motivation to establish the Nigerian trust project is principally to promote the equitable sharing of benefits arising through the sustainable use of biological materials consistent with and in furtherance of Article 8(j) of the U.N. Convention on Biological Diversity. This project furthers the goals and recommendations of decision III/14 of the Convention of the Parties III. Decision III/14 provides a reaffirmation of the dynamic nature of traditional knowledge, innovations and practices. This decision requests Parties to develop national legislation and corresponding strategies for the implementation of Article 8(j). This project provides such a strategy. It recognizes and coordinates the linkages between Article 8(j) and related issues including: technology transfer, access to genetic resources, ownership, intellectual property rights and alternative systems of protection of knowledge, innovations and practices and incentives consistent with Decision III/14.

## **IV PROCESS FOR ESTABLISHING THE ARRANGEMENT**

### **A Stakeholders' participation**

In 1990, Shaman Pharmaceuticals established a research relationship with Nigerian scientific institutions, and the BDCP became the focal point for collaborative research. Nigerian scientists proposed initial discussions with healers and traditional leaders to talk about a collaborative relationship with Shaman. The BDCP visited communities where members had worked for several years. Typically, each community or village state is autonomous, with its own chief and government. Their community decision-making process includes the village chief, his advisors, traditional healers and the elders. After lengthy discussions, the groups felt that Shaman shared a common purpose with them consistent with their cultural values concerning human health. Out of these and other early discussions, the prior informed consent and immediate, medium and long-term compensation policies of the company were formulated (Table 1 - Shaman's Agreement of Principles in Guidelines and Research Protocols). Prior informed consent (Table 2) discussions covered topics such as the intentions and goals of the project; how and where the plants would be analyzed; and their potential for commercialization and benefit-sharing.

**Table 1. Guidelines and Research Protocols**

ORGANIZATION	DOCUMENT	POLICIES AND PRACTICE
Association of Systematics Collections	ASC Guidelines for Institutional Database Policies	The document discusses the ethical way to share, collect, and conserve systematic collections among large institutions, but does not mention any involvement with local communities.
Center for Plant Conservation	Genetics and Conservation of Rare Plants	The guidelines consist of recommendations for collecting genetic variation and rare plants, but do not mention collaboration with local communities.
International Society of Ethnobiology	Covenant Between a Responsible Corporation, Scientist, or Scientific Institution and an Indigenous Group	The covenant lists specific responsibilities required in the partnership between researchers and indigenous peoples for the culture, community, society, environment, region, and nation/state.
National Cancer Institute	Letter of Collection	This agreement acknowledges intellectual property rights and compensation for product development between accessors and owners of biodiversity.
Pew Conservation Fellows	Biodiversity Research Protocols	The protocol suggests a framework to promote good ethical, responsible research between communities and institutions which access biodiversity.
Shaman Pharmaceuticals	Agreement of Principles	This agreement emphasizes prior informed consent and compensation to host countries, cultures, and local communities.
University Research Expeditions Program	Scientific Code of Ethics	The code specifically suggests how researchers can work with, involve, and compensate local communities.

WWF, IUCN, WHO Conservation Strategy of Medicinal Plants	The Guidelines on the Conservation of Medicinal Plants	This document does not discuss the relationship between researchers and local communities.
--	--	--

Data compiled in this table are from: Churcher, T. 1996. Partial Directory of Guidance Documents Relating to Biodiversity and Cultural Knowledge Research and Prospecting, Churcher, T., and Nietschmann, B. 1994, Biodiversity Rights: Paper presented at Pew Conservation Fellows Annual Conference, 1994. From *Diversity*, Vol. 13, no. 1, 1997

**Table 2. Steps to Establish Prior Informed Consent**

STEP	DATES	PROJECT DURATION
1. Shaman communicates with scientists at the University of Nigeria at Nsukka, and prior informed consent regarding Shaman's objectives and commitments is discussed.	1990	start
2. Shaman brings Nigerian scientists to visit its laboratories in California.	1990	1st year
3. Shaman contributes financially to the scientific capacity building at the University of Nigeria at Nsukka (a governmental institution) and the Bioresources Development and Conservation Program (BDCP), a nongovernmental organization established in 1991, prior to any ethnobotanical research.	1990-1992	1st-3rd years
4. Nigerian scientists visit village communities and establish prior informed consent of Shaman's objectives and commitments and proposed collaboration with BDCP and Shaman.	1992	3rd year
5. Interested communities invite Shaman research team to visit.	1993	4th year
6. Shaman obtains research and plant export permits from Nigerian government.	1993	4th year
7. Shaman research team (with Nigerian Western-trained scientists) visits village community and discusses issues to ensure prior informed consent for Shaman's objectives and commitments and propose collaboration.	1993	4th year
8. A mutual agreement is established among the Nigerian scientists, village community, BDCP, and Shaman.	1993	4th year
9. The ethnobotanical research proceeds in combination with capacity building and technology transfer.	1993, 1995, 1996	4th, 6th, 7th years

From *Diversity*, Vol. 13, no. 1, 1997

Four ethnobotanical field expeditions were conducted. By choice of Nigerian collaborators, immediate and medium-term benefits from the expeditions have taken the form of workshops and training programs on public health, botany, conservation and ethnobotany; support for a medicinal plant reserve; supplies for village schools; botanical collection supplies for a herbarium; laboratory equipment for scientific research on plants that treat parasitic diseases prevalent in West Africa and support for Nigerian scientists to apply modern analytical techniques. Fulfilling company policy, immediate and medium-term benefits, such as those above, totaling over US\$200,000 (two hundred thousand dollars) have been distributed through programs to the various stakeholders in the collaboration as the expeditions occur. Table 3 lists specific actions taken by Shaman in Nigeria for immediate and medium-term benefit sharing in compliance with the CBD. The company regularly reports laboratory results to participating communities. General literature is published on medicinal plants from Nigeria, supplying public recognition of the benefits of traditional knowledge from Nigeria to society for human health (Carlson, et. al., 1997).

**Table 3. Compliance by Shaman Pharmaceuticals with CBD**

CBD PRINCIPLES [ARTICLES]	SHAMAN'S COMPLIANCE
<p>Preamble</p> <ul style="list-style-type: none"> <li><i>In situ</i> conservation of ecosystems and natural habitats, recovery of viable species populations</li> <li>Equitable sharing of benefits arising from use of traditional knowledge, innovation, and practices</li> </ul>	<ul style="list-style-type: none"> <li>Founded and supported Healing Forest Conservancy for benefit sharing</li> <li>Provided US\$2,000 in 1994 to community and traditional healers' organization in Umobi Community, Umukabia Village, Imo State, for community-based medical plant forest reserve</li> </ul>
<p>Articles 8(a) and 8(J)</p> <ul style="list-style-type: none"> <li>Protected areas or special measures to conserve biological diversity</li> <li>Respect, preserve, and maintain knowledge, innovations, and practices of indigenous and local communities embodying traditional lifestyles</li> </ul>	<ul style="list-style-type: none"> <li>Sponsored two workshops in 1993 and 1996 on ethnomedicine, botany, and conservation for Nigerian botanists, ecologists, conservation officers, chemists, pharmacologists, and physicians. All Shaman ethnomedical and botanical field research documents given to participants</li> <li>Sponsored three ethnobotany and conservation training programs in Nigeria (1993, 1996) and Cameroon (1994)</li> <li>Co-sponsored workshop on "Ecology, Cultural Transition, and Human Health" at International Society of Ethnobiology (ISE) annual meeting in Nairobi, September 1996. Conducted in three villages, designed for host country Western-trained scientists, local community members, and traditional healers to acquire skills integrating biological ecology, anthropology, and public health</li> <li>Workshop sponsored by Healing Forest Conservancy and BDCP at ISE annual meeting to develop code of ethics</li> </ul>
<p>Article 12(a)</p> <ul style="list-style-type: none"> <li>Scientific and technical education and training in biological diversity for needs of developing countries</li> </ul>	<ul style="list-style-type: none"> <li>Provided \$8,000 to support 1995 BDCP conferences and ethnobotany workshops in Limbe and Douala, Cameroon</li> <li>Financial support for two Cross River State villages to supply village schools with books and furniture, and fund salaries for schoolteachers</li> <li>\$5,000 to support Nigerian scientist attendance at six-week course in biodiversity monitoring at Smithsonian Institution, U.S.</li> <li>Shaman and BDCP sponsor training course in "Ethnobiology and Field Taxonomy" at Limbe Botanic Garden, Cameroon, October 1995</li> </ul>
<p>Article 9(b)</p> <ul style="list-style-type: none"> <li>Establish and maintain <i>ex situ</i> conservation, preferably in country of origin</li> </ul>	<ul style="list-style-type: none"> <li>Contributed resources and botanical collection supplies to help establish herbarium at BDCP office</li> <li>Funded and worked with Enugu State Herbarium, Department of Forestry, Enugu State</li> </ul>
<p>Article 11</p> <ul style="list-style-type: none"> <li>Adopt economic and social incentives for biodiversity conservation, sustainable use</li> </ul>	<ul style="list-style-type: none"> <li>Provided ethnomedical field research materials to BDCP-Nigeria scientists to study malaria, leishmaniasis, and trypanosomiasis to better understand treatment through plant medicines</li> </ul>
<p>Articles 15.5 and 15.6</p> <ul style="list-style-type: none"> <li>Prior informed consent of parties providing access to genetic resources</li> <li>Full participation in scientific research</li> </ul>	<ul style="list-style-type: none"> <li>Shaman established prior informed consent with scientists at University of Nigeria at Nsukka, appropriate government agencies, and village communities (see Table 2). Ethnobotanical research proceeds after mutually agreed-upon relationship established</li> </ul>
<p>Article 18.1</p> <ul style="list-style-type: none"> <li>Promote international technical and scientific cooperation in conservation and sustainable use of biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>Three Nigerian scientists visited Shaman Pharmaceuticals laboratories</li> <li>Nigerian scientist in natural products chemistry at Shaman January 1994-March 1995 to learn modern analytical techniques</li> </ul>

The Conservancy entered this long-established relationship in 1995 during a BDCP meeting in Cameroon. The Director of the Conservancy met with BDCP members to discuss establishing a trust fund pilot project. A Trust Fund Interim Committee was selected. The Director presented materials to the Committee for extensive discussions on the use of a trust fund for long-term benefit sharing among representative stakeholders within Nigeria. After lengthy consultations, the BDCP published priorities of the trust fund to provide a public record. In 1997, the Conservancy Director attended the BDCP launch of the FIRD-TM in Abuja and donated \$40,000 to the fund. Since the purpose of the Conservancy pilot project was to test the efficiency and efficacy of the trust fund process, a complete evaluation of use of the donation will be completed after the project's first year of operation.

### **B Enforcement and compliance measures included**

The model Constitution includes provisions for an external audit (Article X) and the dissolution of a fund (Article XIV). Under Section 14.1, the Fund can be dissolved if any government authority interferes with the operations of the Fund, as determined by a two-thirds majority vote of the Directors or a unanimous vote of the Trustees.

### **C Partners' negotiating skills**

The BDCP has access to a high level of legal and banking skills. For example, legal services were donated through *pro bono publico* service to the Healing Forest Conservancy by the international law firm of Morrison & Foerster, LLP, for the preparation of the template Constitution, which built upon benefit-sharing principles and provisions previously articulated (Mays, 1997).

## **V CONTENT AND IMPLEMENTATION**

### **A Under the model Constitution, inputs, contributions, actions and responsibilities of each stakeholder**

#### **Benefit Provider**

**The Healing Forest Conservancy** — The trust fund pilot project in Nigeria generated a Constitution that was revised to serve as a template trust fund Constitution that can be used for the benefit-sharing actions of the Conservancy in many different countries (see Appendix 1—Draft Trust Fund Constitution). As stated under the mission of the Conservancy, the model Constitution is intended to serve as a general operative document establishing the goals, objectives, rights and duties of a trust fund. The model must also be flexible enough to respond to unique conditions in the numerous countries where Shaman collaborates. The model Constitution supplies a mechanism for wide but effective disbursement of financial resources over time and within varied sectors of society.

#### **Benefit Recipients**

**Sponsoring entity** — The use of a sponsoring entity in the model Constitution is intended to facilitate the establishment of the Fund, as was the case in Nigeria and the role played by the Bioresources Development and Conservation Programme. Such an entity may not exist in every country, however, and it may be necessary in certain cases to rely on other sponsors, such as governmental entities or universities, to establish the Fund. It may also be possible to have the Fund established independently by various groups joining together as founding members. In Nigeria, the use of BDCP as the sponsor of the Fund permitted the BDCP to appoint the initial Members of the Fund. In the event the Fund is established by Members directly without the sponsorship of a BDCP-type entity, this section would be modified accordingly.

**Healers' Associations and Culture Groups** — It is also possible to structure the Fund without a Membership and have the Fund managed directly by a Board of Directors. The template Constitution incorporates a membership component in order to promote greater community participation in the activities of the Fund. The Fund must be an open forum, and it should be easy to become a Member. The provision requiring a two-thirds majority vote of all members ensures general agreement for the admission of a new Member. It is possible that a sponsoring entity of the Fund may insist on having ultimate approval for the admission of new members. While the sponsoring entity should be advised on who is made a new member of the Fund, the sponsor should not be able to veto the admission of new Members.

Unlike the admission of a Member, removal of a Member is intentionally made difficult and subject to a unanimous vote requirement to ensure that a single Member is not removed by a simple majority of the Members due to some disagreement over one or more policies of the Fund. Permitting non-Members to serve on the Board is designed to have the same effect as an outside Director that can provide objective advice to the Board. Inclusion of the reference to the selection of Board members without regard to their ethnic, political or other background is particularly important for countries where the absence of such a provision may result in disparate treatment among various ethnic or other groups.

**Governments** — It is important to acknowledge the consent and support of each host country government for the activities of the Fund in order to minimize the risk that the Fund is perceived as a threat to the sovereign right of the host country government to exploit its own natural resources. However, this acknowledgment should not be viewed as undermining the independence of the Fund and its autonomous operating authority as a non-governmental organization. The precise legal status of the Fund will depend on laws of the host country wherein the Fund is established. It is important that the Fund be able to obtain the benefits normally associated with non-profit and charitable entities, such as exemption from taxation. The international character of the Fund is intended to permit the Fund to collaborate with similar entities established in other countries. The NGO status of the Fund is equally important, as it reinforces the independence of the Fund from the host government and permits the Fund to participate in other NGO fora.

## **B Benefits each stakeholder derived**

Article VIII of the model Constitution provides for the distribution of benefits to all stakeholders under Section 8.1 (percentages will vary in each fund):

The Board of Directors shall distribute the funds available to be provided as benefits in accordance with the following guidelines:

- 1 At least 50 percent, but not more than 70 percent, of available funds shall be distributed to traditional healers' organizations and community development funds.
- 2 At least 10 percent, but not more than 15 percent, of available funds shall be distributed to national universities and other national institutions that share a commitment to the aims and objectives of the Fund.
- 3 At least 10 percent, but not more than 15 percent, of available funds shall be distributed to the sponsoring entity for its furtherance of conservation and development activities.

## **C Mechanisms for sharing benefits**

The model Constitution designates Committees that are intended to assist the Board of Directors in allocating the benefits to be distributed by the Fund. It is not intended that the committee membership be limited to Members of the Fund.

#### **Section 4.14 Committees**

The Board of Directors shall, [in consultation with the sponsoring entity], appoint individuals to the following committees, which are designed to assist the Directors in fulfilling the Fund's aims and objectives and to promote activities in furtherance of such objectives.

**Benefits Allocation Committee.** This Committee shall ensure that the benefits provided by the Fund are allocated consistent with Article VIII of this Constitution.

**Training Committee.** This Committee shall serve as the liaison between the Fund and scientists, traditional healers and any other individuals or organizations as the Committee sees appropriate. It shall actively promote the implementation of programs or other mechanisms designed to train individuals in the areas of biodiversity conservation and traditional medicinal knowledge.

**Educational Committee.** This Committee shall serve as the liaison between the Fund and universities and other educational institutions and support university departments and other individuals or groups that are committed to the education of individuals in the areas of biodiversity conservation and traditional medicinal knowledge.

**Credit Union Committee.** This Committee shall supervise the activities of the Fund with respect to its lending programs and make recommendations to the Board of Directors as to appropriate credit activities of the Fund.

**Other Committees.** The Board of Directors may, by resolution, approve the establishment of such other committees as may be required to achieve the objectives of the Fund and as permitted by law.

### **D Compliance with new regulations**

Nigeria, like other CBD signators, is currently amending existing sectoral natural resource laws such as wildlife and forestry laws, by including provisions on access for genetic resources. The Office of Intellectual Property (OIP), a department of the Federal Ministry of Trade, has the primary responsibility to protect the intellectual property of inventions within the civil service. OIP is currently in collaboration with the Nigerian Law Reform Commission to develop laws to regulate the transfer of genetic material to and from Nigeria (Iwu, 1996a).

## **VI POLICY CONTEXT OF THE COUNTRY**

### **A Policy environment in Nigeria**

No law in Nigeria now specifically addresses issues covered by the Biodiversity Convention. In principle, biological resources are considered similar to any other natural resources with different levels of stakeholders. Regulations in Nigeria for the isolation of biologically active compounds and/or their exportation from the country fall under several government departments. The National Policy on the Environment of 1989 states strategies to conserve biotic resources, but does not elaborate on the exportation of genetic materials.

### **B Specific regulations and/or policies that were helpful**

The Natural Resources Conservation Council (NARESCON) was established by Decree No. 50 of 1989. The NARESCON mandate strengthens the research efforts of universities specifically to:

- 1 gather data on all plant resources with particular attention to:  
species distribution within and outside forest reserves;

phenology of flowering and fruiting;  
reproductive biology, population structure and breeding systems in  
various species;  
silviculture of endangered species;  
ecophysiology of important species;  
intensification of vegetative propagation techniques; and  
minimum plot size for effective conservation

- 2 update information on the extent and conservation status of the vegetation formations in ancestral communities
- 3 give a clear research mandate to research institutes and universities that have the expertise and adequate facilities

## **C Specific policy, social, economic, cultural and environmental constraints**

**Environmental** — Many biodiversity conservation efforts in Nigeria are projects for the *ex situ* management of species in plantation forestry, which can threaten biodiversity. Such projects may lead to the disappearance of highly adapted plants that cannot survive outside their savannah and forest ecosystems.

**Social** — Nigeria has a National Healers' Association, which most healers are reluctant to join. Many healers feel that those who initiate such associations are sometimes motivated by special interests, rather than by the potential benefits to healers and their patients.

**Health care** — The widespread use and critical importance of herbal medicines to the health of Nigerians mandate the better identification of basic criteria for their quality, safety and efficacy evaluations. Although government authorities have addressed the lack of such criteria, herbal medicines are not yet standardized.

## **D Other relevant policies**

The Natural Resources Conservation Council (NARESCON) was established by Decree No. 50 of 1989 "to redress the environmental stress occasioned by the abuse of natural resources and to consolidate the national focus and for the purpose of effective implementation of the various actions in the conservation strategy." The specific programme that relates to plant resources as articulated by NARESCON provides for 15 activity clusters, each addressing a major conservation problem. The following objectives and activities outlined in the NARESCON have bearing on the sustainable use of bioresources in Nigeria:

- 1 to increase the size of forests under conservation to about 20% of the total land area, so as to ensure future adequate plant resources for timber, medicinal plants, food plants for both man and animals and other forest products
- 2 to inventory vegetal resources using existing information on their distribution and surveying their current status of availability
- 3 to conduct ethnobotanical surveys from Nigeria's diverse culture groups to determine the role of plants in human health
- 4 to ensure sustainable forest management
- 5 to strengthen plant research efforts of universities and research agencies
- 6 to supply a clear research mandate to research institutes and universities that have the expertise and facilities
- 7 to establish a program of germplasm collection, evaluation and characterization leading to central germplasm blocks in various ecological zones

## **VII IMPACT ON CONSERVATION**

### **A Potential impact on the conservation of biological diversity**

Two major conservation activities of the BDCP include an inventory of species and their economic evaluation in the forest complex. Appendix 2 lists plants that are possible species for cultivation by villagers in the main vegetation zones of the country.



## **VIII POLICY RELEVANT CONCLUSIONS: LESSONS LEARNED AND REPLICABILITY:**

### **A Lessons learned**

1 Nigeria offered a strategic alliance for Shaman, with intact institutional capacities, particularly at the village level. These autonomous systems, with their own chiefs and functioning governments, chose to use their traditional knowledge in the outside world to reach goals that they, as a group, decided were important to them. Even though their method to accomplish their goal of improved health care is distinctly modern, it serves their interest. Different indigenous groups hold different beliefs about entrepreneurship. It can be a double-edged sword when Western concepts such as markets are introduced into non-market economies, but, at the same time, many cultures seek greater access to markets. These differences should never be an excuse to exclude indigenous groups from the sustainable use of biodiversity, for this is their, and only their, decision to make. There is much near-hysterical and inflammatory rhetoric from non-indigenous NGOs who claim to represent indigenous views in deciding these matters. Paternalism must be guarded against; indigenous groups must determine for themselves the extent to which they choose to participate in world culture. Within most cultures there exists some kind of social structure to decide if and how such practices should be conducted.

2 Accurate information is essential. It is incumbent upon all CBD stakeholders to develop a clear understanding of exactly what intellectual property rights (IPR) are and what they are not. They are not, for example, a surrogate for human rights. Frustrations arise from attempting to use IPR in ways not originally intended. What will succeed is for countries, cultures and companies to share their experiences cooperatively, since no single paradigm will work for all. The conservation and sustainable development of biodiversity require a diversity of approaches.

3 When biodiversity is discussed in the context of human health, it too often means the health of residents of industrialized nations. Even earnest efforts tend to reflect an unconscious attitude that biodiversity must be preserved as genetic resources to enlarge the pharmacopoeia of Western medicine, which provides therapeutics primarily for Western societies. Less discussed is the vitality of biodiversity to the health of 80% of the world, the populations that have no alternatives to natural medicine, and depend solely on medicinal plants for their primary health care. Escalating costs of imported medicines and the poor financial performance of many African economies creates an urgent need to use traditional medicinal practices to meet increasing demands for human health.

Similarly, many decisions on biodiversity conservation in developing countries are often made by Western scientists who embrace Western value systems. Decisions are made by those socially, culturally, economically and politically removed from the endangered species and ecosystems. Local cultures have understood the value of biodiversity for millennia, but projects planned by outsiders seldom fall within the cultural and biological landscape of community use. Biotic resources conserved on behalf of local communities have a greater potential for success because they represent a cultural and economic investment to the community.

### **B Replicability**

The purpose of the Conservancy pilot project was to test the efficiency and efficacy of the trust fund process, using a step-by-step process to assess the feasibility of future trust funds for benefit sharing. The Constitution emerged from this process. An administrative structure, the model Constitution, allows long-term funding to be disbursed in many countries in a consistent manner, while maintaining the flexibility for programs to respond to local needs.

Trust funds controlled locally to supply long-term funding of programs that are identified by Shaman collaborators as being important to them offer many advantages. They discourage corruption because boards are chosen by culture groups in a transparent and participatory process. Monitoring and

evaluating the use of funds are built into the process, since funds will be distributed long-term on a designated schedule. Because compensation trust funds provide a stable source of funding for as long as Shaman shows a profit, culture groups gain greater responsibility and capacity to identify and manage projects independently. A periodic addition of a smaller amount of funds shared by all Shaman collaborators, rather than one large donation, alleviates the problem of swamping beneficiaries with an amount of money that cannot be absorbed responsibly. It also offers the choice of regularly setting aside a stated percentage to create a permanent endowment for the culture group.

Although the BDCP chose to include Nigerian government agencies as participants in the FIRD-TM, typically governments will receive equal benefits under a separate process that is different from a trust fund. Under the CBD, governments may have sovereign mandates to use funds generated from the commercial use of bioresources for legislated national conservation priorities, such as species inventories.

### **C Policy advice for implementation**

1 Article 8 (j) is the CBD section that addresses maintenance and respect for indigenous knowledge. But it offers only weak protection for culture groups and subordinates CBD obligations to national legislation. Legally, it is Contracting Parties of the CBD, not NGOs' or companies' policies, that hold sovereign authority to decide if and how the sustainable development of biodiversity will be accomplished within their borders. The political climate of states under which indigenous groups live is critical to its success. Since indigenous groups are huge stakeholders in the issues put forth under the CBD, it is essential that they be included in national discussions on interpreting and implementing the CBD in their country. To ensure continuation of their cultural systems, they must fully participate and advocate for themselves and their own interests. If states are to be effective at conserving the world's species, their strategies must be built up through participation by the custodians of biodiversity, not imposed from the capital down.

2 Tropical ecosystems, historical home of most indigenous cultures, are also where most of the world's remaining biodiversity is found. The affiliation of indigenous peoples with traditional territories sanctions and governs their ecological practices. Legal recognition of territorial rights by governments provides authority for indigenous groups to deny or permit outsiders' access to them—the first step in biodiversity conservation through traditional land and resource management.

### **ACKNOWLEDGMENTS**

I gratefully acknowledge the critical input to this article from Maurice Iwu, the BCDP and its members and staff in Nigeria; Lisa Conte, Steve King, Julie Chinook and Tom Carlson from Shaman

Pharmaceuticals, Inc.; and Tom Mays, Panagiotis C. Bayz, Samoa Watanabe and Elaine Sales of Morrison and Foerster, LLP, Stas Burgiel of Bionet, Sue Dodge and all other members of the Nigerian Trust Fund Pilot Project Committee.

## REFERENCES

- CARLSON, T. J. , M.M. IWU, S. KING, C. OBIALOR, and A. OZIOKO. 1997. Medicinal plant research in Nigeria: an approach for compliance with the Convention on Biological Diversity. *Diversity*. Vol.13, No.1:29-33.
- CENTER FOR INTERNATIONAL HEALTH INFORMATION (CIHI). 1996. Nigeria: country health profile. 53 pp. Arlington,VA, CIHI.
- CONTE, LISA. 1994. Testimony for hearing on US ratification of the convention on biological diversity. US Senate Foreign Relations Committee. U.S. Senate, Washington, D.C.
- CONVENTION ON BIOLOGICAL DIVERSITY (UNCBD), 5 June 1992. UNEP: Nairobi.
- GREEN, EDWARD C. 1996. *Indigenous healers and the African state*. Pact Publications: New York, N.Y.
- IWU, MAURICE. 1993. *Handbook of African medicinal plants*. 435 pages. Boca Raton: CRC Press.
- IWU, MAURICE. 1995. *Linking biodiversity and socio-economic development*. Bioresources Development and Conservation Programme: Washington, D.C.
- IWU, MAURICE. 1996 (a). Biodiversity prospecting in Nigeria: seeking equity and reciprocity in intellectual property rights through partnership arrangements and capacity building. *Journal of Ethnopharmacology* 51:209-219.
- IWU, MAURICE. 1996 (b). Resource utilization and conservation in Africa. In *Medicinal resources of the tropical forest* (Michael J. Balick, Elaine Elizabetsky and Sarah Laird, editors). Columbia University Press, New York.
- KING, STEVEN R. and THOMAS J. CARLSON. 1995. Biocultural diversity, biomedicine and ethnobotany: the experience of Shaman Pharmaceuticals. *Interciencia*. Pp. 134-139. Volume 20, No. 3.
- KING, STEVEN R. 1996. Conservation and tropical medicinal plant research. In *Medicinal resources of the tropical forest* (Michael J. Balick, Elaine Elizabetsky and Sarah Laird, editors). Columbia University Press, New York.
- MAYS, THOMAS D., KATE DUFFY-MAZAN, GORDON CRAGG AND MICHAEL BOYD. 1997. A paradigm for the equitable sharing of benefits resulting from biodiversity research and development. Pp. 267-280 in *Biodiversity and human health* (Francesca Grifo and Josh Rosenthal, editors). Island Press, Washington, D.C.
- MCNAMARA, ROBERT S. 1991. Africa's development crisis: agricultural stagnation, population explosion and environmental degradation. Paper presented at the African Leadership Forum, Ota, Nigeria, June 21, 1990.
- MORAN, KATY. 1991. Debt-for-nature swaps: U.S. policy issues and options. *Renewable Resources Journal*. Spring: 19-24.

MORAN, KATY. 1997. Returning benefits from ethnobotanical drug discovery to native communities. Pp. 243-263 in Biodiversity and human health (Francesca Grifo and Josh Rosenthal, editors). Island Press, Washington, D.C.

NATIONAL ADVISORY COMMITTEE ON CONSERVATION OF NATURAL RESOURCES (NACCRR) 1992. The Presidency - Natural Resources Conservation Council: Natural Resources Conservation Plan. Final Report, Vol. 1, May 1992, 113 pp.

THE NATURE CONSERVANCY, FOUNDATION FOR THE PHILIPPINES ENVIRONMENT, UNDP. 1997. Report on the First Asia Pacific Forum on Environmental Funds (Cebu, Philippines. 16-21 February, 1997). The Nature Conservancy: Arlington, Va.