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*Contractual Regulation of Access
to Information on Biodiversity
for Scientific and Commercial Use*

The Novartis-UZACHI Biolead Project

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Diploma Thesis

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ABSTRACT:

This study deals with the question of access, property, use, benefit-sharing and protection of genetic information of plants having a high potential market value. On an international level, the Convention on Biological Diversity has been developed to stop the rapid loss of biodiversity (international regime), while there are also bottom-up approaches where communities negotiate with bio-prospecting multinational firms.

The paper provides the analysis of a success story in Mexico, where Sandoz (today Novartis), a Swiss multinational chemical company, concluded a contract with four Mexican Communities on the access and use of micro-fungi. The process leading to the conclusion of the contract will be studied as well as questions such as the appropriate consideration of local people and the access and benefit-sharing. The paper will finally conclude on conditions indispensable for a successful completion of bio-prospecting agreements.

KEYWORDS:

access and benefit sharing, property and use rights, biodiversity, bio-prospecting, contract, knowledge transfer, Mexico

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PREFACE AND ACKNOWLEDGMENT

This diploma thesis (Masters Degree) was written in the winter 2001/2002 at the independent Professorship of Forest Resource Economics, part of the Chair of Forest Policy and Forest Economics at the Swiss Federal Institute of Technology ETH Zürich, Switzerland, under the supervision of Prof. Dr. Ingrid Kissling-Näf and Dr. Susette Biber-Klemm from the Faculty of Law at the University of Basel, and with the assistance of Dipl Forst. Ing. Thomas Volken. Beside several discussions about the procedure, this study was reviewed at various stages.

Bio-prospecting, a possibility for source providing countries to receive a monetary return for their biological wealth, looked like a reasonable solution to me, to bolster the economic goals, and, at the same time, create an incentive for biodiversity conservation. The study of the literature and the interviews with concerned persons showed me that this issue is complex and multi-layered. The position of the wealthy, technologically rich northern countries on the one hand and the biodiversity rich but economically poor southern countries on the other hand, are wide apart from each other. Thus, the question of equity concerning the benefits is difficult to answer.

Therefore, cases of collaboration, like the present one, considered a success by both of the stakeholders, are important examples for the ongoing discussion about access and benefit-sharing issues on an international and national level, and for the search of incentives to induce and strengthen conservation activities on a local level.

Many thanks to all the persons who supported me in the present research. I would like to express my gratitude to Prof. Dr. Ingrid Kissling-Näf, Dr. Susette Biber-Klemm, and Thomas Volken for their professional support in Switzerland and especially to Prof. Dr. Leticia Merino in Mexico, who opened so many doors for this research, making it possible to realize so many interviews in the limited time available, and offering working facilities to me in her office at the University.

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SUMMARY

By adopting the Convention on Biological Diversity (CBD) in 1992 at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, the issue of how to access and use genetic resources for commercial and scientific purposes, in particular by industry, has become a central topic of discussion among national and international policymakers. It was the beginning of the first negotiations of bio-prospecting agreements between the owners of biological resources, mainly being the government, and in this special case a Union of communities, and the users of such resources which are, amongst others, the pharmaceutical industries of the world.

The Novartis-UZACHI BioLead (bio-prospecting) agreement, the first of this kind for Novartis, was set up in 1995, and the collaboration, transfer of know-how, equipment and material was realized in 1996-1998. The aim of the study of this case was to analyze the process and the conditions leading to this collaboration, focusing on the terms of access and benefit-sharing of the contract, and to answer the question of whether and under what conditions bio-prospecting can create an incentive to induce or foster biodiversity conservation. Therefore, the value of biological diversity was also discussed.

The objective of the collaboration was, basically, to evaluate and prove a scientific concept concerning the perturbation and the production of secondary metabolites in micro-organisms, and to explore the possibilities of a direct collaboration between a pharmaceutical giant like Novartis and communities in a remote area of Oaxaca, Mexico.

The analysis showed that the completion of this agreement depended on various very particular conditions, like the network of personal relationships, external consultancy and the structural and organizational strength of the communities. The perfect interaction made the intervention of national authorities unnecessary. It is not likely that this case is replicable, but it provides various ideas concerning specific elements of great importance. However, an adequate legal framework should be set up on a national level.

The pharmaceutical industry today is more interested in combinatorial chemistry than natural compounds, but they still do have a certain importance in Research and Development (R&D) activities, because they are the product of an evolutionary process and provide interesting compounds. However, their monetary value is marginal, and the economic incentive for conservation of biodiversity is small in comparison. Therefore, bio-prospecting activities, at the best, support existing conservation activities, like in the case of UZACHI. The Mexican communities considered the collaboration as successful, because it exactly provided what they were looking for – the generation of know-how, equipment and the establishment of a research team, to realize their own prospecting activities in the future, and to strengthen the appropriation of their natural resources.

LIST OF ABBREVIATIONS

ABS	Access and Benefit-Sharing
AGC	Assamblea General de Comuneros - Commune Membership Meeting
CBD	Convention on Biological Diversity
Ceccam	Centro de Estudios para el Cambio en el Campo Americano
CGRFA	Commission on Genetic Resources for Food and Agriculture
CITES	Convention on International Trade of Endangered Species of Wild Fauna and Flora
CONABIO	Comision Nacional de la Biodiversidad, Mexico
COP	Conference of the Parties to the CBD
CPR	Common Property Regime
DNA	Desoxyribonucleic acid
ERA	Estudios Rurales y Asesoría Campesina, A.C.
FAO	Food and Agricultural Organization
FAPATUX	Fábricas de Papel Tuxtepec
FR	Farmers Rights
GATT	General Agreement on Tariffs and Trade, was established in the wake of the Second World War
GMC	Genetically Modified Crop
GPA	Global Plan of Action for the Conservation and Sustainable Use and Utilization of PGRFA
ICBG	International Cooperative Biodiversity Groups
ILO	International Labour Organization
INE	Instituto Nacional de Ecología, Mexico
IT	International Treaty on PGRFA. Successor of IU, adopted at the 3. Nov. 2001
IU	International Undertaking on PGRFA, adopted in 1983
IPGRI	International Plant Genetic Resource Institute
IPR	Intellectual Property Rights
LGEEPA	Ley General de Equilibrio Ecológico y Protección al Ambiente (General Law of Ecological Equilibrium and Environmental Protection)
MAT	Mutually Agreed Terms
MTA	Material Transfer Agreement
NAFTA	North American Free Trade Agreement
NGO	Non Governmental Organization
ODRENASIJ	Organización en Defensa de los Recursos Naturales y Desarrollo Social de la Sierra Juárez – Organization for the Defence of Natural Resources and Social Development in the Sierra Juárez
PAN	Grupo Parlamentario del Partido Acción Nacional
PBR	Plant Breeders Rights
PCMT	Plan Comunitario del Manejo del Territorio – Communal Land Management Plan
PGRFA	Plant Genetic Resources for Food and Agriculture

PI	Pharmaceutical Industry
PIC	Prior Informed Consent
Profepa	Procuraduría Federal de Protección al Ambiente, Mexico
PRONASOL	Programa Nacional de Solidaridad – National Program of Solidarity
RAFI	Rural Advancement Foundation International. Since 2000 ETCGroup
R&D	Research and Development
RFF	Resources for the Future
RI	Research Institution
SARH	Secretaría de Agricultura y Recursos Hidráulicos
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SEMARNAT	Secretaria de Medio Ambiente y Recursos Naturales, Mexico
TFS	Technical Forest Services
UCODEFO	Units of Conservation and Forest Development (Unidades de Conservación y Desarrollo Forestal
UNAM	Universidad Nacional Autónoma de México
UNCED	United Nations’ Conference on Environment and Development
UPOV	International Convention on the Protection of New Varieties of Plants
USA	United States of America
UZACHI	Union de Comunidades Productoras Forestales Zapotecas-Chinantecas, Oaxaca, Mexico
TRIPS	Trade Related Aspects on Intellectual Property Rights
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WTO	World Trade Organization, created at the Uruguay round 1986-1994, came into being at the 1. January 1995

PART A – INTRODUCTION

1. Overview

Sandoz¹, a Swiss multinational pharmaceutical industry, signed a contract with four Mexican communities in Oaxaca in 1995, to explore the microbiological diversity of their surroundings. According to the contract, Novartis scientists could not have access to the forests or to raw material, which had to be collected and prepared by trained local people. Novartis was to provide the equipment of a local laboratory, train the employees and pay the salaries, while the Mexican partner delivered the desired microbiological strains, mostly fungi. The contract expired in 1998.

There are only a few bio-prospecting² agreements throughout the world which are considered to be a success by all (both) of the involved stakeholders. The “Novartis-UZACHI BioLead Agreement” is one of them. Considering its special characteristics it is a very interesting project, nevertheless it has been scarcely documented until present.³ The aim of this research is to make a case study on this agreement, analyse the access and benefit-sharing (ABS) terms used, and answer the key question of whether and under what conditions bio-prospecting by valuing biodiversity can create an incentive to preserve biodiversity or not.

This agreement is not only one of the first experiences of collaboration between a pharmaceutical giant like Novartis and a group of small communities of a remote area of Oaxaca, Mexico; it also demonstrates how important the institutional organisation of communities, the respect for specific property rights, the external consultancy and personal efforts and ideals can be for its realisation. Such experiences are very valuable to the ongoing discussion on bio-prospecting agreements and ABS issues, and therefore should be followed up.

The issue of how to access and use genetic resources, in particular by industry for commercial purposes, has become a central topic of discussion among national and international policymakers in the last two decades (Perkoff 1999:1). The problem reached the public only in 1992, during the United Nations’ Conference on Environment and Development (UNCED) in Rio de Janeiro, in which global problems concerning environment and development were

¹ The new name after the merger of Sandoz and Ciba-Geigy in 1996 was Novartis. In summer 2000 Novartis (Pharmaceuticals) split off „Syngenta“ (Agronomy; seed material and plant protection), because it was not part of their core business. From now on we will talk about Novartis.

² Biodiversity prospecting (=Bio-prospecting) is the systematic search, collection and appropriation of biota for new commercial applications. Bio-prospecting after the CBD requires previous information and prior informed consent of the land owner and an appropriate ABS arrangement. The illegal appropriation of these resources is called biopiracy, a term invented by RAFI.

Henne (1998:88): The idea to finance conservation activities by biodiversity prospecting originates in the PI. Bill Clinton, at this time a candidate for American president, supported in his speech for the Earth Day, 22. April 1992, a fund of the industrial nations, together with the PI, to gain access to the rain forest for pharmaceutical research (cited in; Eisner, T 1994: Proceedings of the American Philosophical Society 138, p. 388). This idea, to make a contribution to the conservation of nature, was expanded to other industries using genetic resources. The proposal was to deposit a part of the profit made by the PI in the “Biotic Exploration Fund”, to support conservation activities. Such a fund never was established.

discussed for the first time. One of the key agreements reached at the Conference was the Convention on Biological Diversity (CBD). Since then, over 160 nations have ratified it. Later, the CBD Secretariat was established in Montreal, and until now six Conferences of the Parties (COP) have taken place, with the goal to establish guidelines and policies to implement the CBD in a fair way.

One of the three major objectives⁴ of the CBD, as set out in Article 1, is the “*fair and equitable sharing of benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding*”. At the fourth meeting of the COP, it was decided (Decision IV/ 8) to establish a regionally balanced panel of experts with the mandate to “*draw up all relevant sources, best practices and case-studies on access to genetic resources and benefit-sharing.*”⁵ By the same decision, the CBD Secretariat was requested to compile information about ABS arrangements.

Biodiversity and traditional knowledge are the two elements that make it especially attractive for the pharmaceutical industry (PI) to find new compounds, active substances or genes to improve cultivated crops as transgenic products. That is where bio-prospecting comes in as the search of biogenetic or biochemical information. In this search for active compounds traditional knowledge can give valuable indications.

After the fast development of biotechnology in the 80s and the appearance of the first patents on living beings, bio-prospecting was first regulated by the CBD, namely by its system of access and benefit sharing.

Bio-prospecting is proposed as an option for mega-biodiverse countries, most of them in developing states, to create the awareness of the benefits of “wild land”, mostly forest, and thus, through its conservation, prevent its conversion into farmland. This, at least, is the plan. The providing countries should in exchange for their resources and knowledge receive financial support from transnational PI to facilitate local development projects, scientific research and conservation of biodiversity in these areas (Adame 2000:3).

1.1. Aim of the Study

The following research represents a case study focusing on the ABS terms, and analyses what conditions are important to establish such a contract, and if biodiversity prospecting is a viable method to create an incentive or support existing conservation activities. The primary goals are to realize a documentation of this case, from the first contact up to recent prospecting and other activities of the main stakeholders, and to analyse the impact this

³ Alexandra Hughes from the Sussex University, England, made recently a research about the story lines emerging out of Mexico’s debate around bio-prospecting. The title of her work is: „Selling little mirrors for gold: a rip-off or an opportunity?“ Her study was not used for the present research.

⁴ See <http://www.biodiv.org>, Art.1 CBD: 1. Conservation of biodiversity/ 2. Sustainable use of the components of biodiversity/ 3. Sharing the benefits arising from the commercial and other utilization of genetic resources in a fair and equitable way.

⁵ <http://www.biodiv.org/programmes/socio-eco/benefit/default/asp>

project has had concerning the benefits for the stakeholders, especially the Mexican communities.

It should be noted that the author focused in this report on genetic resources generally used for pharmaceutical and not for agricultural purposes.

Main Question – Many prominent scientists advocate for bio-prospecting, the systematic search for new commercial applications for biota, as a mechanism for inducing biodiversity conservation by making it commercially attractive (Barrett 2000:293). That is a very controversial statement⁶ which leads to the following question:

- **Under what conditions can bio-prospecting create an incentive to induce or foster biodiversity conservation?**

To draw a complete picture of this case, many questions, especially concerning the ABS terms negotiated within the process, need answering, and a careful analysis of the results must be made.

Concerning the process it will be interesting to see in which ways the different stakeholders became involved; which were their primary objectives and incentives to negotiate such an agreement; how did the network of relationships favour the transfer of information; who were the owners of the resources involved; in which ways did the government participate; how was the prior informed consent (PIC) obtained; how was the access to the resource regulated; and finally, were the benefits distributed? All of these points will be examined, and were important within the negotiations of appropriate ABS terms. Furthermore, the distribution of non-monetary benefits in the communities; the measures encouraging compliance; and the impact on the conservation of biological diversity will be analysed.

1.2. Structure

The present research starts by presenting in part A a general overview and the aim of the study.

Part B is dedicated to the construction of the framework. It characterises the genetic resources, presents the basic concepts on the value of biological diversity, and outlines problems like the differences between the political boundaries and natural ranges. Furthermore, it provides an insight into the international efforts, actions and frameworks dealing with biodiversity and genetic resources. The efforts made by the COP and the Panel of Experts established to discuss ABS issues on an international level, are emphasised. Finally, the design of the case study and the instrument for data collection are presented.

Part C contains the case study, provides a description of the stakeholders and the expected results, the institutional context, the national legislation and efforts for an adequate ABS law.

⁶ Barrett (2000:295): “There is no hard empirical or theoretical evidence that bio-prospecting adds significant value to [...] ecosystems and thus to biodiversity”.

The analysis of the contract terms permits an insight into the applied ABS regulations. The structure of this part, as already mentioned, follows the indicated outline for studies on benefit-sharing arrangements of the CBD Secretariat.⁷

The analysis in part D chapter four is divided into four parts. First, the project results will be presented followed by an analysis of the ABS issues. Further, the compliance and conflict resolution, as well as the impact on conservation, will be considered. Thirdly, the organizational structure and the collective management of the resources, analysed with Ostrom-criterions, will be considered, as it seems fundamentally important for the successful establishment of the agreement. Last but not least, the significant effect of technological change, especially within the last decade, on the value and importance of natural compounds for the PI, and the strong influence on bio-prospecting activities will be discussed. This point seems often to be forgotten within the rather emotional discussions about the use and value of biodiversity. This chapter is finished with some general observations of the stakeholders concerning the importance of bio-prospecting for conservation activities.

Part E starts with the lessons learnt by the two main stakeholders, then discussing the possibilities of finding similar conditions elsewhere to make this agreement replicable. The conclusions contain recommendations for future policy implementations, and discuss if bio-prospecting in biodiversity rich areas could be used as a tool to create a financial incentive for property owners strong enough to induce or strengthen activities concerning the preservation of nature or not.

⁷ www.biodiv.org/programmes/socio-eco/benefit/case-studies.asp

PART B – PRELIMINARIES

2. Biological Diversity

Overview

The special character of genetic resources, the different approaches to value biological diversity in economical terms, and the threats and problems relating to genetic resources will be discussed in this chapter.

2.1. Character of Genetic Resources⁸

Biological Diversity is defined as being “*the variability among living organisms from all sources including, inter alia, 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*” (Art. 2 CBD).

While there is a great danger for a large part of genetic resources to be extinct, the biotechnological development has created a strong interest in these kinds of resources, particularly for agricultural and pharmaceutical purposes.

2.1.1. The Theory of Goods

A resource, such as biodiversity, generally makes available a multiplicity of services and goods. The theory of goods distinguishes between several types of goods as showed in Table 1. The type of good is defined by two characteristics; on one hand the possibility of exclusion of other users, and on the other hand, the rivalry between the consumers. The character of a good can change over time or it can be changed by setting up or changing the property rights. The four types of goods are:

		Exclusion	
		Yes	No
Rivalry	Yes	Private Good	“Mixed” Good (CPR)
	No	Toll Good	Public Good

Table 1: Characteristics of goods (drawn from Kissling 2000:18).

State sovereignty remains the fundamental principle around which all inter-state relations are organized.⁹ In effect, international law is based on the principle that all states are juridically equal and that there is no authority superior to states. One of the specific elements of state sovereignty concerns the control of the natural, biological and genetic resources found in areas under their jurisdiction (Cullet, P. 2002:2).

So it is the States determining an adequate legislation and the handling of biodiversity, defining if it should be a public, private or common good. However, there exist different approaches to measure biological diversity in economic terms, to assign it a monetary value.

⁸ This part is mainly based on: Day-Rubenstein (2001), Columbia University (1999) and OECD (1999).

⁹ UN Charter, San Francisco, 26 June 1945 and UN General Assembly Res. 2625 (XXV), Declaration on Principles of International Law Concerning Friendly Relations and Co-operation among States in Accordance with the Charter of the United Nations, 24 Oct. 1970, *reprinted in* 9 *ILM* 1292 (1970).

2.2. Value of Biological Diversity

The essential question is if biodiversity can be given a value. Economists and scientists agree that it is not possible to determine, with accuracy the monetary value of biodiversity. The economic point of view is insufficient for the complex interrelationship of species in an ecosystem. According to Ehrenfeld, the focus on economic terms prevents the development of a successful conservation strategy, as “economic criteria of value are shifting, fluid and utterly opportunistic in their practical application. This is the opposite of the value systems needed to conserve biodiversity over the course of decades and centuries.” (Ehrenfeld 1988:214 in Szymura 2001:3). However, biodiversity does have a commercial value by providing agricultural and pharmaceutical products (food and medicine), energy, and raw material. Further, its ecological value (environmental services, carbon sink, watershed protection, etc.); its esthetical, as well as ethical values, should not be underestimated. Biodiversity provides benefits substantial for our living (OECD 1999:9). We also differentiate between direct, indirect, option; bequest and existence values (see Table 2). Among all these values, it is justified to ask whether the search by the PI for active compounds within biodiversity creates a financial incentive to preserve it or not.

2.2.1. Categories of Value of Biodiversity

The valuation of genetic resources made with the focus on pharmaceuticals is limited. The value of biodiversity is categorized by the OECD (1999) as follows:

Direct use value	Food and fibres, building and industrial material/ Fuel/ Medicines for local people/ Pharmaceuticals/ Agricultural inputs: Genes, pesticides, microorganisms/ Recreation
Indirect use value	Habitat for plants, animals and micro-organisms/ Habitat for migratory species/ Watershed protection/ Soil protection/ Storage and recycling of human produced wastes/ Carbon storage/ Climate regulation/ Medicine; model for synthetic copy of natural active molecules
Option value	The option for any direct or indirect use in the future (e.g. medical, agricultural, industrial, climate control needs)
Quasi option value	The value of information held in conserved resources
Bequest value	The value placed by some people on leaving resources for future generations
Existence value	The value placed by some people on the existence of a biodiversity they never expect to see or to use (e.g. the value of knowledge that Siberian tigers survive).

Table 2: Categories of Values of Biodiversity (drawn from Day-Rubenstein (2001:211). See also OECD (1999:28-31)).

Direct use value: Elements of biodiversity which can be directly consumed, traded or used for commercial activities, including sightseeing and eco-tourism (OECD 1999:29).

Indirect use value: This includes all services a healthy natural environment can provide by functioning properly. Such benefits are not privately appropriable, though the measures designed to encourage the increase of such values must have a public or social dimension, such as tax on emission (OECD 1999:29).

Option and quasi-option value: The option value represents the freedom and possibilities to change the preferences, in this context fully dependent on the biological resources existing in

the future. The quasi-option value refers to the resources and the according information, which cannot be made accessible with presently available technology.

Bequest and existence value: This is the value placed on the simple fact that a certain habitat or species exists.

Potentially, many of these values of preserved biodiversity could be addressed in bio-prospecting agreements. The problem is that there is no incentive to do so because indirect and non-use values are unlikely to generate economic returns.

Göschl and Swanson (2000:90) relate the difficulty of valuing diversity with the poorly constructed property rights systems.

2.2.2. *Value of Undiscovered Natural Drugs*

Natural products are still the main source of products of western medicine. In the USA 25% of the prescription medicines contain active ingredients derived from plants, while most of the others are synthesized to replicate or improve naturally produced molecules (Simpson 1997:2). The World Health Organization (WHO) estimates that 80% of the world's population relies on plant-based medications (Lancet 1994 in Day-Rubenstein 2001: 209). Natural products are important sources for two reasons. First, living creatures must protect themselves, so they produce toxic substances against intruders and second, natural substances are more diverse than synthetic substances. They are the product of evolution.

Most of the large pharmaceutical companies have a natural compound unit, but the interest and investments in this sector have diminished over the last years.¹⁰ However, the expectations in the early 90s, with the appearance of the CBD, have raised the hopes in source countries to profit from the development of bio-based drugs.

There are different estimations of the value of undiscovered drugs, and they are generally high. Mendelsohn (1995:223) estimate that every new drug is worth US\$ 94 million to a private drug company and US\$ 449 million to society as a whole.¹¹ He also estimates that the world's tropical forests contain 375 potential pharmaceuticals of which 48 have been discovered. Making the calculations he writes that a complete collection and screening should be worth US\$ 3-4 billion to a private drug company and US\$ 147 billion to the society as a whole. The social value is much higher than the value to drug companies (see Figure 1). Others like Simpson (1996:168), quantify the value of biodiversity in terms of conserved land, which is a useful measure considering that land conversion is the main threat to biodiversity conservation. There is a broad range of studies,¹² most with some deficiencies,¹³ showing that the valuation of biodiversity depends on the assumptions and methodologies.

¹⁰ Petersen (Novartis), 25. Jan. 2002 and Henkel (Bayer) 16. Jan. 2002, both telephone-interviews.

¹¹ The private value for a company is always smaller than the value for society as a whole (see also Figure 1).

¹² (1) Rausser and Small (2000): One disease/ one drug model: Once a drug for this disease is found, no other drug will be needed. They found that genetic resources have a higher marginal value in targeted search structure. (2) Simpson (1996): One disease/ one drug model. They found that the value of marginal species is low, consequently pharmaceutical prospecting is not a viable method to finance biodiversity conservation.

The interest of PI in natural products does not necessarily lead to bio-prospecting activities due to the influence of technological change and the importance of combinatorial chemistry. Actually, combinatorial chemistry is much more important in research and development (R&D) of new products. Also a major problem to define the value of samples is the time lag between the collection and the marketing of the product, which is estimated to be 10-15 years (see Table 16). This is not only an issue for the source providers but also for the users.

2.3. Threats and Issues concerning the Value of Biodiversity

There are several obstacles to overcome for an appropriate access and benefit sharing (ABS) regulation. First, it is difficult to define the clear value of biodiversity, because there are no established markets; and second, genetic resources do not respect national boundaries. Therefore, it is a challenge to national and international policymakers to set up laws and guidelines how to deal with biodiversity.

2.3.1. Marginal Value of Species¹⁴

In economics, the worth of something is its marginal value. In the case of bio-prospecting, its marginal value lies in the potential contribution of an additional species to the probability that researchers may be able to find what they are looking for. In other words, chemical compounds are valuable, if only few substitutes for them exist. There are millions of species (animals, plants, micro-organisms) as sources for useful products, so they are either so common to be redundant or so rare to make discovery unlikely (Simpson 1997:1).

There are several reasons why genetic resources may be relatively redundant.¹⁵ It may be that (a) the same species may be found over a wide range, (b) that the organisms in similar ecological niches often evolve similar chemicals, so drugs with similar clinical properties can be isolated from different species, and (c) different therapeutic mechanisms may be effective in treating the same symptoms.

The essence of this argument is that, if the set of organisms that may be sampled is large, the marginal value of the species is small (Simpson 1996:168-169). If their value is small, no incentive for conservation exists, and no arguments can be used against the conversion of land to generate other incomes. On the other hand, the high value of a resource can on this way result in unsustainable harvesting and destruction. These are the main two reasons why biodiversity is becoming extinct.

2.3.2. Threats and Economics of in situ Conservation

Biodiversity has many values. It is a direct resource for agricultural and medical purposes, and environmental services and has therefore different use and non-use values (see Table 2). Despite this, the loss of biodiversity arises because the opportunity costs of preserving land

¹³ Day-Rubenstein (2001:210): 1. Not accurate considering the time lag between collection and marketing of the drug/ 2. The one disease – one drug assumption is an unreal simplification/ 3. Recent advances in technology are not considered/ 4. Broad range of benefits for society through conservation is poorly investigated and known etc.

¹⁴ This part draws on Simpson (1997:2).

¹⁵ Example: Caffeine can be found in tea and coffee.

are immediate while the benefits are long term and up to date somehow diffuse. (Day-Rubenstein 2001: 205).

Three different objectives of biodiversity prospecting can be identified. The discovery and use of genetic material can be made for (a) commercial purposes, (b) scientific purposes, or (c) to give local people a return for biodiversity conservation.

Such agreements help local communities to capture more of the benefits arising from bio-prospecting activities. The different non-monetary and monetary benefits are listed in Table 4. These benefits give the developing countries more scientific and financial resources, which increases their capacity to realize and improve conservation activities. The case discussed below will show this statement to be true.

Day-Rubenstein (2001:206) mentions two reasons why biological resources are threatened. First the fact that high value of a resource leads to over-harvesting, and second, that low value compared with a competing resource leads to substitution or land conversion.¹⁶ Economically speaking, a conservation incentive only exists if the benefits derived from preservation are the same or higher than those converting the land for other purposes.¹⁷

Different authors¹⁸ agree that the underlying cause for the destruction of biodiversity may be found in the differences between the private values and the social values (see Figure 1). The problem is that on one hand, the landowners' decision, private or community based, affects the conservation of biodiversity strongly, because they decide whether to clear their land or not, which crop they are going to plant etc., and on the other hand, the (social) benefits mostly accrue on the national or global level. Therefore, conservation efforts should be compensated by the national and global level.

Increasing the returns to the holders of the resources is difficult, because markets for transactions in genetic resources are just beginning to emerge. In addition, the payments made (up-front payments, sample fees, royalties etc.), provide little evidence concerning the real value of unimproved "wild" genetic resources.

¹⁶ According to Simpson (1997:4), land conversion is the greatest threat for natural habitats to be destroyed.

¹⁷ Henne (1998:52) writes that, according to different assumptions, the estimations of the rate of destruction of biological diversity lay between one and eleven percent per decade between the years 1975 and 2015.

¹⁸ Day-Rubenstein cites here: Perrings et al. (1995), Hannemann (1998) and Janssen (1999).

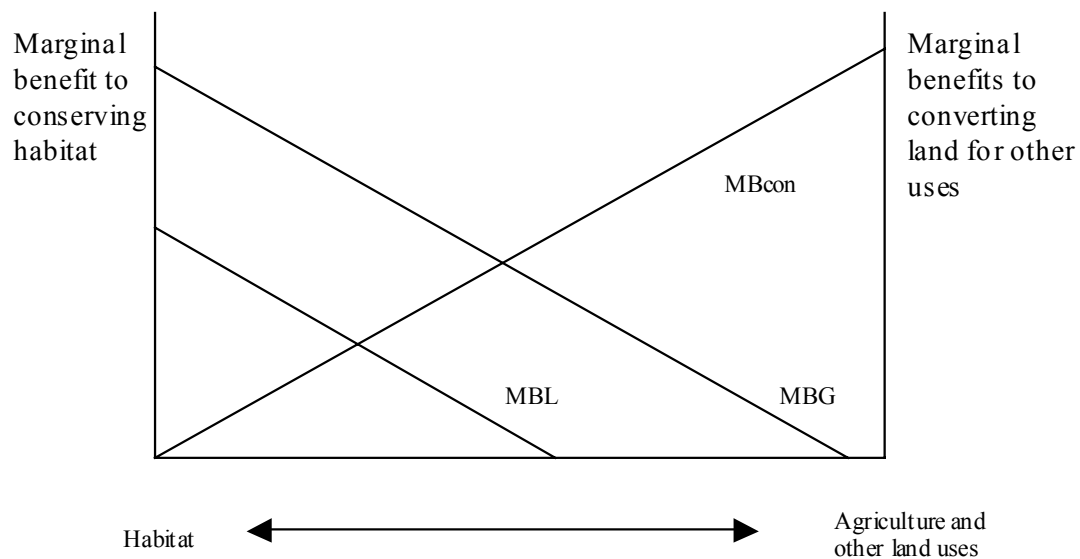


Figure 1: Local and global incentives for *in situ* conservation of genetic resources (Day-Rubenstein 2001: 207; based on Larson 1994 and Janssen 1999).

- Horizontal axis: Stock of land available to the local community
- Vertical axis: Marginal benefits
- MB_{con} : Benefit to local inhabitants of converting an additional acre = opportunity cost of preserving an additional acre
- MB_L : Benefit of local residents keeping an additional acre of land in its natural state
- MB_G : Global benefits of preserving an additional acre are higher reflecting the public good nature of diversity benefits
- H_L : Local optimum; given these costs and benefits, the local inhabitants would choose to preserve land up to H_L
- H_G : Optimal preservation level for the world is higher than the local optimum

National and international policies, as well as the strengthening of IPR should be able to shift the MB_L curve to the right and increase the incentive to preserve land. If benefits are more easily appropriable they should increase the incentives for conservation.

2.3.3. Political Boundaries vs. Natural Biological Ranges

Species distribution has nothing to do with political boundaries. There is a concentration of biodiversity along the equator and other “hot spots”. In the 70s and 80s of the 20th century, the loss of diversity became a global concern and in 1992 the process of international collaboration culminated in the signing of the CBD.

The state oriented approach by the CBD is not necessarily appropriate for the conservation of genetic resources, because animals and plants as well as micro-organisms do not respect national boundaries. This is the reason why the national sovereignty over genetic resources is often criticised. “These political factors, which are the product of history, geography and strategic interest, make regulating access a very complicated matter.” (Columbia University 1999: 6).

Swanson (1997:131-132) proposes to develop a “Global Land Use Plan” managed by a special authority, which would have to set up a very general global land use plan and a very specific map of the territories, where the particular land use is defined. Thus, he argues, it is necessary (and possible) to unbundle the various services that flow from a parcel of land, and distribute these rights among various individuals or groups.

3. International Agreements

Overview

The past and present use of biological resources have led international policymakers to perceive genetic resources as economically valuable assets, as presented in the previous chapter, access to which must be regulated to fight against an inefficient use. The continuing loss of biodiversity, due largely to the enormous growth of the earth's population, asks for appropriate management and planning of its exploitation. The role of international environmental agreements in the global development process is to provide the necessary regulation.¹⁹

The objectives of conservation of biodiversity are often contradictory.²⁰ There are different approaches to handle the genetic resources. There are efforts to preserve them *in situ*, in their natural habitat valued through use, or *ex situ* in gene-banks. The *in situ* approach tries to create incentives to conserve by using economic means. On the other hand, there is neither great economic incentive nor equitable sharing of benefits generated by the existing gene-banks world wide with the provider-countries, because most of the *ex-situ* collections acquired their genetic resources prior to the entry into force of the CBD. They thus remain outside the Convention and are not regulated by its stipulations (Lesser 1998:97).

Besides the Convention on Biological Diversity (CBD) there are other international agreements addressing the terms for using and processing genetic resources. They are the Trade Related Aspects of Intellectual Property Rights Agreement (TRIPS)²¹ of the World Trade Organization (WTO) and the Food and Agriculture's (FAO) International Treaty on Plant Genetic Resources for Food and Agriculture (IT on PGRFA). Also considered here is the Convention 169 of the International Labour Organization (ILO), recognizing the rights of indigenous people over the resources in their land, and the North American Free Trade Agreement (NAFTA), which is important concerning the handling of patents.

3.1. The Convention on Biological Diversity – CBD

On May 22nd, 1992 the nations of the world adopted the global Convention on Biological Diversity.²² On June 5th, 1992, at the United Nations Conference on Environment and Development in Rio de Janeiro, 150 States signed it. On December 29th, 1993 the Convention entered into force (Glowka 1994:1). The CBD provides the first umbrella agreement addressing the conservation and use of biological resources. Today, most countries have

¹⁹ Swanson (1999) gives a good introduction to global environmental problems and international environmental agreements.

²⁰ The valuation of resources often leads to an exploitation that runs counter to conservation.

²¹ http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm6_e.htm : Ideas and knowledge are an increasingly important part of the trade. Most of the value of new medicines and other high technology products lies in the amount of the invention, innovation, research, design and testing involved. Firms, music recordings, books, computer software and on-line services are bought and sold because of the information and creativity they contain, not usually because of the plastic, metal or paper used to make them.

²² McConnel (1996) gives a good insight into the negotiating history of the CBD, starting with the UNEP's 14th Council in Nairobi, June 1987.

ratified the Convention, a major exception being the USA, and are represented in the Conference of the Parties (COP).²³

The CBD provides the main legal framework covering plant genetic resources and other components of biological diversity, placing decision-making at the national level.²⁴ The objectives of the CBD are the (a) conservation of biological diversity, (b) the sustainable use of its components, and (c) the fair and equitable sharing of benefits derived from its utilisation (Art. 1 CBD). These objectives are to be considered when discussing appropriate terms for bio-prospecting contracts.

Table 3 provides a short description of the principle articles of access and benefit-sharing of the CBD, which are relevant for the use of genetic resources and pertinent in the present research.

Article	Text
Art. 8: <i>In-situ</i> conservation	The primary approach of biodiversity conservation. Each party shall establish a system of protected areas and develop guidelines for their management. Art. 8 j urges Contracting Parties to respect and maintain traditional knowledge and to integrate its holders in the decisions about its wider application
Art. 12: Research and training	Establish and maintain programs for scientific and technical education and training corresponding to the needs of developing countries
Art. 15: Access to genetic resources	Determination of access rests with the national governments and is subject to national legislation. Each contracting party shall endeavour to facilitate access
Art. 16: Access to and transfer of technology	Each Contracting Party, recognizing that technology including biotechnology, is an essential element, shall provide and/ or facilitate access and transfer to other parties
Art. 18: Technical and scientific cooperation	Facilitate exchange of information, such as results of technical, scientific and socio-economic research, as well as training information and other knowledge
Art. 19: Handling of biotechnology and distribution of its benefits	Each contracting party shall take legislative, administrative or policy measures, as appropriate, to provide for the effective participation in research activities, especially developing countries

Table 3: Principal articles concerning ABS issues in the CBD (Glowka 1994: 39, 65, 76, 84, 94, 96; Lesser 1998: 6)

²³ <http://www.biodiv.org/world/parties.asp>: 168 countries have signed the Convention.

The implementation of the CBD is governed by the COP and the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA). As already mentioned, the major means of implementing the CBD is through national strategies, considering national programmes and policies (FAO 1998:255). As the Convention is a complex agenda, it is perhaps not surprising that little has been accomplished during the initial five conferences (COP 1-5, see Appendix E).

Legally, the biogenetic resources fall under the sovereignty of the states (Art. 2 CBD). However, their right to dispose over these resources is not unlimited. “General principles” and concepts such as the “common concern” and “sustainable development” (Preamble and Art. 1 CBD) are attempts to discipline its use with a view to preserve the heritage” (Biber-Klemm 2000:7).

Article 15 provides the regulations concerning access to genetic resources, outlining the rights and obligations of each contracting party. Article 15 (1) establishes clearly the authority of a government to determine physical access to genetic resources in areas within its jurisdiction. Article 15 (2) requires the parties to endeavour to create conditions to facilitate access and not to impose restrictions which run counter the objectives of the convention. According to Article 15 (4), access can only be given if the terms of the contract were mutually agreed upon and the Prior Informed Consent (PIC) from the providing Parties was obtained (Art. 15(5)). These four fundamental concepts are important (Glowka 1998:4-9).

Concerning the benefit-sharing, Article 15(6), 15(7), 16, 19(1) and 19(2) are important. Article 15(6) provides for participation in scientific research, Article 15(7) for sharing fairly and equitably research and development results, commercial and other benefits, Article 16(3) for the access to and transfer of technology, Article 19(1) for participation in biological research activities, and finally, Article 19(2) provides for priority access to results and benefits arising from biotechnological use of genetic resources (Glowka 1998:12).

Legal Status – When the agreement between Novartis and the Mexican communities in Oaxaca was signed in 1995, the CBD was already ratified by the two countries Mexico and Switzerland. Mexico signed the CBD on June 13th, 1992 and ratified it on March 11th, 1993. Switzerland signed it on June 12th, 1992 and ratified it on November 21st, 1994.

3.1.1. Cartagena Protocol on Bio-safety

According to decision II/5 of November 17th, 1995 of the COP the Protocol on Bio-safety was developed, especially focusing on trans-boundary movement of any living modified organism resulting from modern biotechnology, which may have a negative impact on the conservation and sustainable use of biological diversity.²⁵

This Protocol became very important in the recent discussion about genetic modified maize in remote areas of Oaxaca, Mexico.²⁶

²⁴ Glowka (1994:1): Unlike other treaties for the conservation of biological diversity, for example the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES), there are no lists or annexes of accepted sites or species to be protected.

²⁵ <http://www.biodiv.org/biosafety/articles.asp?lg=0&a=bsp-00>

²⁶ Chapela, I. and Quist (2001).

3.2. Law and Policy in the World Trade Organization (WTO)²⁷

3.2.1. The TRIPS Agreement

The World Trade Organisation (WTO) succeeded the General Agreement on Tariffs and Trade (GATT) 1947. It is based on the principle that a liberalized system of international trade based on non-discrimination and the elimination of trade barriers is essential to global economic well-being. The WTO was established out of a package of several agreements. It includes an Agreement on Trade Related Aspects of Intellectual Property Rights, which requires its members to raise their national standards on the protection of intellectual property to a certain level. Until the coming into force of the WTO, the World Intellectual Property Organization (WIPO)²⁸ was considered the most important intergovernmental forum on intellectual property rights.²⁹

Intellectual Property Rights (IPR) plays a crucial role in the use of genetic resources. The inclusion of IPR reflects the explosive growth in information technology and biotechnology in international trade. There is a strong desire of the industrialized countries to protect their products from intellectual piracy in foreign markets. IPR in general protect intangibles like inventions or developments in form of genes, organic components or entire organisms. IPR are exclusive rights. The material in question can no longer be used by third parties without the consent of the owner. This leads to a *de facto* denial of access to certain resources, which will no longer be available for commercial use.

Under the TRIPS Agreement³⁰, the signatories are obligated to adopt a minimal standard for IPR and mechanisms to enforce them.³¹ The provisions of the TRIPS agreement are very controversial in developing countries, because they are seen as a reflection of the Western perception of innovation.³²

3.2.2. The International Union for the Protection of New Varieties of Plants (UPOV)

Formal IPR have existed in different forms for several centuries. A modern, harmonized system of IPRs was introduced by the Paris Convention for the Protection of Industrial Property, 1883. In 1961, specific IPRs for the protection of the rights of plant breeders to their varieties were created by the Convention on the Protection of New Varieties of Plants (UPOV).

UPOV seeks to protect new varieties of plants both in the interest of agricultural development and of plant breeders. Though it did not introduce patents, UPOV sought from the outset to provide incentives for the private sector to engage in commercial plant breeding by introducing so-called plant breeders' rights. Despite the distinction between patents and plant breeders' rights, the two share several basic characteristics: they provide exclusive

²⁷ Basic information from Gervais (1998), http://www.wto.org/english/thewto_e/thewto_e.htm and Cullet (2002:13ff)

²⁸ <http://www.wipo.org>.

²⁹ Crucible II Group (2000: 87).

³⁰ http://www.wto.org/english/tratop_e/trips_e/trips_e.htm.

³¹ E.g. patent, copyright, geographical indications etc.

³² Crucible II Group (2000: 88).

commercial rights to holders, reward an inventive process, and are granted for a limited period of time after which they pass into the public domain (Cullet 2002:27).

Only about 50 countries are part to the UPOV because of the general distrust of IPR's by the developing world, but UPOV may become more important now because of the TRIPS. Article 27.3(b) of the TRIPS Agreement states that plants and animals may be excluded from patentability. Nevertheless, WTO members must offer protection for plant varieties, either by patents, an effective *sui generis* system, or a combination thereof.³³ The UPOV is widely, if not reluctantly, seen to fulfil this.³⁴

Summarizing, it can be said that TRIPS protects formal innovations, while the informal innovations by farmers and communities in cumulative and multigenerational form are not taken into account.³⁵

Both the national implementation of the necessary legislation and the pending reviews of the TRIPS agreement offer considerable scope for interpreting, amending or supplementing the agreement to align IPR's with the objectives of the CBD (Seiler 2001:4).

However, the misuse of the TRIPS Agreement mainly by “developed countries” including in particular the strong and inflexible US position, which includes the imposition of trade sanctions to impose their system on countries with different IPR regimes, are a bad approach for the necessary negotiations on this topic on international level.

Some deem the TRIPS Agreement as incompatible with the CBD, and others fear that the TRIPS, which is focused on inventions, has adverse affects on global biodiversity in open access property systems. (Macilwain (1998) and Janssen (1999) in Day-Rubenstein (2001: 208)).

3.3. The International Treaty on Plant Genetic Resources for Food and Agricultural – IT on PGRFA (FAO)

Traditionally, PGRFA were considered to be a common heritage of humankind, which means that PGRFA could not be appropriated.³⁶ This principle was reflected in the practice of the Commission on Genetic Resources for Food and Agriculture (CGRFA) and was embodied in the International Undertaking on Plant Genetic Resources (IU), adopted by the FAO conference in 1983 (FAO Resolution 8/83) (Cullet 2002:9).

The CGRFA is a permanent forum, where governments discuss and negotiate matters relevant to genetic resources for food and agriculture. Their main objectives are to ensure the conservation and sustainable use of PGRFA, as well as the fair and equitable sharing of the

³³ Art. 27.3 (b) of the TRIPS: “Members may also exclude from patentability: b) plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes. However, members shall to provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof.”

³⁴ Danuta Szymura Berglas, 21. Feb. 2002, notes to the research.

³⁵ In other international instruments farmers' rights are considered; in the Global Plan of Action (GPA) and Agenda 21 (Girsberger (1999:178, 283).

³⁶ WRI (1992:64) and Cullet (2002:8ff).

benefits derived from their use, by establishing a wide range of measures, guidelines and codes.³⁷

Through negotiations, the commission tries to reach an international consensus on topics of global interest regarding PGRFA. It facilitates the cooperation between the FAO and other relevant intergovernmental and non-governmental institutions, including the COP of the CBD, the International Plant Genetic Resources Institute (IPGRI) and the United Nations Commission on Sustainable Development.³⁸

The IU was an answer to the expansion of IPR's in the process of plant breeding. The discussions focused on the question of access to ex-situ collections and of creation of rights to traditional PGRFA. One of the goals of the IU was to ensure that plant genetic resources of economic and/or social interest were made available for plant breeding and scientific purposes (Art. 1). In 1993, the contracting parties recognised the need to harmonize the IU with the CBD, in particular to integrate the principle of sovereignty of states over their genetic resources, and to seek solutions for several outstanding problems such as access to PGR and farmers rights (Biber 2000:444). Therefore they decided to revise the IU. At the 31st session of the FAO, on November 3rd, 2001, the International Treaty (IT) on PGRFA was adopted. It aims to guarantee the diversity of PGRFA in the future, taking into account the needs of farmers and plant breeders concerning the fair and equitable sharing of the benefits and the harmonisation with the CBD (Art. 1).

The IT, now a legally binding agreement, will enter into force when at least 40 states have ratified it. As a framework it will ensure access to plant genetic resources, related knowledge, and technology transfer and internationally agreed funding.³⁹

3.3.1. *International Code of Conduct for Plant Germ-plasma Collection and Transfer*⁴⁰

This code must be mentioned here because it is one of the first international voluntary codes in this matter, serving as a point of reference until the individual countries establish their own codes and regulations concerning the collection, conservation, exploration, use and exchange of germ-plasma. It was adopted by the FAO in November 1993 and is fully compatible with the CBD and the IT.

It aims at promoting sustainable use of genetic resources, to prevent genetic erosion, as well as protect the interests of providers and users.

³⁷ For example: „Code of Conduct for Plant Germ-plasma (*Not germ-plasm?*) Collecting and Transfer“, a „Code of Conduct for Biotechnology“, the „World State Report“, the „Global Plan of Action“ and others.

³⁸ <http://www.fao.org/ag/cgrfa/>

³⁹ http://www.fao.org/WAICENT/OIS/PRESS_NE/PRESSENG/2001/pren0181.htm.

⁴⁰ See Stoll (2000:267-280) and <http://www.fao.org/ag/cgrfa/docs.htm>.

3.4. Convention 169 of the International Labor Organization (ILO)⁴¹

The ILO was created in 1919 with the goal to reduce unemployment, protect the interests of the workers and achieve social justice (Preamble of the ILO Constitution).⁴² The initial motivation was of humanitarian, political and economic nature. The ILO constitution was written in the same year.

Today, the ILO tries to reach social justice, considered basic for a universal and lasting peace. It basically regulates labor; prevention of unemployment; provision of an adequate living wages; protection of worker against sickness; disease and injury arising from employment; protection of children, young persons and women; provision for old age; protection of the interests of workers when employed in countries other than their own; recognition of the principle of equal remuneration for work of equal value; recognition of the principle of freedom of association; organization of vocational and technical education; and other measures (Preamble of the Constitution).

The Convention 169 on Indigenous and Tribal People was created to coordinate and protect the rights of those peoples. Adopted by the International Community and 1989 and ratified by the Mexican Senate in 1991, it mentions in Article 15⁴³ that “*the rights of the peoples over the natural resources present on their lands shall be especially safeguarded. These include, the rights of these people to participate in the use, management and conservation of these resources*” and if “*the State retains the ownership [...] or rights to other resources present on their lands, governments shall establish or maintain procedures through which they shall consult these peoples [...] before undertaking or permitting any programs for the exploration or exploitation of such resources present on their lands. The peoples concerned shall, wherever possible, participate in the benefits of such activities, and shall receive fair compensation for any damages, which they may sustain as a result of such activities.*” Few years later, the CBD used the ideas expressed in this article.

3.5. North American Free Trade Agreement – NAFTA⁴⁴

The parties to the NAFTA-agreement are the United States of America (USA), Canada and Mexico. Together they established a free trade area with the objectives (Art. 102) of eliminating trade barriers, facilitating cross-border movements, and promoting fair trade conditions, providing effective protection of IPR, and creating effective procedures to implement this agreement.

For the present research Art. 1709.3 (Patents) in Chapter Seventeen (Intellectual Property) is relevant. Article 1709.3 of the NAFTA agreement states that each of the parties can exclude from patentability (a) diagnostic, therapeutic and surgical methods for the treatment of humans or animals, (b) plants and animals other than micro-organisms and (c) essential

⁴¹ <http://www.ilo.org/public/english/standards/norm/whatare/standards/indig.htm>.

⁴² <http://www.ilo.org/public/english/about/iloconst.htm#pre>

⁴³ <http://ilolex.ilo.ch:1567/scripts/convde.pl?C169>.

⁴⁴ <http://www.nafta-sec-alena.org>.

biological processes for the production of plants and animals, other than non-biological and microbiological processes for such production.

Thus, micro-organisms, the main source in the following case study, are not excluded from patentability by the parties of NAFTA.

4. Access and Benefit-Sharing (ABS) Issues

Overview

The issue of how and under what conditions genetic resources can be accessed and used has become a central topic of discussion among policymakers, especially for commercial and industrial purposes. It is widely recognized that genetic and biological materials are important for the production and generation of pharmaceuticals, generation of seed varieties and other industrial products (Perkoff 2000:1).

4.1. Unregulated Estate – Biopiracy⁴⁵

The illegal appropriation of biological resources and associated knowledge is called biopiracy. Most of the bio-prospecting activities before 1992, especially talking about micro-organisms, were realized without previous information, prior informed consent or any type of access or benefit sharing agreement with the legal property and resource owner. With the appearance of patents on living beings and on removed compounds the argument around this topic became more intense.⁴⁶

The organisations and persons, who consider bio-prospecting *per se* as biopiracy,⁴⁷ say that biodiversity, living beings and traditional knowledge are public goods, which should not be subject to private property. According to them, biodiversity is not a product which can be treated like merchandise with a monetary value. They consider all of the compensations of PI's for the communities/ indigenous people insufficient, and that it should not be allowed to establish exclusive user rights.⁴⁸

This is an incomplete and problematic but often mentioned argument by the holders of biodiversity, because if biodiversity is a public good, how can there be complains about someone taking it? Rather, the holders of biodiversity wish their rights and interests over their resources to be recognised.⁴⁹

Thinking in terms of the CBD, only projects not taking into account the according regulations can be considered guilty of biopiracy.

⁴⁵Gonzalez (2000:4): The term „biopiracy“ was invented by Pat Mooney (RAFI – Rural Advancement Foundation International) and became popular through persons like Vandana Shiva.

⁴⁶ Gonzalez (2000:4): There is a debate presently going on about a patent issued to Larry Proctor for a yellow bean in 1999, which has been produced by Mexican farmers for decades.

⁴⁷ RAFI and Ceccam for example. See also: Hernández Navarro, Luis (2000): Piratas de la vida. La Jornada. 12. September 2000, p. 19.

⁴⁸ Ribeiro (RAFI), 13. Dec. 2001, personal communication. See also Adame (2000:3).

⁴⁹ Danuta Szymura Berglas, 21. Feb. 2002, notes to the research. According to the arguments of Graham Dutfield concerning public goods.

4.2. Regulated Estate – Basic Issues

It must be noted that in this research the author focused on the genetic resources used for pharmaceutical and not for agricultural purposes.

The access to biodiversity is the main strategic factor for bio-prospecting. It has become an increasingly important issue over recent years in international and national policy making. Access is the key to the generation of biotechnological innovations, which is the goal of the pharmaceutical industry.

Especially the providing countries, most of them in developing estate, have great interest in the value-adding process. They make access dependent on the compliance of certain agreement terms with the goal to receive a share of the generated benefits by the use of their resources.

The following points related to the basic issues on ABS are important:⁵⁰

- **Stakeholders**
- **Prior Informed Consent (PIC)**
- **Mutually Agreed Terms (MAT)**
- **Benefit Sharing**
- **Approaches for Property Protection**

4.2.1. Stakeholders

It is important to analyze who the stakeholders are and which are there interests. The different stakeholders could be:⁵¹

- Research Institutions (RI)
- Pharmaceutical Industry (PI)
- Governments (as well as regional and local authorities)
- Local communities and indigenous people, mostly supported by Non-Governmental Organizations (NGO)

Research Institutions: Nowadays, RI's normally have strong relationships with the PI. The agreements have to reflect the changing reality of the increasing commercial value of academic research.

Pharmaceutical Industry: This sector is characterized by its volatility, which makes it difficult for other partners to deal with. Important from the point of view of development, is to ensure that access activities enhance value-added activities and do not solely promote the one-way resource flow from developing to developed countries.

⁵⁰ Drawn from: Columbia University (1999) and Seiler (2001).

⁵¹ There is a long list of possible stakeholders, but drawing some limits, these are the most important ones in the case studied.

Government: It does have an important function in controlling the resource flow and by developing appropriate access legislations. The government may be represented by local or regional administrations.

Local communities and indigenous people: They are really “playing on a field that is leveled against them” (Columbia University 1999:v). As direct managers of the resources, of the maintenance and sustainable use, they mostly lack the skills and the financial resources to defend their rights and negotiate contracts.⁵² That is where different NGOs emerge as consultants for communities. Governments often do not recognize the important function that the communities have in the conservation of their resources, and, on the contrary, even provide incentives for continuous destruction of those resources. It is crucial to recognize and strengthen the position of indigenous people and local communities in their effort to reach the ultimate goal of the conservation of biodiversity.

Seiler (2001:17) also mentions the media and the not-organized sectors of society as key elements with great responsibilities. He will be proved right by the case study in the present research. Basically he divides the stakeholders in users (RI, PI etc.) and providers (governments, local communities etc.) of genetic resources.

It is also important to keep the number of parties on the negotiating table as low as possible, but still linked to the large political context. The recent failure of two bio-prospecting contracts in Mexico⁵³ shows that a lot of basic research has to be done, followed by an information campaign to uncover speculations and misunderstandings. However, there exists no generally applicable formula. Every case has its own specific conditions, national and international context. Most lack any monitoring and evaluation at all, which makes the evaluation of the impact such contracts even more difficult.

4.2.2. *Prior Informed Consent (PIC)*

According to Article 15.5 CBD “access to genetic resources shall be subject to prior informed consent of the contracting party providing such resources, unless otherwise determined by the party.” The PIC must be obtained from source providers and the way in which they are going to be compensated. The obstacles here are mainly the language and cultural differences. Another relevant question is who should be informed and how substantial this information has to be. The phrase “unless otherwise determined” in Article 15.5 indicates that governments can decide if they make access subject to PIC. In Mexico, access to genetic resources is, according to environmental law, subject to PIC.

ABS provides a new context for PIC. Originally PIC has only been used in medicine, for patients that required special treatments, based on their doctor’s information and advice, and

⁵² Ribeiro (RAFI), 13. Dec. 2002, personal communication: A warning that RAFI sends out to all the communities, trying to establish a contract with PIs, is that they would never have a chance to win in a trial, because of their lack of financial resources.

⁵³ UNAM-Diversa and ICBG-Maya, both cancelled in 2001.

on an international level, for trans-boundary transports of hazardous waste. Thus, there is not much experience in applying PIC to access to genetic resources. Every case is very particular. However, the establishment of national and international guidelines would be helpful.

4.2.3. *Mutually Agreed Terms (MAT)*⁵⁴

The principles of MAT are applied in several articles of the CBD. MAT must be obtained concerning the access to genetic resources (Art. 15.4); the fair and equitable sharing of the results of R&D; the benefits arising from commercial and other use of genetic resources (Art. 15.7); the access to and transfer of technology (Art. 16.3); and the access to the results and benefits arising from biotechnology (Art. 19.2).

Article 15.4 is the only binding obligation. Concerning the other articles, governments have to take appropriate legislative and practical measures to facilitate their implementation. PIC and MAT are closely related. In fact, PIC should be a precondition for MAT in ABS contracts.

4.2.4. *Benefit Sharing*

A pillar of the CBD philosophy is to reach an equitable sharing of benefits arising from the use of germ-plasma between the northern and southern countries. Up to date, these profits have been minimal and “the win-win opportunities foreseen when uniting environmental and development objectives have been few and far between” (Columbia University 1999:iv).

Two issues have to be discussed concerning the “fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies” (Glowka 1994:15). The very controversial and difficult question to be answered is “what is appropriate and equitable?” It raises the issue of how to distribute the monetary, as well as the non-monetary benefits, and what parties are to be considered, i.e. the government, the private landholder(s) or the communities who are preserving the resources? Should the benefits be shared between the parties who worked hard for establishing a contract, or between all the owners of the land where the respective resources are located?⁵⁵

Access to relevant technologies was a main concern of many developing countries in the negotiations for the CBD (Glowka 1994:5). As the importance of biotechnology is growing and biodiversity becomes more and more valuable, developing countries do not want to see themselves in the situation of being a mere extension of the international production line of the PI in the northern countries. Thus, the transfer of technology and of scientific and technological education is certainly likely to also be a very effective approach for medium and long-term benefits.⁵⁶

⁵⁴ This material is based on Seiler (2001:16-17).

⁵⁵ One of the reproaches of neighboring communities is often, that they own the same resources as the source providing party within a bio-prospecting agreement, and thus they should receive a benefit as well.

⁵⁶ Fernandez (INE), 19. Dec. 2001, personal communication.

Seiler provides a list of possible approaches, dividing them into monetary and non-monetary benefits (see Table 4). As the literature and the Mexican case in particular shows, a case-by-case approach is always preferable. The conditions (property rights, national versus regional jurisdiction, political versus botanical demarcation etc.) ask for a “careful elaboration of a set of suitable instruments tailored to each prospecting project” (Seiler 2001:11).

Non-Monetary	Monetary
<ul style="list-style-type: none"> • Acknowledgment in publication • Joint research and increased scientific capacity • Participation in planning and decision making • Co-ownership or sole ownership of IPR • Free access to technology and products resulting from the agreement • Protection of local existing applications of IPR • Technology transfer • Training in bio-prospecting methods, collection and preparation of samples, biodiversity monitoring etc. 	<ul style="list-style-type: none"> • Bio-prospecting fees • Sample fees • Percentage of research budget • Percentage of royalties • Development of alternative income generating schemes • Commitment to re-supply in source country • Specific funds

Table 4: Possible non-monetary and monetary benefits (Columbia University (1999:78) and Seiler (2001:11)).

Except up-front payments, most royalty-derived benefits are expected to occur on a long-term basis. However, different mega-biodiverse countries and NGO’s do not realize that. They expect the industries to pay immediate large monetary returns, considering biodiversity their “green gold”.⁵⁷

Royalty payment – Delayed royalty payments are generally preferred by the contracting firms to reduce the interest expenses on the money paid out. The average pharmaceutical product needs eleven to twelve years to reach the market, thus the interests can be significant. An initial payment shifts the risk to the firm (Lesser 1998:37).

Lump sum payment - Suppliers know that the likelihood of a sample leading to a product is around one in 10’000 or less (Macilwain 1998:535). Therefore, the risk of no future payment is considerable, and thus, initial payments are preferred. But prepayments in form of “once and for all payment” are dangerous because incentives for further conservation are not provided (Simpson and Sedjo (1992) in Lesser (1998: 36)). On the other hand, prepayments could also grant a close association between the commercial agreement and its funding, which can be an incentive for conservation and careful use, recognizing that initial payments favour current generation over future ones.

⁵⁷ Henkel (Bayer), 16. Jan. 2002, telephone-interview.

4.2.5. *Approaches for Property Protection*

One of the main problems is the tension created by property rights over land and user rights, which are mainly private or community based. On the other hand, Article 15 CBD recognizes that access to genetic resources depends on governmental approval and thus is subject to national legislation (Glowka 1994:5).

Important developments in this discussion are happening in the WTO, which established the TRIPS standards regulating the use and protection of knowledge. The CBD raises an infringement with the WTO principles, like non-discrimination and most favored nation status, by recognizing the sovereign right of the country over their genetic resources. The protection of traditional knowledge is poorly accommodated in TRIPS. There are various examples of misappropriation. A recent example of misappropriation is the patenting of a yellow bean (frijol) variety, which brought confusion into the export market of the bean cultivators in Mexico. This patent turns illegal anyone who imports, cultivates, and sells or uses the yellow bean in the USA without paying license fees to Larry Proctor. He is the president of the Company Pod-Ners, which holds the patent.⁵⁸ The fight against this patent has been launched.

Since the very famous Article 8(j) CBD commits the signatory states to maintain and preserve indigenous knowledge, innovations, practices, lifestyles, etc., these are important elements to be considered when formulating appropriate terms of access. This article does not contain a legal basis to create an individual right. Therefore, traditional knowledge remains in public domain. The problem is that there exists an imbalance between the legal status of industrial and traditional types of information in international research and trade. That is why users of genetic resources are accused to pirate traditional knowledge (Biber-Klemm 2000:8).⁵⁹ However, one of the conditions of UZACHI, as the resource provider in the following case, was, that the collaboration with the industry would not include the handling of traditional indigenous knowledge.⁶⁰

⁵⁸ For further information see www.etcgroup.org.

⁵⁹ Biber-Klemm (2000:16): She proposes that IPR to traditional knowledge should be created where possible, second, that natural resources should be left under the sovereignty of the states, and third, that an international funding system should be created to compensate the *ex situ* use of biological resources.

⁶⁰ In the opinion of RAFI member Ribeiro (RAFI, 13. Dec. 2001, personal communication), the project did involve traditional knowledge, because the people involved in the project, all of them local inhabitants, have a huge basis of common indigenous knowledge, which they actually used to fulfil the tasks given by the BioLead project (search of appropriate collection-sites etc.).

Danuta Szymura Berglas, 21. Feb. 2002, notes to the research: According to her, traditional knowledge is always related to Plant Genetic Resources.

Different political and legal instruments, addressing the core issues, are available to implement appropriate ABS arrangements. Approaches can be classified into three categories as follows (Lesser 1998:21):

- **Unilateral – Patents and other traditional and non-traditional forms of IPR**
- **Bilateral – Contracts**
- **Multilateral – The common heritage approach**

Unilateral Systems

IPR is referred to as unilateral because it operates as national law. Economically speaking, IPR's provide incentives and serve as protection of investment by granting exclusive rights, mostly limited in time. The essential common feature consists in granting protection to innovation, always depending on the novelty of information (Cottier 1997:10). The following table (Table 5) shows some of the tools used in the context with PGR and associated traditional knowledge and cultural goods.⁶¹

<i>Formal, industrial IPR's</i>	<i>New sui-generis tools</i>
<ul style="list-style-type: none"> • Plant Breeders Rights (PBR) • Patents • Trade secrets 	<ul style="list-style-type: none"> • Farmers Rights • Codes of Conduct • (Instruments to protect Folklore) • (Cultural Property)

Table 5: Tools of protection for traditional and non-traditional IP.

Formal IPR

PBR –They are a *sui generis* form of IPR protection, designed specifically to promote materials of plant varieties (FAO 1998:396). Thus, they are not broadly useful to claim ownership of genetic resources from micro-organisms, and thus are not of great relevance for the present research.

Patents – Genetic resources are most likely to be protected by patents. The distinction between invention and discovery is essential. What is inhibitory to the patentability of the bulk of materials identified in the wild is the “utility” (USA, in Europe “industrial application) requirement for patenting. In few words, the utility requirement specifies a use of the invention to be identified. The use must not be original or practical in an efficiency sense, but there must be a specific use designation (Lesser 1998:23).

IPR, intangible until applied, are part of the discussion about patent protection. A great difference between the IPR in pharmaceutical and agricultural industries is the “high value, low volume character of pharmaceutical bio-prospecting” (Columbia University 1999:iv).

According to Chapela and Massieu (2001:23) there exist some basic differences concerning the application of patents between plants and micro-organisms (see Table 6). The latter described bio-prospecting agreement concerns exclusively micro-organisms.

⁶¹ This material is mainly based on Lesser (1998:21-44).

Taxonomic Level	Characteristics	Protection with Patents possible	
		Plants	Micro-organisms
Families	Assembly of compatible species	No	No
Species	The individuals can be crossed	No	Yes, if they are stable, new and useful
Races	Assembly of individuals with shared physical characteristics	No	No
Ecotypes	Assembly of individuals with shared physical characteristics. They are unstable; that is to say, the children and grandsons can be different from the parents	No, for being unstable	No
Varieties or strains	Assembly of individuals with shared physical characteristics. They are stable; that is to say, the children and grandsons inherit most of the characteristics of the parents	Yes, if they are stable, new and useful	Yes, if they are stable, new and useful
Compounds	Chemically defined substance, that can be derived from an alive organism or being produced by precursors produces by alive organisms	Yes, if they are new and useful	Yes, if they are new and useful
Procedures	Assembly of methods and techniques that are used to obtain certain compound or product.	Yes, if they are new and useful	Yes, if they are new and useful

Table 6: Differences concerning the patent application between plants and micro-organisms (Chapela and Massieu 2001:23).

Trade secrets – They are used to keep valuable information confidential. The refusal of local communities to share their knowledge with outsiders is a form of trade secret protection. From a public perspective they are not desirable, because they limit the flow of information.

This concept, developed in industry, is important concerning the protection of traditional knowledge, know-how or genetic resources. However, the laws and discussion on this topic are far from being settled.

New sui-generis tools

Farmers Rights – Farmers Rights (FR) were introduced as an answer to the creation of the PBR's in the Revised Undertaking for Plant Genetic Resources. FR's are not necessarily restricted to plants with agricultural applications. FR's as laid down in the IU – and now in the IT on PGRFA do not confer any rights. They operate more as a moral obligation than an economic incentive, and are rather connected with a general conservation and equity motive than with specific actions. In this context they are not of interest.

Codes of Conduct – Codes of Conduct serve as guidelines for the conclusion of standardized but voluntary agreements, between providers and users of plant genetic resources.

The FAO Conference, for example, adopted in November 1993 the “International Code of Conduct for Plant Germ-plasma Collecting and Transfer”, which should serve as a “point of reference until such time as individual countries establish their own codes or regulations for germ-plasma exploration and collection, conservation, exchange and utilisation.”⁶² The code is directed to the national governments, proposing that users of germ-plasma should share the benefits derived from the use of plant genetic resources. However, this Code of Conduct does not consider micro-organisms, which were the main subject of the BioLead Project of Novartis. Anyway, this code is a valuable guideline.

(Instruments to protect Folklore) – There are many parallels between the protection of expressions of folklore and the protection of genetic material. Especially locally developed species, are, like folkloric expression, the result of long-term community contribution. There is no system which acknowledges or compensates for these contributions. This is a significant problem, but it is beyond the scope of this research.

(Cultural Property) – The term “cultural property” designates tangible forms of ancestral artefacts. In the present research it is not of interest

Bilateral Systems

The use of contracts to govern transactions involving the use of genetic diversity and other biological resources is increasing, particularly in the field of “bio-prospecting” (FAO 1998:402). They are often used in bilateral arrangements related to the exploitation of biological resources for pharmaceutical or industrial purposes.

Know-How Licenses – This is a type of industrial agreement providing licenses with exclusive or non-exclusive rights to use informal knowledge that is not generally patentable, but is important in the utilization of an associated technology. The use of a know-how license for ethno-medical knowledge in the context of bio-prospecting was suggested by the legal council for the Aguaran, but its application is not without legal complications. It offers a legal protection and recognition of the local and indigenous inhabitants in a type of contract, which is familiar to the commercial sector (Rosenthal 1998:19).

Material Transfer Agreement (MTA) – They are a standard tool being used in commercial and academic research partnerships. MTA are used when the owner of a specific material is known and willing to provide usage permissions. They define the basic rights and responsibilities related to the specific material transferred. There is a difference being made between research agreements and commercial contracts. There are three principal aspects important in a simple MTA to allow research use only. Namely, (a) a description of the material, (b) a statement that only research use is permitted and commercialisation would

⁶² www.fao.org/ag/cgrfa/docs.htm

require an additional agreement, and (c) the distribution of material is prohibited to third parties (Lesser (1998:29), or Putterman (1997:301-302)).

Where the material is considered to have a significant commercial potential, matters of access, use and sharing become more important and the MTA gets more complex. There are case by case issues which need to be solved. Rosenthal (1998:19) mentions that commercial and research agreements on the one hand, and the terms of associated benefit-sharing on the other, will involve separate but linked agreements.

Trust Fund Mechanism – They appear to be one of the most flexible and equitable ways of managing monetary rewards in a short as well as long-term sense, and are a part of most benefit-sharing schemes today. They can be designed to fit the local needs and reach the appropriate parties as well as offering an opportunity to structure local compensation schemes and, thus, maximise conservation incentives (Rosenthal 1998:19).

Information and Risk – Analysing users and providers we find huge institutional, economic and cultural differences. Furthermore, the contract payment terms are associated with deficient and imbalanced information and risks. Lesser offers a useful list of the claims of the suppliers and users of genetic resources (Table 7). “Thus, for good or ill, most protection will be achieved through MTA” (Lesser 1998:41).

Suppliers of genetic resources – National/ local/ indigenous communities	Users of genetic resources – PI, RI
<ul style="list-style-type: none"> • Want up-front payments • Be risk averse • Wish to screen samples to increase value added over time through training and equipment transfer • Identify a reputable partner (moral hazard) • Be the poorer informed • Wish to claim the bulk of profits after the buyer share and other costs are deducted (residual claimant) 	<ul style="list-style-type: none"> • Want to delay expenditure rather than increase the risk of loss by large up-front payment • Identify a reputable partner, especially if transferring proprietary screening equipment • Be risk neutral • Be better informed • Wish to claim the bulk of the profits (be the residual claimant)

Table 7: Consequences of institutional, economical and cultural differences between the resources suppliers and the users of genetic resources (Lesser 1998:38).

Multilateral Approach

Lesser (1998:21) refers here predominantly to open exchange systems, including the “common heritage approach”. The common heritage approach expands the circle of beneficiaries and the ones with obligations in two directions (Biber-Klemm 1992:68):

- Addressee of this approach is the humanity;
- This approach does not take effect only in limited bio-geographical regions, but the whole world;
- It includes the dimension of time, including with the term “heritage” the future generations.

Goal of the classical concept of the “human heritage” is to regulate the utilization of common geographical regions like the ocean bed or orbs, on an international level and to prevent them to be under state sovereignty.

The element of access and use was challenged since the beginning of the “common heritage” discussion. The concern was that states of the developing world would, once again, loose the race, since the technologies for a fruitful exploitation of the common resources are in the hands of the industrialized countries.

The common heritage approach concerning biological resources was discussed, but is of limited importance in view of biological resources⁶³. They are, since the entry into force of the CBD in 1992, under state sovereignty.

The call for an equitable sharing of the benefits resulting of the use of biological resources is understandable, because it is unfair to consider the raw material of no commercial value, while the resulting products can be quite profitable. Further, the need for an adequate IPR system is urgent. The present system protects the products of biotechnology from unapproved use, but is not applicable to the inputs. The explanation is simple. IPR, created for technical and practical reasons, need a use to be identified; this is seldom applicable to the bulk of genetic resources, which is in fact “new territory” in the present state of research.

⁶³ The Multilateral System on Facilitated Access to Plant Genetic Resources for Food and Agriculture of the IT PGRFA has been created on the background of this approach.

5. Importance of Structural Conditions

Overview

Besides the importance of an international and national legal frame and further regulations for the access and benefit-sharing issues, there are conditions even more important for biodiversity conservation in communal land, such as the existence of a local (or regional) community structure and rules for an efficient management of the natural resources.

It is important to understand under what conditions communities as resource providers are able to manage their resources successfully providing the necessary conditions for a bio-prospecting agreement. For the later analysis, the basis of Elinor Ostrom's theory of the "self-governance of common pool resources" (Ostrom 1998 (b)) will be presented here.

5.1. Collective Management of Environmental Resources

The discussion about the collective exploitation of natural resources was raised in 1968 by Garret Hardin with an article entitled "The Tragedy of the Commons" (Hardin 1968) published in the Journal Nature. It is still considered an important article by environmental economists. In his article, Hardin argues that the communitarian property systems creates a situation of open access, which means conditions without restrictions or control for the use of natural resources. Further, he states that there is a conflict between the interest of the individual and those of the community, because each user of a common resource tends to maximise the individual use, which leads promptly to overexploitation. "Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a common brings ruin to all" (Hardin 1968:1244). There is no incentive to maintain the resources. Thus, according to his theory, open access leads to the tragedy. His community members are incapable (by definition) to communicate and reach an agreement and establish rules for the use of the resources. There lies the origin of the question of the best way to protect the resources from being destroyed. The first main possibilities discussed were, (a) centralisation of the control over environmental resources by the government and (b) privatisation. As the debate progressed, (c) Common Property Regime (CPR) was considered more and more important for the sustainable use of natural resources.⁶⁴

5.1.1. Centralisation of the Control

The theory of Hardin often lead to policies of either privatisation, centralisation via concessions, or state ownership of, mainly inhabited vast forest land.

"These policies have been disastrous for both the conservation of forests and the well being of the people who live in them, because, paradoxically, they often create just the situation the policy makers thought they were correcting. The de jure nationalization or privatisation of

⁶⁴ OECD (1996:201): Common Property = "Property in which the nature, size and internal structure of the owner group and the definition of those who are entitled to rights, interests, cultural norms and endogenous systems of authority vary." Mostly, the relationships are founded in mutual trust, shared knowledge and culture, some going back centuries.

inhabited forest land created a de facto open-access situation by sweeping away established systems of resource control, to which the state policy makers had been blind” (Ostrom (1990:23) cited in Klooster (1997:59-60)).

The assumption that governments always know what sustainable management of resources is, also in particular circumstances, and that the governments have enough capacity and money to maintain their monitoring agencies, was proven wrong. It was not taken into account that there is no incentive for communities to fulfil bureaucratic regulations if the specific circumstances and their problems are not considered (Merino 2000: 4).

5.1.2. Privatisation

Some authors see the privatisation of common goods as the only possibility to regulate the access to environmental resources.⁶⁵ They perceive the CPR as an absence of property, as open access systems.⁶⁶ Often, the privatisation of ecosystems induces the division of collective goods in small units, supposing that this division creates an ecological rationality of the user's action. This proposal completely ignores the fact that the incentives of rational use of private property are not necessary compatible with the sustainable use of the resources, especially in fragile ecosystems. In other cases, the privatisation is impossible, like in the case of mobile resources (Merino 2000:4).

Both, the ones voting for centralisation, as well as the ones voting for privatisation of the resources, consider that the communities, and, therefore, the concerned individuals, are incapable of solving the problems arising from the use of common resources (Merino 2000:5).

5.1.3. Common Property Regime (CPR)

Several authors recognized Hardin's confusion between a free-for-all open access situation and a CPR, and offer a less pessimistic view. CPR, where rules for its orderly use have been worked out, can be a socially efficient response to certain ecological conditions. The theoretical concept of Elinor Ostrom will be emphasized here. She does not propose one solution for the management of common property, but offers a variety of options to a diversity of problems (Merino 2000:6). Ostrom does not consider these regulations of access to resources as ideal, but rather as difficult and costly measures, the establishment of which is a long and laborious process.

5.2. Self-Governance of Common Pool Resources

In the analysis of the management of natural resources by local institutions,⁶⁷ common pool resources⁶⁸ are distinguished from collective or common property. The character of common pool resources is typified mostly by their physical attributes. Common resources are defined

⁶⁵ Vogel (1994:4) acknowledges the complexity of the problem, and proposes the creation of property rights, where not existent, over genetic resources (as a form of privatization).

⁶⁶ Jansen (1999:317): “An economically rational society will privatize a resource, defining and enforcing exclusive property rights, when exclusion costs are less than the costs associated with the overuse of the resource, or with other words, when the gains of internalization become larger than the costs of internalization.” However, the welfare of private property, as compared to open access, depends on the transaction costs associated with the strategy of privatization.

as systems of natural resources, constructed by communities, which are big enough to permit the achievement of benefits, and exclude potential beneficiaries, by certain rules (Ostrom (1991:30) cited in Merino (2000:8)). The communities as well as the society as a whole, require the design and implementation of institutions that would allow an efficient use of the different resources they depend on. The property systems are a central part of these institutions (Merino 2000:7).

The management and maintenance of natural resources depends increasingly on the capacity of the communities living in the areas where the natural resources are located. Thus, this topic is very important. Common property, as well as only private or public property, is not the only solution to the problem of an optimal management and conservation of the resources. A better solution could be a combination of different types of properties and management systems. Within this different types of properties, as well as considering different organisational structures and cultural contexts, the central problem stays the same; “how to coordinate the use of a resource employed by numerous individuals, maintaining an optimal rate of production or common consumption” (Merino 2000:8).

In the case of CPR, where no exclusion is possible and rivalry may exist,⁶⁹ increased use makes sustainable supply difficult to achieve. Further, there is a danger of over-exploitation, because of unrestricted access. Thus, the users of common pool resources have to set up exploitation and management rules for a sustainable use of their resources. The different patterns of interaction are the “free rider strategy”⁷⁰ and the coordinated action.

5.2.1. Theory of Common Pool Resources

The performance of self-governed common-pool resource systems vary substantially. Consequently, it's not possible to arrive at empirical generalizations about rules⁷¹ and rights of such systems. However, it is possible to derive a series of design principles⁷² that characterize the configuration of rules that are used. According to Ostrom (1998(a):15), robust long-term institutions are characterized by most of the design principles listed below.⁷³

⁶⁷ Ostrom (1996:2): Institution in this context refers to shared concepts used by humans in repetitive situations organized by rules norms and strategies.

⁶⁸ Ostrom, Gardener and Walker (1994) in; Ostrom (1998 (b)): Common pool resources generate finite quantities of resources units, so that one person's use subtracts from the quantity of resource units available to others. Examples of CPR are irrigation systems, forests, grazing lands, etc.

⁶⁹ Merino (2000:10): Private goods represent a maximum level of rivalry and exclusion. A good used by a particular user cannot be available for others while it is being used.

⁷⁰ Individuals using resources, without considering the rules defined by the community for their exploitation.

⁷¹ Ostrom (1996:2): Rules = shared prescriptions of that are mutually understood and enforced in particular situations in a predictable way by agents responsible for monitoring conduct and for imposing sanctions.

⁷² Ostrom (1998(a):14): Design principle = conditions that help to account for the success of these institutions in sustaining a common-pool resource and gaining the compliance of generation after generation of users to the rules used in a location.

⁷³ Adapted from: Ostrom, Elinor (1990): *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.

Principles

- P1. Clear defined boundaries: individuals or households with rights to withdraw resource units from the common-pool resource and the boundaries of the common-pool resource itself are clearly defined;
- P2. Congruence: The distribution of the benefits from appropriation rules is roughly proportionate to the costs imposed by provision rules and the appropriation rules restricting time, place, technology and/or quantity of resource units are related to local conditions;
- P3. Collective-choice arrangements: Most individuals affected by operational rules can participate in modifying operational rules;
- P4. Monitoring: Monitors, who actively audit common-pool resource conditions and user behaviour, are accountable to the users and/or the users themselves;
- P5. Graduated sanctions: Users who violate operational rules are likely to receive graduated sanctions (depending on the seriousness and context of the offence) from other users, from officials accountable to these users, or from both;
- P6. Conflict resolution mechanisms: users and their officials have access at low-cost, local arenas to resolve conflict among users or between users and officials;
- P7. Minimal recognition of rights to organize: The rights of users to devise their own institutions are not challenged by external governmental authorities;
- P8. Nested enterprises:⁷⁴ Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.

These principles work to enhance the shared understanding of participants of the structure of a common-pool resource. In the case examined by the present research, the concerned resource is the community forest and its biodiversity.

Considerable consensus exists between scientists, that the following attributes of users (U) and resources (R) are conducive that self-governing associations will form (Ostrom 1998(b):427-428).

Attributes of Users

- U1. Salience: Users are dependent on the resource system for a major portion of their livelihood;
- U2. Common understanding: Users have a shared image of how the resource system operates and how their actions affect each other and the resource system;
- U3. Discount rate: Users use a sufficiently low discount rate in relation to future benefits to be achieved from the resources;
- U4. Distribution of interests: Users with higher economical and political assets are similarly affected by a lack of coordinated patterns of appropriation and use;
- U5. Trust: Users trust one another to keep promises and relate to one another with reciprocity;

⁷⁴ For common-pool resources, that is part of larger systems.

U6.Autonomy: Users are able to determine access and harvesting rules without external authorities countermanding them;

U7.Prior organizational experience: Users have learned at least minimal skills of organization through participation in other local associations or learning about ways that neighbouring groups have organized.

Attributes of Resources

R1.Feasible improvement: Resource conditions are not at a point of deterioration such that is useless to organize or so under-utilized that little advantage results from organizing;

R2.Indicators: Reliable and valid indicators of the condition of the resource system are frequently available at a relatively low cost (limits, extension, ecological dynamic).

R3.Predictability: The flow of resource units is relatively predictable (the productivity of the system);

R4.Spatial extent: The resource system is sufficiently small, given the transportation and communication technology in use, the users can develop accurate knowledge of external boundaries and internal micro-environments.

In addition to the variables enhancing self-organization and there are other unresolved theoretical issues to be considered, like the effect of size and heterogeneity of the user-group (Ostrom 1998(a):17-19).

Size – There seems to be a consensus among the scientists that large groups of users are more difficult to manage than smaller ones, while the organizational costs for small groups are relatively high. Consequently, the hypothesis is that medium-sized groups succeed more often than very small or very large groups.

Heterogeneity – The size of a group and its heterogeneity are closely related. The higher the heterogeneity the more difficult it is to manage the group. If among the users there are groups with different cultural backgrounds, the success of a common management of resources depends on the sharing of a common understanding of their situation.

In the management of biodiversity, the development of these conditions is a wide area of investigation, education and technical assistance for governmental and non-governmental institutions.

The concerned resources generally represent a fundamental productive capital for the majority of the communities, as well as important elements of identification of the group. Therefore, management or conservation of the resources is often subordinated to reproduction, not mainly heading for high rates of gain. On the other hand, often exists social capital, namely, shared rules, relationships of trust, and knowledge of the resources, thus maintaining the incentive for opportunistic behaviour low.

However, if the communities do not have control over the above mentioned conditions in a certain moment of time, this does not imply that they are not able to develop them or that a collective management is impossible. The organisation of a collective management is an experience of auto-transformation for them. The inversion in the creation and development of an institutional structure is important.

Without doubt, the recognition of the possibilities of management by the user-groups and the consensus about the importance of participation does not automatically lead to the conclusion, that the majority of the users will adopt the according rules for an effective auto-government. Also, the influence of external authorities can strongly affect the possibilities of success of communitarian management. Governments can strengthen such institutions by recognizing their rights for self-organisation, concerning the management of their resources, providing the necessary information (Merino 2000:14).

Threats

There are various possible reasons for the failure of communal management of resources, even with institutions characterized by the above designed principles. Below, eight important threats to communal government of resources are listed (Ostrom 1999:6-12):

1. Blueprint thinking: It occurs when policymakers propose uniform solutions to a wide variety of problems and situations;
2. Over-reliance on simple voting rules as the primary decision mechanism for making all collective choices. The problem is to gain a general understanding and agreement to a set of rules;
3. Rapid exogenous changes:⁷⁵ The faster and the more key variables change, the more difficult is the adaptation to these new circumstances;
4. Transmission failure from one generation to the next of the operational principles on which community governance is based;
5. Turning to external help sources too frequently: The reliance on “easy-money” from external authorities and donors could be a threat to long-term sustainability;
6. International aid that does not take account of indigenous knowledge and institutions;
7. Corruption and other forms of opportunistic behaviour;
8. Lack of large-scale institutional arrangements related to reliable information collection, aggregation and dissemination; fair and low-cost conflict-resolution mechanisms; educational and extension facilities; facilities for helping when natural disasters or other major problems occur at a local level.

The basic institutional structures mentioned by Ostrom as prerequisites for all the activities in communities governing common-pool resources, do (in some form) exist in the communities treated in the following case. In communities of UZACHI, structures and rules were

⁷⁵ Ostrom (1999:6): In technology, in human, animal, or plant populations, in factor availability, in substitution of relative importance of monetary transactions, in heterogeneity of participants.

developed over the last two decades, and strengthened throughout the last 10 to 15 years by the appropriation of the resources.

6. Method

Overview

The single case study was considered the appropriate research method. The instruments for data collection were basically the analysis of the documents and semi-standardised qualitative interviews with experts and other persons involved in the case.

6.1. Design and Choice of the Case Study

For the analysis of the inquiry the single case study was chosen as the appropriate research design.⁷⁶ The case study is one way of several for conducting evaluations and research.⁷⁷ The advantages and disadvantages of a strategy in general depend on (a) the research question, (b) the control an investigator has over actual events and (c) the focus on contemporary as opposed to historical phenomena (Yin 1994:1).

Schramm⁷⁸ provides a valuable definition for case studies: *The essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or a set of decisions: why they are taken, how they were implemented, and with what result.*

Every type of empirical research should have a research design, which is “an action plan for getting from here to there” (Yin 1994:19). Yin mentions five components which are especially important; (a) the study’s question, (b) its proposition, (c) its units of analysis, (d) the logic linking of the data to the proposition, and (e) the criteria for interpreting the findings. The case study inquiry copes with technically distinctive situations, dealing with more variables of interest than data points, relies on multiple sources of evidence and benefits from the prior development of theoretical propositions, which is guiding the data collection and the following analysis of the results (Yin 1994:13).

The single case design is a common design for doing case studies. Yin (1994:39-40) says that the single-case design is eminently justifiable under certain conditions, especially if “the case represents a [...] unique case” or if “the case serves a revelatory purpose”. The general goal of the single case study is the understanding and explanation of the case. This must be reached by a detailed description, making possible further statements (Bussmann 1997:187). The following case represents a unique single-case study, according to the special conditions and circumstances within which it was developed.

⁷⁶ Yin (1994:38): He discusses four types of design: Multiple or single case study, holistic or embedded. The embedded approach involves more than one unit of analysis. Accordingly, this case study also could be seen as a slight mixture of holistic and embedded case design, because different units are involved. Clear boundaries between different strategies or designs are seldom clear and sharp.

⁷⁷ Yin (1994:1): Other strategies and ways of doing research are: experiments, surveys, histories etc., all with their own limitations. See Yin (1994:13).

⁷⁸ Schramm (1971) cited in Yin (1994:12).

6.2. Instruments of Data Collection

The main part of this single-case study is the reconstruction of the process. The present research is based on the analysis of documents, if existent and accessible and on semi-standardized qualitative interviews with experts⁷⁹ and persons involved and affected in one way or another by the project under analysis.

The vast majority of single-case studies work with qualitative search-methods. They prefer open or little structured interviews with few concerned persons or experts interpret documents and generally don't use quantitative indicators. Accordingly their method, single-case studies have often a strong descriptive touch (translation from; Bussmann 1997:200).

6.2.1. Analysis of Documents

After having defined the research frame, a reliable study of documents is important. *The analysis of documents serves the gaining of information out of existing documents. Because there is no distortion-effect to the content by analyzing the material, this method is designated non-reactive (translation from; Alemann 1995:362).* A number of documents concerning the ABS regulations in general and this case in particular have been analysed, with the exception of the contract, which is confidential.⁸⁰

6.2.2. Interviews

The interview reflects a personal opinion and therefore is a qualitative data collection method. The major concern as to the value of this kind of investigation is always “how objective are interviews” (Mieg 2001:4).

Quantitative methods are usually thought of as an easier way to collect data. *The prejudice exists, that quantitative data collection [...] are more difficult than the qualitative ones. This is wrong. Because everybody knows what a conversation is, [...] (people think that) it's possible to make interviews without previous methodical knowledge. [...]. The difficulty is, to assess if the results of an interview for a specific topic are relevant (translation from; Mieg 2001:5).*

An important point when undertaking and evaluating qualitative research is to understand the data collection as a social interaction between the research team/ person and the interviewed persons. Therefore, this process has a certain dynamic character, and the interpersonal reliability is not given (Bussmann 1997:220).⁸¹

The semi-standardised qualitative interview was chosen as interview method (Bussmann 1997: 225). This means that a semi-structured question guide was used. Nevertheless, it was adapted to particular circumstances arising during the research.

⁷⁹ Mieg (2001:6): An expert is a person with years of experience and knowledge (10-year-rule) on a specific topic/ science.

⁸⁰ The confidentiality clause is a usual custom in industry contracts.

⁸¹ See also Mieg (2001:4).

Bussmann distinguishes three different interview types: the (a) narrative interview, the (b) focused interview and the (c) problem-centred interview.

- (a) This is an inductive approach with interview-guide. The interviewing team starts the data-collection without having structured scientific concepts about the topic (Lamnek (1989:74) in Bussmann (1997:225)).
- (b) The interview guide is the result of a detailed construction of theory and hypothesis. The goal is to examine the hypothesis (Lamnek (1989:78) in Bussmann (1997:225)).
- (c) A previously defined problem leads the interview. The interviewer already screened the topic, made a documentation analysis, talked to experts and created a theoretic concept. A question-guide is leads the interview (Witzel (1985) in Bussmann (1997:225)).

For the present research, the interview type chosen is a mixture between type (b) and (c). The question guide used followed the outline of the CBD Secretariat in its basic structure, and was completed with experts' suggestions, collected during previous conversations.

The relevant interviewees in the present case study represented a wide range of interests, located in different parts of the world. Due to the time limit and other obstacles,⁸² it was not possible to interview all the persons of interest in this study. Therefore, telephone-interviews and email inquiries completed the research part. Altogether, 22 persons were interviewed or contacted for a statement (see Appendix B and H).

⁸² Due to their work load and because of the eminent Christmas season, some of the people interviewed did not have much time.

PART C – BIOLEAD PROJECT NOVARTIS-UZACHI

7. Introduction to the Case

Overview

This chapter contains the case study, following in its structure the indicative outline for benefit-sharing arrangements set up by the CBD Secretariat.⁸³ In a first step the main actors, which were directly involved, will be introduced, followed by the expected results of Novartis and UZACHI.

7.1. Oaxaca Experience

In the pharmaceutical industry, finally supported by the drafting of the CBD, there has been a growing consensus since the early 1990s for the need to share the generated benefits from bio-prospecting activities with source countries. This process of sharing can take different forms, namely: financial support; goods, services or know-how; investment in local projects e.g. for food production; capacity building for a sustainable exploitation of the forests and the development of a local timber industry, as achieved by the communities of UZACHI; as well as the establishment of alternative sources of income (production of fungi, ornamental plants etc.). The diversification of activities within a community is important to avoid any over-dependency on one particular product on the market (Novartis 1999:9). However, the acknowledgment of the rights of indigenous people and communities as owners of a pool of natural resources is very important for their future protection.

7.2. Main actors

7.2.1. *Benefit Recipients*

Unión de Comunidades Productoras Forestales Zapotecas-Chinantecas (UZACHI)⁸⁴

The recent history of the communities of the area since the 1950s is important to understand the relationship between UZACHI and their consultant ERA (see below), the appropriation of the resources by the communities, and the process of creation of a Union (more details in chapter nine).



Between 1956 and 1981, the forests of the northern mountain range of Oaxaca were exploited under the concession of a paper industry. The forests were heavily destroyed and deforestation was observed. After a difficult fight, a judge decided in favour of the communities and returned those rights for proper exploitation of their forests. At the end of the 1980s the communities La Trinidad, Capulalpam de Méndez y Santiago Xiacui (Photo 1), belonging to the ethnic group Zapoteca, and Santiago Comaltepec, belonging to the Chinantecan ethnic group, were given legal status as the “Unión de Comunidades Productoras Forestales Zapotecas-Chinantecas” (UZACHI) on September 14th,

⁸³ Not exactly, but in its general structure.

⁸⁴ This material is based on Ramírez (1999) and Chapela, F. (1999 (b)).

1989. The group consists of 950 community members, and the Union has control over 26'000 hectares of land, of which 88% are forest.



Photo 1: Community of Santiago Xiacuí

(See Photos of La Trinidad (A1) and Capulalpam (A2) in Appendix K)

An important person for both ERA and UZACHI, was Dr. Igancio Chapela. He is a microbiologist, Assistant-Professor at the University of Berkeley⁸⁵ and scientific research director of the UZACHI, and was involved when ERA started to search for possibilities to generate additional incomes for the communities. After finishing his Ph.D. in England in 1987 he went to Basel to write his post-doc, where he met Dr. Michael Dreyfuss, which later turned out to be important for the BioLead project. For both of the partners he was a person of confidence.⁸⁶ Besides his scientific knowledge, the experiences he made by participating at the INBio-Merck negotiations in the early 1990s proved to be very valuable.⁸⁷

⁸⁵ See www.cnr.berkeley.edu/chaplalab/ignacio.htm.

⁸⁶ By knowing both of the partners “personally” and being able to measure the benefits that could be generated for them.

⁸⁷ InBio is a Costa Rican non-governmental, non-profit, scientific research institute of social orientation and for the public good, created in October 1989. Merck is a research-driven multinational pharmaceutical and services company, organized under the laws of the State of New Jersey, USA. The agreement, one of the first bio-prospecting agreements at all, was signed on the 1. November 1991. See more details in; Sittenfeld and Gámez (1993:69-97).

7.2.2. External Consultancy

Estudios Rurales y Asesoría, A.C. (ERA) – Rural Studies and Peasant Consultancy⁸⁸

ERA is a non-profit Civil Organization formed by professionals concerned with the sustainable management of Mexico's natural resources, and committed to make that management a base to provide social equity to development opportunities.

ERA members are acting in Mexican rural areas at three levels. Namely (a) research, focused on agriculture and forestry management systems; (b) community work to foster the rescue and systematisation of their know-how, converting it into collectively sustainable development projects; and (c) collaboration with similar communities, as well as other civil and governmental organizations.⁸⁹



Estudios Rurales y Asesoría, A.C.

Members of the NGO ERA are working in the “Sierra Norte de Oaxaca” supporting the communities in this region since 1982,⁹⁰ initially, in the fight against the paper industry FAPATUX,⁹¹ for the reappropriation of the resources on their territory. Further, they helped the communities in designing their community structures and in establishing a sustainable management for their natural resources, namely the

establishment of a timber industry and a range of alternative products. The search and application of appropriate techniques of the cultivation and exploitation of forests, as well as the generation of know-how within the communities, were two of the main elements ERA worked on, always including the existent know-how gained by the communities over the last decades. ERA also tried to reinforce the concepts of defence of communal patrimony, which guided the mobilisation of the communities for, at least, the last 20 years.

During this time, a lot of different experiences have been made, with different approaches and different results, but with the common goal of the appropriation and control of the resources by the communities. This is considered to be extremely important, because the use and conservation of the majority of the forests, and with them a great part of the Mexican biodiversity, depends on the management of these resources by the communities (Chapela and Lara 1995:1-2). Francisco Chapela, one of the main actors at ERA, is the brother of Ignacio Chapela.⁹²

⁸⁸ Or according to Chapela (1999(a):457): Rural Studies and Farm Consultancy.

⁸⁹ www.mesoamerica.org.mx/era.

⁹⁰ Chapela, F. (1999(b):64): Founded by twelve professionals.

⁹¹ FAPATUX = Fábricas de Papel Tuxtepec.

⁹² According to Chapela (ERA, 28. Nov. 2001, personal communication), this was an important factor for the mutual trust and confidence.

7.2.3. Benefit Providers

Novartis⁹³

In a merger of the chemical and agrochemical companies Ciba and Sandoz, Novartis arose and is developing into what is described as a life science company. This is a concept by



Novartis attempting a more interdisciplinary approach by linking different elements of biology, physics and chemistry, with more specialised areas, such as pharmaceuticals, agrochemical business and consumer health, for improved and new business opportunities. This new approach also seeks to incorporate a wider consideration of the impact which technology can have on the economic, political and socio-cultural realms.

Novartis presently employs around 80'000 persons in 140 countries around the world. The sales and main business are located in developed countries, mostly North America and Europe, with only a small involvement in southern hemisphere developing countries (Novartis 1999:4).

The main actor and Project Manager at Novartis was Dr. Michael Dreyfuss. He worked at Sandoz/ Novartis from 1976 until 1998. He was the initiator of the BioLead project, which he started to design in the early 1990s. It was approved after years of internal negotiations. He met Dr. Ignacio Chapela when Chapela started to write his post-doc at Novartis Basel, after having finishing his Ph.D. in England in 1987. According to Dreyfuss they had a good relationship and intense discussions about the bio-prospecting issues.

Figure 2 depicts the relationships between the stakeholders of the Novartis-UZACHI BioLead agreement.

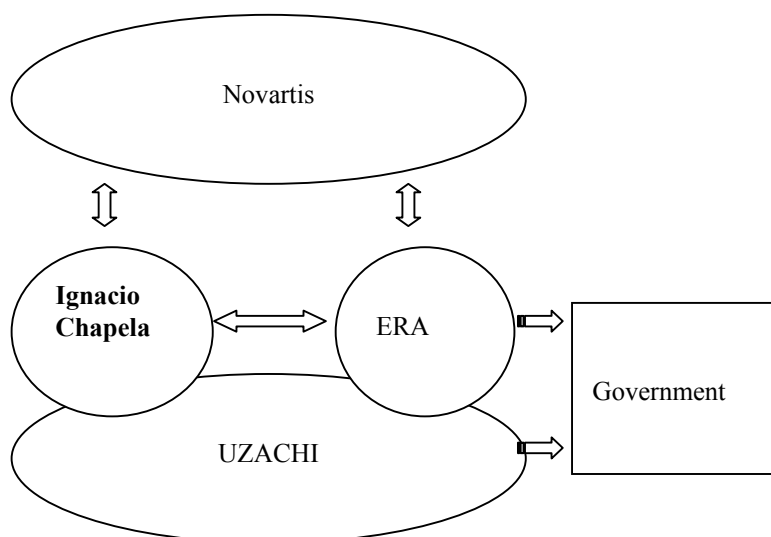


Figure 2: Flow-scheme of the relationships between the stakeholders.

⁹³ Sandoz initiated this project, but with the merger of Ciba and Sandoz in 1996, the new pharmaceutical giant Novartis was created. During the present research, the PI will be called Sandoz until 1996 and Novartis from then on. See www.novartis.com.

Position on Bio-prospecting and Benefit-sharing

Sandoz AG, the former pharmaceutical industry, declared to have realized bio-prospecting only according to legal agreements.⁹⁴ Soon after the CBD came into being, Sandoz adopted a bio-prospecting policy which agreed with the Convention. This policy was followed strictly, even though in most countries detailed rules and legal requirements did not then exist, and often still do not exist today. Their activities also include capacity development in countries, which needed such assistance, with the hope to establish additional cooperation with independent development organizations on a case by case basis in the future. According to Strub and Petersen, Novartis is ready to share the benefits derived from future products based on bio-prospecting activities with future generations of providers, according to the CBD and the legal requirements derived thereof. They argue that it is almost impossible to hide the origin of the compounds once a new product reaches the market, and, on the other hand, there is no incentive to do so, because the image-damage for Novartis would be tremendous. Novartis claims to act according to the ideas and requirements of the Convention, and to contribute to their implementation.⁹⁵

7.2.4. Others

Government

The Secretary of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales – SEMARNAT)⁹⁶ unifies all the existent departments of federal environmental management. The Sub-Secretariats are the central motors of the environmental management, supported by five decentralised institutes, which include the key institutions for handling the ABS issues. Namely, the National Institute of Ecology (Instituto Nacional de la Ecología – INE), the Federal Attorney General for the Protection of the Environment (Procuraduría Federal de Protección al Ambiente – Profepa), which played an important role in the UNAM-Diversa case, and the National Commission for Knowledge and Use of Biodiversity (CONABIO – Comisión Nacional para el Conocimiento y Uso de la Biodiversidad).

The only task of the government in the presently studied case was to issue the permit to export the samples collected in the area.⁹⁷ Besides that, the government observed the negotiations of the contract. Further, ERA periodically informed them about the current state of negotiations.⁹⁸

⁹⁴ According to Dreyfuss (Ex-Novartis, 14. Jan. 2002, personal communication), only few bio-prospecting agreements existed before 1992 (one was the Merck-InBio agreement). He carried out several collection expeditions between 1976 and 1989 for Sandoz.

⁹⁵ Strub (Novartis), 11. Jan. 2002, personal communication and Petersen (Novartis), 25. Jan. 2002, telephone-interview.

⁹⁶ See Appendix I, for the structure of SEMARNAT. The delegate of SEMARNAT in Oaxaca since 1994 is Dr. Salvador Anta Fonseca.

⁹⁷ According to Pérez (UZACHI, 5. Dec. 2001, personal communication), the permit for all the samples sent to Switzerland had to be obtained only once, at the Federal Office for Wildlife at INE.

⁹⁸ Anta Fonseca (SEMARNAT), 5. Dec. 2001, personal communication.

Ford Foundation

The Ford Foundation, founded in 1936, is an independent, globally active, non-profit, non-governmental organization. In Oaxaca, within their environment and development program, they are fostering communitarian forestry projects and supporting innovative mechanisms for the generation of benefits from natural resources.⁹⁹ ERA is one of the organizations receiving funding from Ford for their activities.¹⁰⁰

For the case itself, Ford Foundation was not of great importance, because they were not involved in nor fostered bio-prospecting activities. This topic was discussed when problems between ERA and Ceccam (Centro de Estudios para el Cambio en el Campo Mexicano) emerged.¹⁰¹ Both receiving funds from Ford. ERA was attacked retrospectively by Ceccam for their role in the BioLead case, which they considered biopiracy. The forum about biopiracy and bio-prospecting November 8th, 2000, organized by Ceccam and funded by Ford, intended to calm down the conflict and make some proposals for further procedure. No agreements could be achieved.¹⁰²

7.3. Type of ABS Agreement and Expected Results

In August 1995 the contract, basically a Material Transfer Agreement (MTA) between UZACHI and Novartis, was signed. In the same year the technology and know-how transfer was realized.

7.3.1. UZACHI

One of the core elements of the Biolead Project in Mexico was to set up a communal forest culture project together with UZACHI. One of the principal aims of the project was, that the benefits resulting from a bio-prospecting agreement, according to the CBD could be shared in a new type of relation, namely, the community-industrial partnerships (Novartis 1999:9).

The principal aims of the project for the communities of UZACHI were:

- To support community autonomy and self sufficiency;
- To maintain cultural values;
- To seek to internalise the environmental costs of the use of natural resource use;
- To develop specific projects, aiming to maintain biodiversity.¹⁰³

The goal was to strengthen the appropriation of the communal resources; establish a non-extractive use of the protected areas; and to search possibilities to generate and diversify their product range and their income.

Novartis supported this project by providing environmental education and technical training on biodiversity assessment. The technical capacities obtained have been used to develop a

⁹⁹ www.fordfound.org

¹⁰⁰ Dueñas (Ford Foundation), 18. Dec. 2001, personal communication: Further Foundations working in Mexico are McArthur, which is leaving Mexico soon; Hewlett, which gives funding to big and well structured organisations; Packard, with geographical areas of importance (biodiversity rich areas); Kellogg, which is involved in agricultural questions; Rockefeller; and a host of smaller ones.

¹⁰¹ www.ceccam.org.mx.

¹⁰² Anonymous (2000 (b)).

¹⁰³ Generate the know-how to set up own prospecting projects.

regional project for the production of fungi. The lessons learnt through that local project, helped to promote the organisations of projects along similar lines within other communities in the region (Novartis 1999:10).

7.3.2. *Novartis*

Novartis Pharma regarded the project as an ecological approach with the following main goals:

- To evaluate or prove a scientific concept;
- To maintain a project in a manner which fully adheres to the requirements of the CBD;
- To ensure the supply of microbial strains for lead findings.

The BioLead project was designed to reveal possible correlations between chemical diversity, creativity of micro-organisms and ecological factors, as well as to develop a more structured approach in bio-prospecting, agreeing with the CBD requirements. A more open and collaborative company strategy was aimed for, including the exchange and sharing of technology and knowledge as a means to increase the benefits arising from bio-prospecting for all partners involved (Novartis 2000:6).

Scientific Concept

Since the onset of microbial screening programs in 1940, millions of micro-organisms have been screened by dozens of PI. There it became obvious that certain taxonomic groups of micro-organisms are more productive than others. Fungi like *Aspergillus*, for example, are known to produce many different secondary metabolites, whereas yeast seems to be uncreative.

Several publications have shown that only few of the existing microbiological species have been isolated, described and screened until now. For example, of the estimated 1.5 million species of fungi existing worldwide, around 70'000 have been described, suggesting that a large number of micro-organisms remain to be isolated and screened for their metabolite potential. Up to now, a large gap exists in scientific knowledge regarding the underlying correlations between micro-organisms, their ecology and potential for biochemical use. It is still uncertain whether, (a) particular habitats or climates harbour a higher proportion of creative micro-organisms, (b) biological diversity directly correlates with metabolic creativity of micro-organisms present in a particular habitat, and equates to a greater potential, and (c) if other unknown ecological factors might demonstrate certain relationships with metabolic creativity (Novartis 1999:7).

Adherence with the CBD

The used approach of exchange and sharing of knowledge, capacity building, collaboration between the government and the local community,¹⁰⁴ technology transfer and benefit sharing was designed for the BioLead Project to examine such correlations. The collection of samples

¹⁰⁴ Not in Mexico, but in Panama and India.

took place mostly in undisturbed and protected areas, and at the same time local research projects were supported and promoted (Novartis 1999:7).

Microbial Strains for Lead Finding

Drug R&D is a labour intensive, time-consuming and increasingly expensive process.

Novartis (1999:7) estimates that it takes an average of 11.5 years from the point of discovery of a substance until the time of its introduction to the market. This is a long period for an industry usually dealing with short term processes (in economic terms). Such a product would cost approximately US\$ 500 million.

Today, the microbial culture broth extracts enter the discovery process today by the high-throughput screening, where 100'000 samples per assay are analysed. Most are represented by crude microbial culture broth extracts; others are pure, mainly synthetic compounds and combinatorial libraries (Novartis 1999:7).¹⁰⁵ The objects of interest in this case were micro-organisms, exclusively, especially micro-fungi, which are considered to be very creative, and still show a great potential for discoveries, as they have not been much investigated.

The CBD at this time was still very young but taken into account by both partners. A contract term clearly stated, when it was sent to Mexico for revision, that the national law and the CBD regulations had to be considered.¹⁰⁶

¹⁰⁵ See chapter 13 for more details about the processing of micro-organisms.

¹⁰⁶ Strub (Novartis), 11. Jan. 2002, personal communication.

The tempered forests of Oaxaca, in general, have a high biological productivity. The timber growth is around 10 m³/ ha and year, the rotation period is between 40 and 60 years and the regeneration is quit easy.¹⁰⁸

8.2. Ecosystem

8.2.1. Mexico and its Mega-Biodiversity

The biodiversity of species is not distributed uniformly over the planet. In general, the tropical regions contain the biggest proportion of biodiversity in the world, mostly concentrated in rain forests. 50-80% of biodiversity is localized in 6-12 countries. The seven mega-biodiverse countries of the world are Brazil, Colombia, Mexico, Congo, Madagascar, Indonesia and Australia.

Mexico accommodates between 8-12% of the species of the planet. It occupies the first place concerning reptiles, the second in terrestrial mammals and the fourth in amphibians. Some plants reach the maximum diversity in Mexico itself like the family of Cactaceae, of the 900 Mexican species of Cactaceae, 687 are endemic. Of the genera Agavaceae, 375 species are known in America, of which 81% grow in Mexico, and 68% exist there exclusively.

Nevertheless, in Mexico, as well as in other countries with high biodiversity, there is an elevated proportion of species and ecosystems in danger (Challenger 1998:34-37).

Mexico's high biodiversity is due to its geographic position, where different bio-geographic regions meet, producing an increased diversity of microclimates, species and wild plants. For all these reasons, Mexico is considered as a centre of diversification. The southern region of Mexico and Centro America was once a centre of plant and animal domestications. Additionally, the first classification and publication on the use of the wild plants for medical, alimentary, agronomical and other purposes is Mexican (Barreda 1998:1-2).

Ecosystems in Oaxaca

The ecological zone of importance in the mountain range of Oaxaca is characterised by its tempered sub-humid climate, containing various types of vegetation. There are remarkable season's changes. The winter is cold and it rains little or not at all, while summer is hot and humid. Pine-oak forests are very typical for this zone, and are ecosystems very rich in species (see Table 8, Photo 2, and Photos A4-A7 in Appendix K).

It is the primary diversity zone for pine in the world, and an important region in the western hemisphere for diversity of oak. Both of these tree types belong to the economically most

Table 8: Main types of forests in the Sierra Juárez in Oaxaca

- Pure oak forest
- Pure pine forest
- Mixed oak-pine forest
- Forests of oyamel

Main tree species: *Pinus patula*, *P. pseudostrobus*, *P. chiapensis*, *P. ayacahuite*, *P. tecunumanii*, *P. quadrifolia*, *Qercus mexicana*, *Q. crassifolia*, *Q. laurina*, *Q. emoryi*, *Q. clivicola*, *Q. cupreata*, *Abies religiosa*, *Alnus jorullensis* etc.

Further types in this zone:

- Scrub of *Pinus culminicola*
- Forest of *Juniperus*
- Scrub of *Juniperus*
- Forest of *Pseudotsuga* and *Picea*
- Forest of *Cupressus*
- Forest of *Alnus*

Challenger (1998:520)

¹⁰⁸ Torres (UZACHI), 4. Dec. 2001, personal communication.

important species in tempered forests. Opposing the relatively low diversity in general in the canopy, the forests of the Sierra Norte of Oaxaca exhibit a comparatively high biodiversity in the herb and shrub level.

Pines are not only the principal species dominant in primary forests, they also represent the pioneering species predominant after natural or anthropological perturbations have taken place. The pine-oak forests regenerate relatively fast, which is very important for the economic situation of the communities living on timber production. Therefore, these ecosystems are considered to be comparatively resistant to human influence, as long as the anthropological impact is not as intense as to radically alter the characteristics of the ground and destroy the local sources of small plants and seeds, indispensable for the regeneration of the forest.



Photo 2: Pine-oak forest in Comaltepec

The main threats and reasons of destruction of these ecosystems have been the incremental unsustainable exploitation of forests, the conversion of land for agricultural purposes, and its extensive use for cattle-raising. On the other hand, the protected regions have often served as recreational areas and thus have been destroyed (Challenger 1998:520). In 1982, when the communities in the Sierra Norte of Oaxaca reclaimed the property and exploitation rights of their forests, most of them established a management and usage plan for the community land. In 1992, the communities of UZACHI employed a forest engineer and several technicians to manage this resource adequately. Today the communities derive their main income from their timber industry and related products. Their communal management plan defines the

productive and the protected areas for the conservation of the natural resources (timber, watershed protection etc.).

However, Novartis was interested in micro-fungi, considering them to have a high potential of creativity concerning the secondary metabolites (Table 13). The reason why UZACHI was chosen by Novartis as partner for the project was its high diversity in the realm of fungi, associated with the high diversity of pine species. The research question was to investigate the relationship between the perturbation of the ecosystems and the production of secondary metabolites in micro-organisms (Table 15). In general, micro-organisms and micro-fungi seem to have a great potential for the further discovery active substances. Drs. M. Dreyfuss and I. Chapela worked together on this subject in the early 90s.¹⁰⁹

8.3. Institutional and Organizational Structure

8.3.1. Property Rights System in Mexico

The clear definition and strengthening of property right in natural areas is a basic condition for an adequate management. In Mexico public, private, ejidal and common property can be distinguished. The differences between communities and ejidos are listed in the following Table 9:

COMMUNITIES	EJIDOS
Characteristics	
<ul style="list-style-type: none"> Men, born in a particular community, have the right to participate at the age of 18 (up to now only men) 	<ul style="list-style-type: none"> A fixed number of persons with the right to participate This right is passed on to the following generation within the family
Advantages	
<ul style="list-style-type: none"> The whole community is involved in the decision making process. The decisions are supported by the whole community 	<ul style="list-style-type: none"> Only a limited number of persons is involved in the decision making process (generally shorter decision-making process). The rights over the resources are based on fundamental titles
Problems	
<ul style="list-style-type: none"> The territory cannot be divided, sold or rented 	<ul style="list-style-type: none"> The owners of these rights are mostly old people. There is not much, renovating energy The state concedes them less rights Provokes exclusion Generally more conservative

Table 9: Comparison of the characteristics of communities and ejidos (Merino (UNAM), 23. Nov. 2001, personal communication)

Both systems divide the land in two ways, namely, a private plot, where the personal needs can be satisfied and a common territory. The possibilities of cooperation always depend on the people, not the system. Generally they are more conservative in “ejidos”. In both systems no women were allowed until now.

¹⁰⁹ Dreyfuss and Chapela, I. (1994:51ff.).

8.3.2. Communitarian Structure¹¹⁰

The indigenous communities of Oaxaca are owners of more than 90% of the forests of the state. This opens interesting perspectives for the management of natural resources. Mostly they maintained their traditional form of organization, the collective participation in the use of the resources and their relations of confidence and reciprocity. The productive systems are mostly a mix of external techniques and communitarian practices (SEMARNAP 2000(a):172).

UZACHI has developed a private strategy in the regulatory framework of property rights their communities. Through the association, supported by a technical team, the efficiency of the management of communal natural resources is beyond the possibilities of individual communities or family units (Chapela, F. 1999(a):456).

At the base, the family unit is responsible for daily activities (Figure 4). The family unit takes decisions concerning their plot, such as the intensity of soil use and other activities on their own land. According to Francisco Chapela (1999(a):455), these basic family unit decisions are very important for the maintenance of phyto-genetic resources. Several families may gather and exercise control over a specific territory, organized in a community to take decisions at a higher level than the family unit. After the agricultural revolution at the beginning of the last century, Mexico's organized communities enjoy legal recognition of property ownership. This ownership of land permitted them to establish an appropriate use and management of their land by defining limits of agricultural, forested and protected areas.

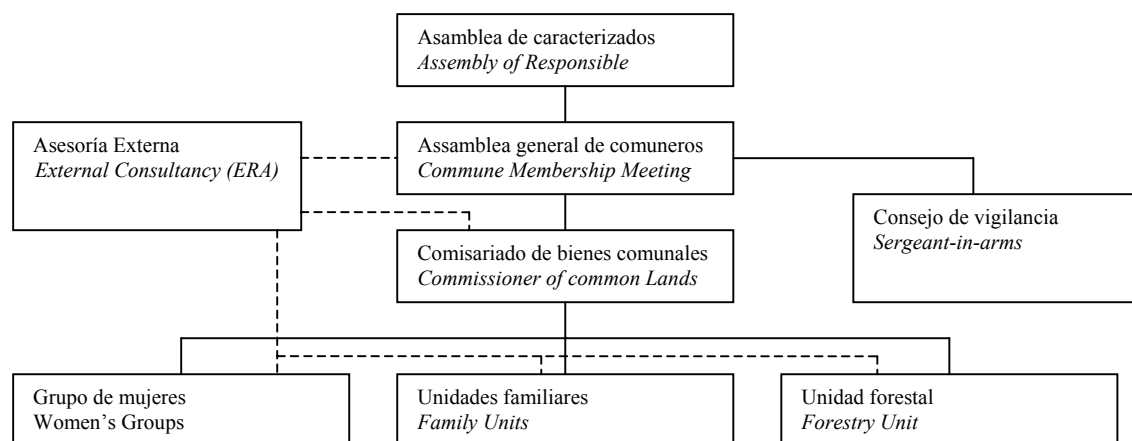


Figure 4: Structure of communities (drawn from Chapela, F. 1999:455).

Each community creates a separate assembly and has its own commission of revision, as well as an administrative council. According to agriculture law, all men above 18 can participate at the assemblies. Comaltepec counts with 400 “comuneros”¹¹¹, Capulalpan with 360, Xiacui with 200, and the smallest community, Trinidad, with approximately 180. Altogether they build the *Commune Membership Meeting* (Asamblea General de Comuneros – AGC). The

¹¹⁰ See also; Chapela, F. (1999(b):31-36).

¹¹¹ Merino (UNAM), 23. Nov. 2001, personal communication: A registered community member with the right to attend the assemblies (men, above 18 years).

AGC is a fundamental element in the social structure of the communities. Another basic element is the *Commissioner of Common Lands* (Comisariado de bienes comunales) as legal representative of the communitarian territory and support manager for governmental programs (SEMARNAP 2000(a):172). Each community counts with a forest management plan for ten years, upon which all the activities are based.¹¹²

8.3.3. *Structure of UZACHI*

Each community elects four delegates or representatives for the *Representatives' Meeting*, which is formed by 16 members (Figure 5). The representatives are elected within the communities. This is the first instance to discuss projects, collect and prepare the appropriate information for the AGC to take decisions.

The *Board of Directors* (Consejo de Administración) is formed by a president, a secretary and a treasurer. Their job is to prepare and lead the AGC, represent the Union, design plans of production for each agrarian nucleus, present the budget for discussion and approval, submit the operational plan to the decision of the AGC, set up a program for financing and investment, issue internal rules etc.

The *Sergeant-in-Arms* (Consejo de Vigilancia) is also built up by a president, a secretary and a treasurer. Their job is to supervise the incomes and expenditures, as well as the operational working plan and the organisation, to supervise that the approved credits are converted in accordance to the solicited decision, to supervise the budget, to correct errors etc.

In general, persons with an official task within the communities cannot be re-elected until at least one period has passed, each period having duration of three years. The election is valid when at least 2/3 of the “comuneros” in the AGC vote for a person or approve a project. All the official positions are honorary positions.

¹¹² Ramírez (UZACHI), 12. Dec. 2001, personal communication.

The following figure depicts the structure of UZACHI and their main projects:

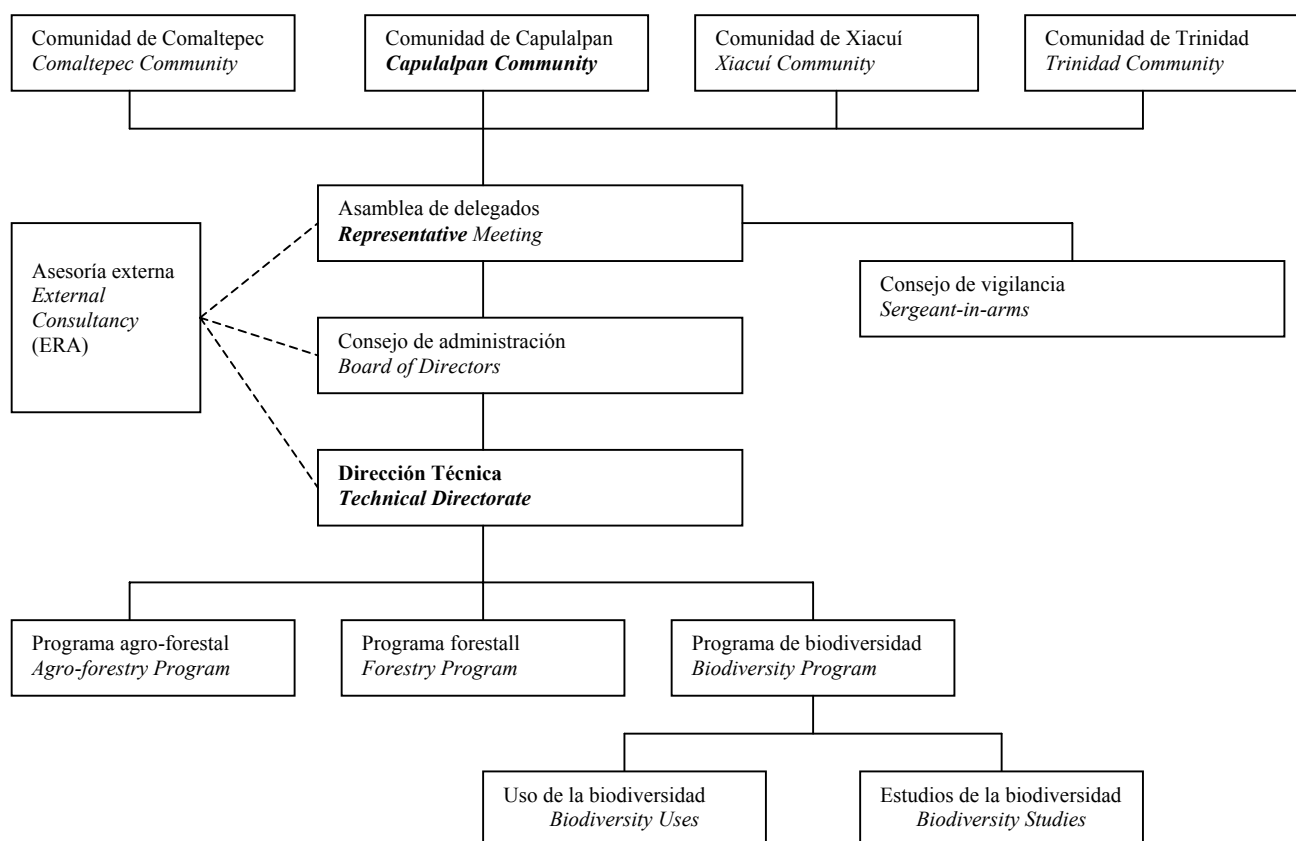


Figure 5: Structure of UZACHI (drawn from; Chapela, F. (1999(a):456))

The technical team of UZACHI, an important link between the communities, is made up by two forest engineers¹¹³ (responsible for the forest management), one engineer in biology (responsible for the ornamental plants), one engineer in agriculture (Lilia Pérez, responsible for the laboratory), four forest technicians, eight communitarian technicians for the projects (including two working in the laboratory), one technician for the promotion, a secretary and four residents. The residents are students from the communities, making a voluntary stage of one semester (without salary). Though there are 18 persons receiving their salary from UZACHI, their positions are related to the priority areas of the Union, namely, the management of the forests, training and organization, protection, promotion and investigation.

The constitutional act¹¹⁴ distinguished three different forms of assembly. The ordinary assembly or AGC, meeting monthly, the extraordinary assembly, meeting in extraordinary situations, and the assembly, which makes the program and the budget at the end of the year or at the end of the productive period.

¹¹³ Ing. Ricardo Ramírez worked for UZACHI from 1992 until 2001. The reorganization created two positions for forest engineers.

¹¹⁴ Acta Constitutiva de la Union de Comunidades Productoras Forestales Zapotecas-Chinantecas de la Sierra Juárez.

As mentioned before, there are no women allowed in the assemblies, as a long-term consequence of the agrarian legislation which can be considered “machista”, meaning chauvinistic. The agrarian law says that the family has to be represented in the assembly by the representative, who generally is the man or the eldest son of the family. Nevertheless, in the activities of the Union the women are involved as forest technicians, as workers in the laboratory (exclusively managed by women), for the cultivation of ornamental plants etc., thus playing an important role.

Due to the confidential relation between ERA and UZACHI, ERA does have an indirect influence on the decision making process by the kind of information provided. Also to mention are the good relations of the UZACHI to official institutions like SEMARNAT.¹¹⁵

Joining UZACHI – Other communities are allowed to apply for joining the Union. The general assembly decides whether to include other communities or not. Substantial is a good relationship between the communities and the interested party. If they are ready to adopt the UZACHI guidelines and standards, permission to join should be granted.¹¹⁶ Francisco Chapela argues that UZACHI, with its 26’000 ha and four communities, still has potential to grow, but according to experience, there are limits related to the size and homogeneity of a Union. According to him, if a Union in this area with the existent conditions (communal structure, ethnic differences etc.) surpasses 100’000 ha, it reaches the limit of governability. The decision making process and the achievement of agreement becomes difficult if too many communities are involved.¹¹⁷

8.4. Biodiversity Prospecting in Mexico

To understand the context of the debate about ABS terms and bio-prospecting, it is important to become acquainted with the three known recent bio-prospecting agreements in Mexico besides the Novartis-UZACHI contract.

The debate in Mexico was raised at the end of 1999 with accusations against the UNAM-Diversa case by different social and environmental organisations¹¹⁸, led by Dr. Alejandro Nadal (Colegio de México). They stated that the contract violates the federal environmental law and considered the benefits ridiculous,¹¹⁹ whereupon a “Denuncia Popular”, a popular denouncement, was placed at the Profepa.¹²⁰ In the following discussions two positions were established from the beginning. The ones who were totally against bio-prospecting activities,

¹¹⁵ Ramírez (UZACHI), 12. Dec. 2001, personal communication.

¹¹⁶ Luna (UZACHI), 8. Dec. 2001, personal communication.

¹¹⁷ Chapela (ERA), 10. Dec. 2001, personal communication.

¹¹⁸ Chapela and Massieu (2001:19): Greenpeace, Asociación Nacional de Abogados Democráticos (ANAD), Grupo de Estudios Ambientales, A.C. (GEA), Unión Nacional de Organizaciones Regionales Campesinas Autónomas (UNORCA), Red de Permacultura México, Centro de Estudios para el Cambio en el Campo Mexicano (CECCAM), Coordinadora Ciudadana en Defensa del Patrimonio Cultural y Natural. Basically all of them are not gladly seen by UZACHI because of the later attacks.

¹¹⁹ Chapela and Massieu (2001:18): US\$ 50 for each sample, US\$ 5000 for equipment used for the collections and between 0.3 and 0.5% of the royalties of derived products.

¹²⁰ Profepa (2000): “Denuncia Popular” against INE, CONABIO and UNAM at the 7. June 2000 as well as the Recommendation of the Profepa (Procuraduría Federal de Protección al Ambiente), applying Art. 189 LGEEPA.

considering them biopiracy, and the on other side a group, mainly persons from “practice” and representatives of governmental institutions, who tried to find a solution by proposing a pragmatic conflict-resolution process.¹²¹ The following discussion concentrated primarily on the first two of three cases, namely, the UNAM¹²²-Diversa¹²³, ICBG¹²⁴-Maya and ICBG-Zonas Aridas agreement (more information about these cases in is the Appendix J). Table 10 provides a short comparison of the four projects.

Basically, these contracts did not have any direct influence on the conclusion of the BioLead project, but by raising the discussion retrospective accusations against UZACHI, ERA and Novartis emerged.

	UNAM-Diversa	ICBG-Maya	ICBG-Zonas Aridas	BioLead
Property	Public	Common	Almost no information available	Common
Material	Bacteria	Traditional knowledge, medical plants		Microfungi, micro-organisms
PIC	No	No		Yes
Benefit	Considered ridiculous	Considered ridiculous		Communities are satisfied
Comment	Strong opposition, project cancelled	Strong opposition, project cancelled		No opposition within the contract period, contract concluded. Retrospective accusations

Table 10: Short comparison of the four bio-prospecting projects that were recently discussed

8.5. National Legislation¹²⁵

There is no specific law or regulation in Mexico solving the problems of access and sharing of the benefits generated by the use of genetic resources. A parliamentary group of the “Partido Acción Nacional” (National Action Party – PAN) considers the present constitutional framework as very favourable for the implementation of the CBD, which was ratified by Mexico in 1993 (PAN 2000:1). In May 1997, the first seminar on this topic was organized by the CONABIO and the Environmental and Natural Resource Commission from the Republic’s Senate (Torres 1998:1).

The protection and preservation of biodiversity is described implicitly by the following terms: use, natural elements and resources. This is applicable to genetic resources. They are considered to be an “intangible resource”. However, they are still natural resources (PAN 2000:2).

¹²¹ This constellation became very clear in the forum about bio-prospecting and biopiracy (Anonymous 2000 (b)).

¹²² Universidad Nacional Autónoma de Mexico.

¹²³ For further information look: www.diversa.com.

¹²⁴ International Cooperative Biodiversity Groups. For further information see; <http://www.ag.arizona.edu/OALS/ICBG/publications/aspectos/contenidos.html>.

¹²⁵ See www.mexico.gob.mx, www.ine.gob.mx, www.conabio.gob.mx and www.semarnat.gob.mx under “normatividad”, translated by the author from Spanish to English.

The following frameworks are important concerning the use and access to genetic resources:

- Political Constitution of the United States of Mexico (Constitucion Política de los Estados Unidos Mexicanos)
- General Law of Ecological Equilibrium and Environmental Protection (Ley General de Equilibrio Ecológico y Protección al Ambiente – LGEEPA)
- Industrial Property Law (Ley de Propiedad Industrial)
- BELEM Declaration (Declaración de BELEM)
- Initiative for a Law to regulate Access and Use of Biological and Genetic Resources (Iniciative de Ley para el Acceso y Aprovechamiento de los Recursos Biológicos y Genéticos)

8.5.1. *Political Constitution of the United States of Mexico*¹²⁶ (Constitución Política de los Estados Unidos Mexicanos)

Art. 27 The property of the land and water within the national boundaries belongs to the nation, which has the right to transmit the property of it to individuals to build private property. [...]. The nation, all the time, has the right to impose upon the private property modalities, which are dictated by the public interest, such as the regulation, for the social benefit, of the use of natural resources susceptible to appropriation, with the object to make an equitable distribution of the public wealth, protect the conservation, reach the balanced development of the country and the improvement of the conditions of life of the rural and urban population.

Fracción VII The jurisdictional personality of ejidos¹²⁷ and communities is recognized, as well as their property rights over their land, for settlement purposes as well as for productive activities. The law protects the integrity of the land of indigenous groups. The law, considering the respect and strengthening of communitarian life, protects the land for human settlements and regulates the use of the land, forest and water of common use, and the provision of the necessary promoting actions to elevate the standard of living of its inhabitants. [...]; the law also establishes the prerequisites and proceedings, based on which the general assembly of the ejidos draws up the power of the ejidatario¹²⁸ over his plot of land.

According to this article the government can impose private property modalities on the use of natural resources, at any time, if this is of public interest, already mentioning the equitable distribution of the public wealth. On the other hand, it grants the integrity of the land belonging to indigenous groups and communities. However, as long as the state does not regulate otherwise, the resources belong to the land owners.

8.5.2. *General Law of Ecological Equilibrium and Environmental Protection*¹²⁹ (Ley General de Equilibrio Ecológico y Protección al Ambiente – LGEEPA)

The LGEEPA is the federal environmental law serving as a frame for other laws that complement and regulate environmental protection and the control of natural resources in Mexico. It was revised in 1996 and addresses the use and handling of biodiversity and genetic

¹²⁶ The following article is drawn from Anonymos (2000 (a)). No official translation.

¹²⁷ Form of management of common property (see above).

¹²⁸ Member of an ejido-based property system.

¹²⁹ Material drawn from http://www.semarnat.gob.mx/legislacion_ambiental/index.shtml/.

resources in the chapter “Wild Flora and Fauna” (Título Tercero) within the Articles 79 until 87bis2. It also provides some basic terms concerning ABS issues. The most important articles are Article 85 and 87bis:

- Article 79 For the preservation and sustainable exploitation of the wild flora and fauna, the following criteria will be considered:
- VII – The promotion and development of investigation on wild flora and fauna, as well as genetic materials, with the objective to know their scientific, environmental, economic and strategic value for the nation.
- Article 85 When required for the protection of species, the Secretariat will promote the total or partial establishment of regulations or restrictions, before the Secretariat of Commerce and Industrial Development (SECOFI), for the import and export of wild flora and fauna specimens, and will impose the necessary restrictions for the circulation and/or transit of wild species of flora and fauna proceeding from, and with destination to a foreign country (Torres 1998:4).
- Article 87 The collection of species of wild flora and fauna, as well as other biological resources for scientific research, requires the authorization of the Secretariat, and will be submitted to the terms and formalities of official Mexican norms, as well as other applicable commandments. In every case, the public must be guaranteed access to the research results. Such authorization will not protect the exploitation for biotechnological aims, which is submitted to Art. 87bis (Torres 1998: 4-5).
- Article 87bis The exploitation of species of the wild flora and fauna, as well as other biological resources with the aim to be used in biotechnology, requires the authorisation of the Secretariat.
- The authorisation, referred to in this article, will only be given if the prior informed and expressed consent is obtained from the legitimate owner of the property where the biological resources are found.**
- Also such legitimate owners have the right to an equitable sharing of the benefits, now or in the future, being derived from the exploitation referred in this article, adapting to applicable jurisdictional dispositions.**
- The Secretariat and other competent dependencies will establish the necessary mechanisms for the exchange of information about authorization or resolutions relative to the exploitation of biological resources for the aims referred to here.

Among the measures established by the LGEEPA to protect the wild flora and fauna, Article 87bis is the most important concerning PIC, access, and use and benefit-sharing of genetic resources, which were incorporated by the modifications of the law in 1996. This article includes the basic principles of the CBD. Nevertheless, this topic and its terms, like “PIC”, “equitable” and “mutually agreed”, are far from being exactly defined (Brañes 2000:308-309).

- Article 189 All persons, social groups, non-governmental organizations, associations and societies can denounce at the Profepa or other authorities any fact, act or omission, which can produce or produces ecological imbalance or damage to the environment or natural resources, or contravenes the dispositions of the present law and other orders, which regulate related material, linked to the protection of the environment and the preservation and restoration of the ecological balance. (...).

This article was employed to challenge the UNAM-Diversa agreement (Profepa 2000:19-20).

8.5.3. *Industrial Property Law* (Ley de Propiedad Industrial)

Basically, Article 16 points out that all biological or genetic material found in nature, such as animal breeds, animals, the human body and the living parts composing it, as well as plant varieties, cannot be patented. Nevertheless, it doesn't mention transgenic species. On the other hand, Article 19 denies the possibility of patenting ancestral knowledge, because it is not innovative and, therefore, not invention (Torres 1998:5).

8.5.4. *BELEM Declaration* (Declaración de BELÉM)

This is an Ethics Code for Research, Collections, Data Bases and Publications (Código de Ética para la Investigación, Colectas, Base de datos y Publicaciones).

According to point ten, no member of the International Society of Ethnobiology or allied organizations should conduct any research, collection, data bases and publications with information or material received from any community, which ask for a moratorium concerning this topic (Anonymous (2000(b)) and Stoll (2000:323)). This voluntary declaration is similar to the International Code of Conduct for Plant Germ-plasm Collecting and Transfer, presented above.

8.5.5. *Initiative for a Law to regulate Access and Use of Biological and Genetic Resources*¹³⁰ (Iniciativa de Ley para el Acceso y Aprovechamiento de los Recursos Biológicos y Genéticos)

This initiative was presented to the Senate on April 26th, 2001 by the PAN, headed by Senator Jorge Rubén Nordhausen González, as a continuation of the work initiated at the legislative period LVII. At this time Dr. Luis H. Alvarez was the President of the Commission of Environment and Natural Resources (governing period of President Salinas, 1994-2000).¹³¹

The PAN considers that “*against the inadequate utilisation and indiscriminate extraction of biological resources for one's own and alien needs, vigorous and urgent actions are demanded.*” They also recognize that, concerning the regulation of ABS problems linked with genetic resources, “*one of the most important limitations is the absence of an adequate legal frame, which promotes the conservation of the species, regulates access to genetic resources and recognises, just like the CBD does, the sovereignty of the country over the inhabitant genetic resources*” (PAN 2000:1).

The absence of regulations provides ideal conditions for the ongoing illegal removal of biodiversity. Thus, a legal frame, as already mentioned, is urgent to permit a sustainable use and to prohibit the illegal extraction of genetic resources.¹³²

¹³⁰ Text on <http://www.jorgenordhausen.com/leyrecgenbio.html>.

¹³¹ Senator Nordhausen, 17. Jan. 2002, E-Mail.

¹³² Chapela (ERA), 30. Nov. 2001, personal communication.

In the articles 8, 9, 15, 16, 17 and 19, the CBD establishes the responsibilities of the signatory countries to determine legislation for access to and use of genetic resources, some important conditions being explicitly expressed in Art. 15.

The project of law has three titles; (1) General Dispositions, (2) Access and Use, and (3) Infractions and Violations. The most important virtues of this project of law are:¹³³

- It is the most complete law proposed on this topic, because it develops all involved aspects in detail, and introduces new suggestions related to the development and transfer of technology;
- It applies experiences of other mega-biodiverse countries in the elaboration and implementation of an access law to genetic resources;
- It was elaborated with a multidisciplinary focus, taking in account the experience of the experts on this subject;
- It facilitates access to genetic resources but, at the same time, accepts the sovereignty of the Mexican Nation over their resources, and the resources of the “pueblos indígenas”¹³⁴ and local communities;
- It fixes terms, conditions and procedure to allow access to genetic resources;
- It determines the minimal benefits which activities of access have to leave to the country and the indigenous and local communities, and, at the same time, allows a broad range for the negotiations of specific conditions in the contracts;
- It specifies the rights which are protected by the proper law in favour of indigenous and local communities, who are recognised as the owners of their resources and knowledge, to participate in the derived benefits from the investigations realized with genetic resources subject to access;
- The obligations of the involved institutions in the access of genetic resources are pointed out;
- It establishes sanctions for subjects violating the law.

This proposal of law could be the first step towards an appropriate regulation of the ABS issues. If accepted, it will be to the advantage of the resource owner, and a support in their efforts of nature conservation. Senator Nordhausen hopes that the law will be approved by the Senate this year.

¹³³ Drawn from PAN (2000:5).

¹³⁴ Pueblo Indigena = all the indigenous people belonging to the same ethic group.

9. Process for Establishing the Arrangement

Overview

This chapter will present a picture of the communitarian history of UZACHI, their relationship to ERA, and a detailed description of the establishment of the agreement with Sandoz/ Novartis. The chapter is divided in the time periods presented in Table 11, below.

9.1. Historical Background of UZACHI¹³⁵

UZACHI - The initial mission of the communities of the later UZACHI in the Sierra Norte de Oaxaca was the fight against the Paper-Industry FAPATUX (Fábricas de Papel Tuxtepec), to gain back the control over the community forests. The old agrarian law recognized the rights of the indigenes communities over their land and forests. Until the 1950s, the communities basically practiced domestic forest exploitation. The timber was used to build houses, to produce carbon, and as fuel. In 1947 the forest law was reformed. The new law allowed the government per presidential decree to issue concessions for timber exploitation to private companies (SEMARNAP 2000(a):17).

Table 11: Structure of Chapter 9

(for more details see Table of Dates in Appendix G)

Historical Background of UZACHI

Period 1: 1986-1992;	Appropriation of the Resources. Search for possibilities to diversify their income, establishment of the communitarian land management plan and the communal timber industry
Period 2: 1992-1994;	Design of the BioLead Project and Transfer of the Basic Information
Period 3: 1994-1995;	Negotiations and Signing of the Contract, as well as transfer of technology and know-how
Period 4: 1996-1998;	Collection, Isolation and Delivery of the Samples to Switzerland
Period 5: 1999-2000;	Production of Fungi and Confrontation
Period 6: 2000-?;	The Discovery of Genetically Modified Maize in the Land of UZACHI

In 1956 a presidential decree granted FAPATUX the concession for 25 years, and the exploitation of over 251'000 hectares of forest in the northern Sierra Juárez. Besides the four communities now constituting UZACHI, many others were affected (2000(a):18).

With the concession, the conditions for the communities possessing these territories were all but favourable. They lost all the rights over their forest resources and received only small compensations in exchange, depending on the good will of the companies (2000:17). Besides

¹³⁵ See SEMARNAP (2000(a)), <http://www.laneta.apc.org/rock/uzachi/uzachi2.htm> and <http://www.mesoamerica.org.mx/uzachi/UZACHI.html>.

some infrastructural support, i.e. the construction of some roads, the community members could work for FAPATUX as non-specialised labourers for a small salary. Large parts of the forests were destroyed or deteriorated by unsustainable logging methods. The resistance started to grow in the 1970s, when destruction of the forests in the highlands became real obvious.¹³⁶ The destruction was caused by the selective extraction of the best logs, lacking any concept of reforestation or conservation of watersheds and soil.



Photo 3: Sawmill in Ixtlán, a neighbouring community.

In 1979 different communities built the Organization for the Defence of Natural Resources and Social Development in the Sierra Juárez,¹³⁷ trying to initiate the process of legal revision of the concessions (2000(a):18). After a difficult fight a judge decided in favour of the mentioned organization (ODRENASIJ) in 1982, giving them back their rights to manage their forests on their own. The first step of the re-appropriation of their resources was made. However, it became immediately evident, that the fight for a good management of the natural resources had just begun. There were many issues to be worked on. First of all, the deforestation had to be stopped, followed by the establishment of a sustainable management plan. Third, a concept to defend the cultural properties had to be established, and fourth, the control over the territory had to be strengthened by negotiating and drawing clear boundaries with the neighbouring communities. The communities started to form their own timber industries, sawmills and carpentries (Photo 3).

ERA - In the late 70s, members of the future ERA started to work with the communities in the Sierra Norte de Oaxaca. Initially, they supported the communities in the fight against the paper industry. They also provided technical support, so that the communities could form teams and educate technicians, and thus systemise their adequate experience and establish a sustainable communitarian timber industry (Chapela, F. 1999(a):457-458). This was the

¹³⁶ Merino (UNAM), 23. Nov. 2001, personal communication: During the Agrarian Revolution (1910-16), the community and ejido based management systems were recognized as legal by the Constitution.

beginning of a long profound relationship of shared visions, trust and mutual respect. ERA is until today, the only consultant of UZACHI. According to Chapela, it was important to demonstrate the communities that they were able to manage their forests by themselves. A certain self-confidence had to be created.¹³⁸

ERA helped UZACHI to be one of the few agricultural organizations in Mexico with a structured mechanism of environmental management. In the first couple of years they financed their consulting activities by themselves; later they received funds from the Rockefeller and Ford Foundation, which support communitarian forestry projects.¹³⁹

Novartis - Dr. Michael Dreyfuss, working for Sandoz since 1976¹⁴⁰, realized various collection expeditions in South-America and Asia, gathering mainly plants and micro-organisms. The only existing Swiss law for trans-boundary movements of micro-organisms, the main source in this case, which had to be considered by him at the time, was the “Swiss regulation on handling micro-organisms in closed systems”.¹⁴¹ It states that all the imported samples have to be treated as if having an epidemical potential, until they are investigated and known. The aim of this regulation is the protection of humans and of the environment against harmful effects of handling organisms¹⁴² in closed systems (Art 1 ESV). However, each time he left Switzerland for another expedition he felt more unsatisfied about his activities.

Thus, he started to think about possible ways of co-operation already ten years before the drafting of the CBD.¹⁴³

Table 12: Involved Persons in the BioLead Project Novartis-UZACHI

UZACHI

All the four communities, represented by the comuneros in the general assembly Ignacio Chapela (research director), from the University of Berkeley

ProjectTeam Novartis

Michael Dreyfuss (Project Manager)
Christel Möller (post-doc)
Luis Toti (post-doc)

ERA

Francisco Chapela, Lara Yolanda and others

9.2. Appropriation of the Resources – 1986-1992

UZACHI/ ERA – Once the re-appropriation of the forest was achieved, the mission was to find an appropriate management for these resources. A later evaluation made by ERA, showed clearly that the exploitation by FAPATUX was not sustainable.¹⁴⁴ The benefits the communities derived from the forests were still received in a more cultural than economic

¹³⁷ ODRENASIJ – Organización en Defensa de los Recursos Naturales y Desarrollo Social de la Sierra Juárez.

¹³⁸ Chapela (ERA), 28. Nov. 2001, personal communication.

¹³⁹ Chapela (ERA), 28. Nov. 2001 and Dueñas (Ford Foundation), 18. Dec. 2001, both personal communication.

¹⁴⁰ And later for Novartis until 1998.

¹⁴¹ Verordnung über den Umgang mit Organismen in geschlossenen Systemen (Einschliessungsverordnung, [ESV]) vom 25. August 1999 (SR 814.912). See http://www.admin.ch/ch/d/sr/c814_912.html.

¹⁴² Art. 3 ESV: (a) Organisms; cellular and non-cellular biological units, able to reproduce or transfer genetic material, especially animals, plants and micro-organisms [...]. (b) Micro-organisms; microbiological units, especially bacteria, algae, fungi, protozoa, viruses and viroids [...]. (e) Handling; every intended activity with organisms, especially use, processing, reproduction, changes, screening, transport, storage and disposal.

¹⁴³ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

¹⁴⁴ This study was realized in 1992: (1) the timber volume has been reduced for 22%, (2) the production value reduced around 60% and (3) 2/3 of the forests lost their trees with commercial value (see <http://www.laneta.apc.org/rock/uzachi/uzachi2.htm>).

manner. The industrial exploitation and processing was going to be established in the following years.

In the mid-80s, while the communities started the forest exploitation, a new battle began. In this time the Secretariat of Agriculture and Hydraulic Resources (Secretaría de Agricultura y Recursos Hidráulicos - SARH) had organized and distributed the principal forest areas of the country in Units of Conservation and Forest Development (Unidades de Conservación y Desarrollo Forestal - UCODEFO's).¹⁴⁵ For each of these units, forest professionals were employed to provide the technical services for forest exploitation. This support was mostly deficient and rare, having a closer relationship to the timber industry than to the communities. In this context, various communities decided to organize themselves in unions between 1985 and 1995, so that SARH would issue the concessions for the technical forest services (TFS) in their favour. Thus, different communal organizations emerged, organized around the TFS, for which they finally received the concession (SEMARNAP 2000:19).

The “Unión de Comunidades Productoras Forestales Zapotecas-Chinantecas” (UZACHI) acquired legal status on September 14th, 1989, built by four communities of northern Sierra de Oaxaca, Mexico. They are La Trinidad, Capulalpam de Méndez and Santiago Xiacui, belonging to the Zapoteca ethnic group, and Santiago Comaltepec, belonging to the Chinanteca ethnic group. The Union started with 950 community members, with 26'000 hectares of land, of which 88% was forest (Ramírez 1999:2).

As UZACHI, they defined strategies, which would allow them to reach an effective control over their natural resources. The two most important points were the consolidation of the communal organizational structure for the formation of an own team of forest technicians, built by “comuneros” or their children. As mentioned, the existing know-how and qualifications had to be strengthened as far as possible.¹⁴⁶ Their main concern was to re-evaluate the study of integrated management, obviously poorly elaborated by FAPATUX. When the communities decided to convert the resources provided by the National Program of Solidarity (Programa Nacional de Solidaridad – PRONASOL) in infrastructure and equipment for forest work, this was a clear sign of the planned direction. The reforestation, the construction of roads and projects with conservation purposes were fostered by communal work. A management plan for the land was established and the traditional burning methods suspended. In that way, UZACHI became a sustainable timber industry with a high degree of self-determination. They set up their own administration for the management of the natural resources (Ramírez 1999:2). When community members lacked the skills such as marketing and business administration, the community hired professionals, which had to take in community members as apprentices (Klooster 1997:292).

During all this time, ERA was an important partner, providing technical support, helping in organizational matters, and systematising their experience to permit the implementation sustainable development projects (Chapela, F. 1999(a):458). The development of projects was

¹⁴⁵ SEMARNAP (2000(a):22): In 1986 the forest law was revised, allowing that concessions for Technical Forest Services (TFS) to be issued to forest engineers.

not only a clue to alternative incomes, but also a way to stop the “brain-drain” in the communities. This is one of the most significant problems throughout the world in economically poor environments.

Even before establishing the communitarian land management plan (Plan Comunitario del Manejo del Territorio – PCMT), the question emerged how the resources in the protected areas could possibly be used in a non-extractive manner. It seemed important to establish activities in these areas, just to make their presence evident. Without such a presence, neighbours may think that these parts are available for colonisations and other uses.¹⁴⁷ To maintain the actual ownership, without having the problem of illegal land taking or use, activities must be effectuated. The communities realized this and asked ERA for advice on the activities that should be developed in the protected areas.¹⁴⁸

ERA first started to search for possible natural products generated by plants, for the production of articles such as soaps or creams, but soon it was clear that the development, at least concerning the big pharmaceutical industries, was not going in that direction. Another problem of natural plant products could have been that the use of plant material, an extractive activity, could have possibly turned out to be destructive. Ignacio Chapela, who was writing his Ph.D. in England at the time, disposing over a large quantity of information in the libraries, as well as employing his know-how as micro-biologist, was, according to Francisco Chapela, of great help in the solution of this question.¹⁴⁹

ERA also thought of the possibility of creating synergetic ranches to sell permits for chasing wild animals, especially deer. But this was not feasible, because large fauna is rare in this area. Eco-tourism and photo-safaris were also proposed, and there were some shy intentions on starting such businesses.¹⁵⁰

UZACHI decided not to include traditional knowledge in a possible agreement remembering the bad experiences a neighbouring community made with former bio-prospectors.¹⁵¹ This was also the advice of Ignacio Chapela, aware of the changes and needs of modern biotechnology and the problems involving traditional knowledge may cause, only gaining some few molecules.

Anyway, the PI, by concentrating on the major diseases affecting the western civilisation like cancer or AIDS, is loosing the interest for traditional knowledge in medicine, which generally

¹⁴⁶ Chapela (ERA), 28. Nov. 2001, personal communication.

¹⁴⁷ The idea that forests are unproductive and have to be converted into agricultural land is a very strong remnant of the Agricultural Revolution.

¹⁴⁸ Chapela (ERA), 28. Nov. 2001, personal communication.

¹⁴⁹ Chapela (ERA), 10. Dec. 2001, personal communication; The exchange of information in this time was difficult and expensive, because the electronic communication systems had not been established yet and international telephone calls were still expensive.

¹⁵⁰ Chapela (ERA), 10. Dec. 2001, personal communication.

¹⁵¹ Chapela (ERA), 30. Nov. 2001, personal communication; *Health System and Traditional Knowledge* – The health problems in the communities are mainly solved within the traditional health care system by the “curandero”, the healer. If there are diseases and fractures which can not be treated, the patient is sent to the “bata blanca”. The physicians of western medicine are called like that because of their white dressing.

concentrates on digestive and respiratory problems, fractures, wounds and other ailments with well known remedies.¹⁵²

Novartis – In 1988, after finishing his Ph.D. in England, I. Chapela went to Basel to write his post-doc at Novartis. There he met M. Dreyfuss. An important milestone in the history of the BioLead agreement. According to Dreyfuss, Chapela made important contributions to the discussion which later helped him to design the BioLead project.¹⁵³

In 1990/1, when the InBio-Merck agreement was negotiated, Ignacio Chapela, as mentioned, went to Costa Rica to participate in the discussions with Merck. It was one of the first agreements where ABS terms were applied.¹⁵⁴

A considerable weakness of the InBio contract was the regulation of access. 90% of the Costa Rican territory is protected. The government decided to make it available to the industries and research organisations for a determined fee. Chapela considered this a bad strategy to sell diversity in a package, without considering quantity or quality of the samples extracted.

During this time, Ignacio Chapela stayed in contact with M. Dreyfuss, who was following the developments in this sector with interest, watching what other PI like Ciba and Merck were doing. A further important input came from Thomas Eisner from the University of Cornell. Ignacio met him in Washington in 1992 and discussed with him his ideas about chemical prospecting. For Thomas Eisner, biodiversity contains the pool of substances with the potential to solve the problems of health and alimentation of humanity in the future.¹⁵⁵ The gathered information and findings were regularly discussed with ERA and UZACHI.¹⁵⁶

¹⁵² Chapela (ERA), 28. Nov. 2001, personal communication.

¹⁵³ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

¹⁵⁴ Chapela (ERA), 28. Nov. 2001 and Dreyfuss (Ex-Novartis) 14. Jan. 2002, personal communications.

¹⁵⁵ See Eisner, T. (1991) and Eisner and Beiring (1994).

¹⁵⁶ Chapela (ERA), 28. Nov. 2001, personal communication.

9.3. Design of the BioLead Project and Transfer of Basic Information – 1992-1994

UZACHI/ ERA - In the beginning of the 1990s a land-management plant was set up by the technicians and approved by the communities. 40% of the UZACHI areas were defined as agro-forest land for agricultural purposes, 30% for commercial forestry, fuel for personal use and timber to sell or process in sawmills and carpentries. The remaining 30% were located in steep and remote areas, which were protected for the conservation of natural resources and to provide environmental services like watershed protection, carbon sinks and others (Novartis 1999:9).

Table 13: Why Micro-Fungi?

The profits of PI are strongly based on the chemical creativity of fungi and other microbes such as actinomycetes. Plants and animals are marginal in the discovery based pharmaceutical process. The reasons why micro-organisms are attractive for prospective activities are relatively well known:

- Property rights have not been clearly assigned to them in most countries, making them ideal to collect (non-extractive) and transport over national borders (this situation will be changed soon by upcoming legislation).
- Fungi can easily be grown and maintained in *ex situ* collections. The biological information can be accessed any time without the need for further collection (According to Petersen (Novartis, 25. Jan. 2002, personal communication), though, even if they are kept in liquid nitrogen, a continuing erosion and loss cannot be stopped, and they must be replaced after a certain time).
- The growth and reproduction of fungi by fermentation of the initial strain is relatively easy and fast, compared to plants and animals. Thus, if a commercially interesting compound is discovered, the production of the appropriate fungi is easy, while in the case of plants, it would be a time-consuming and expensive process, as massive agronomic production is necessary.
- Fungi have historically proven to be particularly creative as producers of secondary metabolites, the staple of novelty for the discovery process in the PI.
- The pool of sources in this area is immense. It is estimated that at least six fungal species exist for each known plant species. The diversity and the high number of undiscovered species promise a high probability for discovery.

(Chapela, I. 1997:245-246)

This territorial ordering with the participation of all the communities and the external consultant was a basic instrument for the development of all further projects. The PCMT tries to satisfy the necessities of the local population without destroying the environment. It was the bases of every existent forestry exploitation, timber as well as non-timber products, used for all the implemented management programs, and for all the different areas (Ramírez (1999:3) and Chapela, F. (1999(b):36-46)).

ERA, as UZACHI's consultant, suggested that within bio-prospecting agreements have a certain potential for them to generate funds and knowledge, which could be useful for further projects. UZACHI was interested, as foreigners were repeatedly observed on their territory realizing collections without informing the communities.¹⁵⁷ Thus, ERA provided them with the necessary information, and UZACHI started to think about the possible terms of such an

¹⁵⁷ Luna (UZACHI), 8. Dec. 2002 and Ramírez (UZACHI), 12. Dec. 2002, both personal communication.

agreement. At this stage, the experiences of Ignacio Chapela, as a trustworthy and knowledgeable person, were very helpful.¹⁵⁸

During this stage, ERA passed on the information to UZACHI and generated a basic understanding of the context. Their task in relation to the project was basically to traduce and facilitate the negotiations. Traducing not only meant traducing from German to Spanish, but also make intelligible the concepts of the indigenous communities to Sandoz and the ideas and interest of Sandoz to the communities. It was necessary to employ the appropriate cultural codes, to reach a mutual understanding. The facilitating consisted basically in supporting the information flow between UZACHI and Sandoz in Basel, Switzerland. The goal was to reach agreements about specific issues, and finally set up a contract, which could be accepted by both of the stakeholders.¹⁵⁹

UZACHI¹⁶⁰ drew the following conclusions based on the discussion of the information provided. If they would establish a bio-prospecting agreement, it would neither involve (a) plants nor (b) traditional knowledge.¹⁶¹ Further, (c) they would not allow any access of foreign scientist to their resources, and (d) the generated benefit would have to be considered adequate by the AGC. These benefits should basically be of a non-monetary kind, such as education or transfer of know-how and equipment, which should serve for different long-term purposes.¹⁶²

Novartis – In the early 1990s, Dreyfuss started to design the BioLead project, after refusing to realize further collection expeditions in 1989. In 1992 the CBD emerged and entered into force in 1993. During the following years he worked on a project proposal, tackling many internal hurdles. The main resource, this became obvious very soon, would be micro-fungi, because they are of special importance for the pharmaceutical industry (Table 13). In this time, he stayed in contact with Ignacio Chapela, discussing the ongoing events. Thus, the flow of information already initiated even before the project was approved in Basel.¹⁶³

According to Strub, this pre-negotiating period, conducted between M. Dreyfuss and the responsible head officials at Novartis, was very hard. In comparison, the following negotiating period was easy for Novartis.¹⁶⁴

¹⁵⁸ According to Chapela (ERA, 28. Nov. 2002, personal communication), Ignacio Chapela knew the possibilities, needs and limits of the PIs and made valuable experiences joining the InBio-Merck negotiations at Costa Rica. He also observed the activities of Shaman Pharmaceuticals. Shaman was a company, founded in 1993, specialized on the discovery of new drugs from ethnobotanical leads worldwide (Chapela, I. 1997:250). They had massive losses and had to stop their activities in 1999. Thus, the local communities, from whom the ethnobotanical information originated, did not receive any benefits, and therefore there were no incentives created for the conservation of biological diversity in those areas.

¹⁵⁹ See <http://www.mesoamerica.org.mx/uzachi/>.

¹⁶⁰ During the first step the Representatives' Assembly discussed the topic over two years (Chapela, F. 2000(a)).

¹⁶¹ Ramírez (UZACHI), 12. Dec. 2001, personal communication: Due to the expected complications in trading with traditional knowledge, as experienced by neighboring communities, it was decided that traditional should be protected and used only for community-intern purposes.

¹⁶² Chapela (ERA), 30. Nov. 2001, personal communication.

¹⁶³ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

¹⁶⁴ Strub (Novartis), 11. Jan. 2002, personal communication.

9.4. Negotiations and Signing of the Contract – 1994-1995

Novartis - In May 1994 the Novartis Research Advisory Board approved the BioLead project. According to Dreyfuss, hundreds of letters were sent to research institutions and other organisation with a certain potential for collaboration.¹⁶⁵ Approximately 50 microbiologists and research institutions from tropical and subtropical countries around the world passed the first selection, including UZACHI represented by Ignacio Chapela.¹⁶⁶ They analysed all the possible partners with certain criteria, for their clear motivation to see the project through, for the feasibility and their interest in participating. Other important criteria were a certain degree of existing know-how in microbiology and ecology, as well as suitable site locations and habitats. A lot of interesting possibilities like one in Brazil had to be rejected, because they insisted on royalties Novartis was not willing to pay.¹⁶⁷

In 1995 three partners were selected and agreed upon. These were the (a) Tropical Research Institute in Panama, (b) the University of Goa in India and last but not least (c) the Mycological Facility in Oaxaca, Mexico (Novartis 1999:7).¹⁶⁸

Strub set up the contracts in spring 1995, together with another attorney, a patent lawyer and Dreyfuss, who provided the scientific input. Strub considered them simple standard contracts.¹⁶⁹ From this point on, it was up to I. Chapela and ERA to present and discuss with UZACHI what M. Dreyfuss had negotiated with his head officials. They knew that it would not be possible to reach better conditions. The contract set up by Novartis, basically contained the important conclusions that had emerged during the former discussions within UZACHI. The results of these discussions were known to Dreyfuss, and he considered and mentioned them by setting up the contract at Novartis.

¹⁶⁵ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication: Letters had been sent to all of the countries except Africa, because no possible counterparts could be identified there in the first selection.

¹⁶⁶ He did not have any competence to take decisions for the communities, as he was just the link to Novartis.

¹⁶⁷ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

¹⁶⁸ Initially, Dreyfuss (Ex-Novartis, 14. Jan. 2002, personal communication) was thinking to establish five agreements, which was not possible in the existent circumstances. Many interesting partners, like some in Brazil, insisted on royalties which he was not allowed to pay.

¹⁶⁹ Strub (Novartis), 11. Jan. 2002, personal communication: The Panama contract was written in Spanish and English, the one for India in English and the Mexican contract in Spanish.

UZACHI/ERA – According to Luna,¹⁷⁰ the discussions, after the contract was presented to the commune membership meeting by the representatives of the communities, lasted six months.¹⁷¹ The representatives, who already had discussed the topic, presented their conclusions and suggestions to the assembly. Within these six months, every one of the “comuneros” had the chance of getting informed and of challenging the contract or its respective terms. This participatory process guaranteed the possibility for everybody to bring in their thoughts and critics, and therefore the later decisions of the general assembly were well embodied and supported in the communities. Thus, it can be seen that a strong confidence in the decisions and proposals of the representatives existed. Therefore, if they recommend a project it was likely to be approved by the communities (Table 14).¹⁷² Though the finally decision was taken, as usual, by the general assembly, implementing their proper aims. Additionally, there were some conditions favouring an unencumbered discussion. The most important was that there was no pressure to sign this agreement, because it was not going to fulfil their basic needs.¹⁷³ Their basic income was already secured with the timber business and this contract was going to be just some “butter on the bread”.

Table 14: UZACHI and Novartis in Numbers

- The four commissioners of common land signed the contract.
- 5000 community members participated at the Union.
- 100% of the communities have been consulted in the general assembly.
- The negotiations of the contract with Novartis lasted two years.
- The collections were carried out on 1.5 ha of land during three years.
- 6000 samples of microscopic fungi have been collected.
- The union received the National Forestry Price, four certificates for a good forest management and a nomination for the national ecological merit.
- Four reunions between the 19th of August and the 18th of September 2000 took place to denounce the biopirates in Mexico (RAFI was present).
- The Union never was invited.

(Chapela, F. 2000(a))

After six months though, the general assembly finally decided to agree upon the contract and to establish collaboration with Novartis. The contract was sent back with few changes, revised in Basel by Strub, and immediately sent back to Mexico with a small delegation and signed in August 1995. The signing celebrations were also attended by a few representatives of the federal environmental services who had been invited. A collaboration concerning bio-

¹⁷⁰ Luna (UZACHI), 8. Dec. 2001, personal communication: Now he is president of UZACHI, at this time he was just comunero.

¹⁷¹ According to Strub (Novartis, 11. Jan. 2002, personal communication), Ignacio Chapela was the in- and outbox for all the information leaving Novartis towards UZACHI and on the other way around. The information flowed through the following channel starting at Novartis; Dreyfuss – I. Chapela – ERA – UZACHI.

¹⁷² Ramírez (UZACHI), 1. Dec. 2002, Pérez (UZACHI), 1. Dec. 2002 and Chapela (ERA), 10. Dec. 2002, personal communications.

¹⁷³ Chapela (ERA), 10. Dec. 2001, personal communication.

prospecting between a multinational pharmaceutical giant and some communities in a remote area of Oaxaca had become true (see Table 15 for details of the contract).¹⁷⁴

The members of UZACHI confirmed, that they were completely informed about the ongoing negotiations concerning the contract and its content by ERA and their scientific research director Ignacio Chapela, in opposite to the later accusations armed by Gonzalez.¹⁷⁵

UZACHI – The fundamental interests of UZACHI in this contract were to obtain the means to acquire their own capacity for biological prospecting.

UZACHI had established three different programs, which were: (a) the improvement of the production of timber, (b) the management of protected areas, and (c) an agro-forestry program, all of them with their special objectives and activities. One single objective of point (b), besides maintaining the biodiversity, use of non-timber products, watershed protection, development of the production of fungi and orchids, installation of a herbarium and others, was the development of the BioLead project (Ramírez (1999:4), see also above; Structure of UZACHI and their main programs).

The acquisition of equipment, the installation of the laboratory and the education of a technical team, allowed UZACHI to advance in their own prospecting projects, as a means to accomplish the above mentioned purposes. UZACHI received financing for four years. In case of discovery of an active compound making its way to the market, the UZACHI would receive sufficient funding to maintain the basic communitarian technical equipment, which means a lot to a rural organisation (Chapela and Massieu 2001:25).

Technology-Transfer – The main problem was the huge waste of time in administration, to get the right permits for the import of the rather simple equipment to Mexico (Photo 4).

Thereafter, it was held on the Mexican border for more than a month by the Mexican Import Office.¹⁷⁶

¹⁷⁴ Colín (2001:3): The local and indigenous communities do have the right to conclude private contracts concerning the access to their genetic resources with the industries, if such agreements are voluntary and the PIC is obtained from the communities. In contrast, the government cannot enforce communities to sign such contracts. This would violate the terms of the CBD and the Convention 169 of the ILO.

¹⁷⁵ See Gonzalez (2000:4).

¹⁷⁶ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

Table 15: Contract Novartis-UZACHI (basic terms of the agreement)¹⁷⁷

<i>Contract Novartis-UZACHI</i>	
Objetives:	
1.	To investigate the relationship between the perturbation and the production of secondary metabolites in micro-organisms,
2.	To explore the possibilities of negotiating and of working directly in collaborative projects between communities, industry, academic institutes and NGOs.
Conditions of UZACHI:	
•	The contract would not have to imply that the communities give access to the investigators sent by Novartis, but that the technicians of the Union would be enabled to get into the position to realize the field work themselves.
•	Under no circumstances whatsoever, the collaboration with the industry would include the handling of traditional indigenous knowledge.
•	The terms of the collaboration would have to adjust to the effective Mexican norms at the moment of the signature, or those going into effect during the time of the project: 1994-1998.
•	Novartis would have to pay the costs of installation and equipment of a laboratory in advance, which would remain property of the Union after completion of the contract.
•	Novartis would have to pay for the training of personnel of the Union.
•	Novartis would have to pay to the communities an annual quota, plus a quota for productivity
•	In case that a compound of pharmaceutical interest would be discovered, derived from the Novartis-UZACHI collaboration, Novartis would make a payment of a sufficient amount to the Union to form a patrimonial fund, with which to maintain their own basic technical equipment in perpetuity (Gonzalez (2000:5) mentions an amount between US\$ 1-2 million per active compound being found).
Conditions of Novartis:	
•	Exclusive use of the information generated by the project, during a term of two years.
•	Receive at least 1.000 isolations annually.
•	To keep confidential over the amount of the payments and the information that has been evaluated by Novartis during the term of two years.
Condition of both parts:	
•	The isolations are made only for purposes of investigation. Novartis cannot demand patents nor other rights of intellectual property on the living species that could be involved in the project. In any case, they could call to each other rights on the procedures derived from the Novartis-UZACHI collaboration, in agreement with the contribution of the partners.
•	UZACHI would keep a registry and duplicates of all the materials, as evidence to demonstrate that Novartis was not discovering organisms on which it could claim property rights.
(drawn from: Chapela and Massieu 2001:26)	

¹⁷⁷ Strub (Novartis), 11. Jan. 2002, personal communication; The contract is a simple document of five pages, written in Spanish describing the following points: Definitions, Description of the Training, Technology Transfer, Collection of Samples, Confidentiality, Transfer of the Samples to Basel, Payments, Property Rights and a term concerning the distribution of the benefits within the communities (implemented by UZACHI, not of interest for Novartis). The contract was signed by two Novartis representatives, the President of each Community, the President of the Monitoring Assembly (Assamblea de Vigilancia), the President of Administration (Assamblea de Administración) and Ignacio Chapela as research director of UZACHI, amongst others.

Knowhow-Transfer – One of the basic ideas of the communities was not to sell the unprocessed samples, but to aggregate value to the product by extraction and isolation. The flow-scheme below (Figure 6) shows the different steps of an industrial microbiological screening. The know-how acquired by the UZACHI was quite basic and limited for the first four steps, including a rudimentary preservation of the extracted samples.

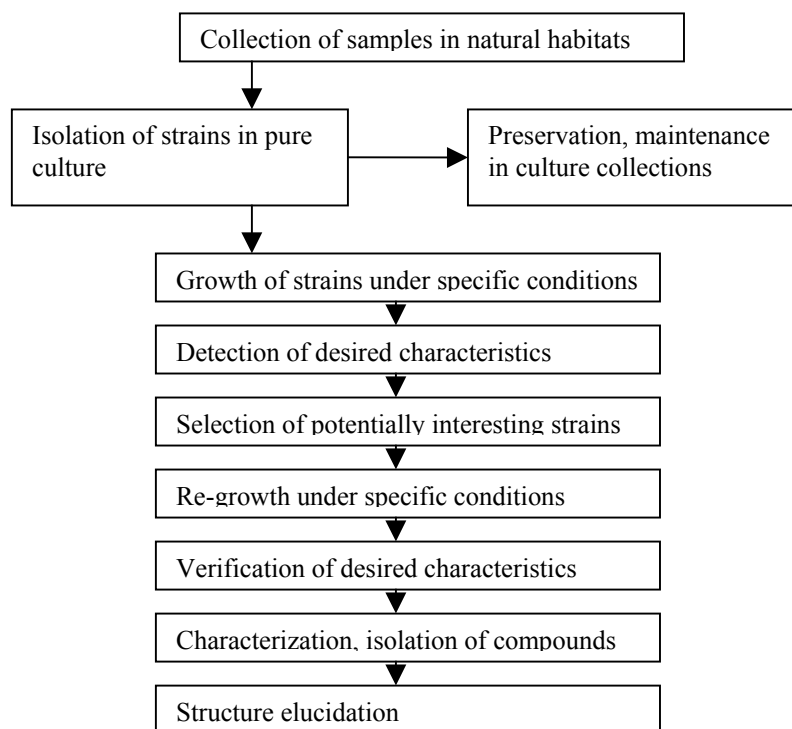


Figure 6: Flow-scheme concerning the processing of samples (Dreyfuss and Chapela, I. 1994:50).

The workshops and training with the partners in the selected projects included looking at the techniques needed for collection and processing samples, the isolation and characterisation of fungi, the use of database, the management of information, the statistical analysis and the necessary skills for project planning. The funds for the equipment of a microbiological laboratory were granted, and the main part of the equipment was delivered immediately after the signing of the contract. A site visit of six weeks of a Novartis scientist (Luis Toti) in Oaxaca provided further support to set up the isolation and characterisation skills, and to carry out collection trips. The principal investigators were encouraged to develop their own local research projects using BioLead data and strains. A final follow-up workshop was carried out to extend the initial training to the methodology of actinomycetes to a wider audience (Novartis 1999:8).

Novartis - According to Dreyfuss, the main problem in Mexico was the recruitment of personnel. It was difficult to find a scientist who would supervise the project, especially the scientific component, over a longer period of time.

Claudia Lopez Sanchez was the first scientist who went for four weeks to Switzerland to learn about the processing of microbiological material and the management of micro-organisms, but she stayed only four months in the project. In this time she passed part of the know-how

over to Lilia Pérez. The second person sent to Novartis in Basel was Leonardo Veraza, also for four weeks, but he never felt comfortable working in Xiacui, and also left the project. The one who finally stayed there and is still making major contribution was Lilia Pérez. She, as an agricultural engineer, generated the corresponding know-how, as mentioned, by talking to Sanchez and reading relevant literature. A further help was Toti, who stayed six weeks in Oaxaca, establishing the standards for collection and isolation. In 1995, the technology and know-how transfer were concluded and the project started in 1996.¹⁷⁸



Photo 4: The laboratory consists of three rooms, and the equipment was rather simple.

Sampling Methods – Specific methods for sample collection, processing, isolation and characterisation of fungi and actinomycetes, the main resources, were developed with the scientist involved in the project. According to Dreyfuss, the success of such a project depended on the accumulation of previous experiences. Thus, before starting the BioLead Project, a field-experiment was realized to establish the basic methods, in order to try out the set up for all of the three projects. The research question, a comparison of micro-organisms from temperate (Puerto Rico) and temperate (Oregon) ecosystems, was similar to the one of the BioLead project. The methods then, in the later projects, were adapted to the conditions in each country and therefore allowed efficient and standardised sampling and isolation procedures of micro-organisms, to ensure comparable results from the different sites, worked on by different people. The project team developed a unique database for the detailed description of sampling sites and samples for all of the countries, applied and adapted at the several sites by the local scientists. In the case of UZACHI, the scientist was Lilia Pérez, counting on the help of Ignacio Chapela in Berkeley.¹⁷⁹

According to Pérez, the first step was the identification of the collection sites. The collections were realized in the following types of forests: pure pine forests, pine-oak forest, “mesophil”

¹⁷⁸ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

¹⁷⁹ *ibid.*

forest etc. (see Ecosystem above). The characterisation of the sample, after the collection, was a very important task, needed for the later identification and analysis. All the information (ecosystem-type, type of carrier of the micro-organisms (soil, leafs etc.), height above sea level, etc.) was finally gathered in a bar code.¹⁸⁰

The expeditions Novartis realized in the different countries included tropical, subtropical and temperate forests, matching the type of ecosystem that was to be examined in Oaxaca, so that samples from these different sites could be compared, in order to answer the scientific question.

The samples sent to Novartis were selected and cultivated in culture broth extracts. They were characterised using chromatographic methods and biological assays, selected and channelled into the screening process (Novartis 1999:8).

9.5. Collection, Isolation and Delivery of the Samples – 1996-1998

Novartis – The merger of Ciba and Sandoz to Novartis was an additional big hurdle to the project.¹⁸¹ The managers started to check the different department for economic measures. Looking at this ecological investigation, it was not clear to them how this project could be of any use for the PI. The climate was not favourable, but Dreyfuss succeeded in maintaining their interest in this project.¹⁸² Additionally, the merger of two different screening and analysing methods, and the technological development over the past few years made it necessary to make some changes concerning the analysis and evaluation of the samples. Dreyfuss is convinced that a lot of information got lost during this time.¹⁸³

UZACHI - The collections in Oaxaca started in 1996. The first one was realized by Lopez and Pérez, from the laboratory and the whole group of forest technicians (around eight persons), but this process turned out to be inefficient and thus, Pérez made the following collections by herself, supported in the laboratory by two assistants.¹⁸⁴ Pérez's work was the planning of the collections, the collections themselves, and the isolation of the samples, their characterisation and their delivery to Basel. At the time of extraction of the samples copies were made. They still exist in the laboratory.¹⁸⁵

The major problem within the first months of extracting the samples was the cleanliness and the time management. Another big problem was, according to Pérez, to obtain the governmental permission to export the samples to Switzerland.¹⁸⁶

The mentioned quantity of samples sent to Switzerland varies between 6000 and 9000.¹⁸⁷ With the delivery of the last samples in 1998, UZACHI concluded their part of the contract

¹⁸⁰ Pérez (UZACHI), 5.Dec. 2001, personal communication.

¹⁸¹ The merger happened in the years of 1995/96.

¹⁸² Chapela, F. (ERA), 30. Nov. 2001, personal communication.

¹⁸³ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

¹⁸⁴ Clara Villanueva and Amparo Martínez, both technicians working at the laboratory since the beginning of the project in 1995.

¹⁸⁵ Pérez (UZACHI), 5. Dec. 2001, personal communication.

¹⁸⁶ According to Pérez (UZACHI, 5. Dec. 2001, personal communication), she had to ask for a permission at the office for wildlife, INE for the export of the samples. The LGEEPA was not revised yet.

¹⁸⁷ Ribeiro (RAFI, 13. Dec. 2001, personal communication) said that she was told so by Lilia Pérez.

and the laboratory became their property. The contract was set up for three years, with an option for prolongation. Nevertheless, Novartis was not interested in a prolongation, because of the considerably large amount of samples of a good quality they had received, and the time it would take to process them with their limited capacities within the natural compound unit. The material generated by the BioLead project is, until today, not yet fully analysed.¹⁸⁸ Novartis still has the obligation, according to the contract, to inform UZACHI, if an active compound is found within the collected samples.¹⁸⁹ Then a “success-fee” will be paid for a heritage fund, sufficient to maintain the technical team for perpetuity. According to Gonzalez (2000:4) this is an amount between US\$ 1-2 million for each active compound (Table 13). Considering a development period of 10-12 years, no news has to be expected until 2010 at the earliest (Table 16).

Basically, UZACHI is interested in establishing other agreements, selling the generated material to other PIs. But as long as no legal framework concerning ABS issues exists, they will not do so.¹⁹⁰ However, the experience was very important for the communities. They gained a lot of confidence in their negotiating capacities and their traditional systems of access to “their” natural resources.

At the end of this collaboration, UZACHI received the laboratory, had established a team of technicians, a herbarium and funds enough to operate for one more year. The revolving funds, established with the annual fee of the project, de-capitalized because of administrative incapacity and got lost in all the communities, with the exception of Trinidad (Chapela and Massieu 2001:25).

9.6. Production of Fungi and Confrontation – 1999-2000

Novartis – In April 1999 Novartis organized a workshop in New York on the subject of “Bio-prospecting and Benefit Sharing”¹⁹¹, as a possibility for different stakeholders to discuss the issues of ABS on a “neutral territory”. At that event, Chapela asked about the possibility to publish the contract, in order to prevent misunderstanding and misinterpretation.¹⁹² Novartis, nevertheless, insisted on the confidential clause (Table 15), which is part of every contract within the industry, and is part of their policy.¹⁹³

¹⁸⁸ Strub (Novartis), 11. Jan. 2002, personal communication.

¹⁸⁹ *ibid.*

¹⁹⁰ Luna (UZACHI), 8. Dec. 2001, personal communication.

¹⁹¹ Novartis 1999.

¹⁹² Anyway, F. Chapela published an Article October 10th, 2000, entitled “Aprovechar la “farmacia selva”” in the Journal “La Jornada”, presenting the details of the contract, as far as possible. See also; Chapela and Massieu (2001:26).

¹⁹³ Strub (Novartis), 11. Jan. 2002, personal communication.

UZACHI – Finally, it is interesting to see how the know-how and the appropriate technology were used after the conclusion of the contract to develop further products and to generate additional incomes. One of the projects of UZACHI is the biodiversity program with the objectives to (a) generate know-how and technological skills for the use of saprophytic fungi originating in the communities, (b) generate alternatives for the familiar income based on non-timber activities, and (c) raise the economic value of the forest areas of UZACHI by producing forestry by-products. The mycelia of these fungi are produced in the laboratory of the Union. The promotion of the fungi is realized by project technicians (Ramírez 1999:6).¹⁹⁴ This project basically aims to improve the appropriation and use of their natural resources.

The laboratory produces mainly mycelia of *Lentinus edodus* (Shitaki) and *Pleurotus ostreatus*, two edible saprophytes, which are produced at the level of the family units. The fungi are used to complete the daily nutrition, as well as to be sold at the market.

Additionally, an evaluation of local fungi species with certain commercial potential is being developed, such as *Lentinus lepidus* and *Pleurocibella spp.*¹⁹⁵

Further, they are investigating a procedure to induce a better growth and distribution of wild fungi like Matzutake (*Tricholoma magnivelare* or *T. matzutake*), which is reaching prices of 600.- Mexican pesos per kilo at the market. This would permit the increase of the income, by maintaining the interventions into the forest at a low level. For these activities, advanced techniques of DNA analysis are employed (Chapela and Massieu 2001:24). Another project, which indirectly profited from the bio-prospecting agreement, was the production and propagation of ornamental plants.

Confrontation – In October 1999 Dr. Alejandro Nadal wrote an article in La Jornada about the UNAM-Diversa case, saying that their contract contradicts the LGEEPA and therefore is illegal. In July 2000 he placed a popular denouncement at Profepa against this contract. The public, sensitive about “indigenous problems” because of the former “Marcha Zapatista”, where their rights had been discussed, supported the topic, producing a wave of disagreement.¹⁹⁶ This wave grew, dragging along all the ongoing and recent projects, without making any distinction initially.

However, the accusations against UZACHI and ERA, a rather dark chapter of the project, were doing more harm than reaching a progress in discussion. Gonzalez (2000:4) reproach was that UZACHI was selling organisms, which could be found in neighbouring communities as well, although they did not receive any of the benefits agreed upon with Novartis. He says that happened due to the bad flow of information and the fact that the communities were not informed. He also accused ERA trying to benefit from the agreement.¹⁹⁷ Ribeiro even went

¹⁹⁴ Ramírez (1999:5): The main UZACHI projects are; (a) Improvement of timber exploitation, (b) improvement of the genetic characteristics of pine species, (c) improvement of the agricultural systems, and (d) to learn about non-timber species, such as fungi and orchids, and their potential use.

¹⁹⁵ Pérez (UZACHI), 5. Dec. 2001, personal communication.

¹⁹⁶ De Ita (Ceccam), 12. Dec. 2001 and Colín (Greenpeace), 13. Dec. 2001, both personal communication.

¹⁹⁷ Ramírez (UZACHI), 1. Dec. 2001, personal communication.

further, saying that it is one of the worst contracts ever to exist. She says that diversity is a public good and not a private property and therefore should not be sold.¹⁹⁸

The accusations, at least the one of personal nature, ended with the meeting on “Bioprospecting and Biopiracy” organized by Ceccam in November 2000.¹⁹⁹ The only conclusion was that anyone launching personal attacks against other participants in the electronic discussion-forum “Corsario” would be excluded (Anonymos 2000 (b)).

On the one hand it was promising that the discussion finally was initiated, but especially in this case it was the beginning of a period of unreflected infliction of harm. Anyway, it was a painful experience for UZACHI, and they felt mistreated.²⁰⁰ This was one of the reasons the communities decided not to get involved with other agreements, as long as there is no legal framework.

9.7. The Discovery of Genetically Modified Maize – 2000 - ?

UZACHI – A short description of recent events and research activities is important, because they are based on the established laboratory and its technical team during the Novartis-UZACHI collaboration.

In 1998, the Mexico prohibited the import of genetically modified crop (GMC) as seed-material. In spite of this, the contamination of the plantations in Mexico with genetically engineered maize is increasing. The question was raised of how dangerous the transgenic contamination of landraces in Oaxaca is for the global food security, being an important centre of origin and diversification of this crop. In a congress held in 2000 in Oaxaca about transgenic maize, diverse organisations informed the communities about the problem this could cause. UZACHI started to work on this problem and decided to establish a monitoring program. In October and November 2000 first tests were made. The result was most revealing. It was found that there is an unexpectedly high percentage of contamination of modified genes in native crop varieties. The results showed a high level of gene flow from industrially produced maize to local maize sorts. In more accessible sites, the introgression is even expected to be higher (Chapela, I. and Quist 2001:542).²⁰¹

Pérez made the first analysis in the laboratory of UZACHI, actually acquiring the know-how and the according instruments to realize a further DNA (Desoxyribonucleic acid) screening and analysis. The laboratory team keeps working, improving and using their know-how for further projects.

¹⁹⁸ Ribeiro (RAFI), 13. Dec. 2001, personal communication.

¹⁹⁹ Dueñas (Ford Foundation), 18. Dec. 2001, personal communication.

²⁰⁰ Ruiz Basquez (UZACHI), 9. Dec. 2001 and Luna (UZACHI), 8. Dec. 2001, both personal communication.

²⁰¹ Further information see www.cimmyt.org.

UZACHI/ ERA/ Novartis – The good “personal” relationship between the partners, the personal efforts in establishing the arrangement, the optimal flow of information, the model organization of the Union concerning the use of their resources, their remarkable social capital and other specific circumstances enhanced the chance of the successful conclusion of this project. Novartis even sees this form of “meta-organisation” as indispensable for the realization of the project (Novartis 1999:10).

“The right men at the right time, at the right place, being personally affected, can move mountains. It is not reproducible”.²⁰²

One of the important recent international events also to be mentioned here, was the meeting of the twelve megabiodiverse countries Mexico, China, Brazil, India, Indonesia, Costa Rica, Columbia, Ecuador, Kenya, Peru, Venezuela and South Africa, between the 15th and the 17th of February 2002. At this meeting in Mexico City, an alliance against biopiracy was built, with the aim to prevent the patenting of their biological wealth (germ-plasma) by northern industrial countries and their claim for exclusive rights (NZZ 2002:60).

²⁰² Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

PART D – ANALYSIS

10. Stakeholders

Overview

According to the CBD, the benefits generated through access to genetic resources must be shared fairly and equitably. This requires a definition of the term “stakeholders”. They can include individuals, communities, groups, institutions, industries and others somehow affected. Direct stakeholders are the ones who benefit or are harmed by the use of the resource, in this case the UZACHI and Novartis, i.e. the resource owners and the users. In general, they are parties making direct formal agreements.

Indirect stakeholders are those who are interested in the outcome, but who are not directly involved in the negotiations of an agreement. Columbia University (1999:68) mentions humanity itself, as the largest group of indirect stakeholders, as all humans should be interested in the conservation of nature. This chapter focuses on the analysis of the stakeholders and their relationships, as well as on the elements which are important to them.

10.1. UZACHI

The richness of biological diversity is, without doubt, an opportunity for communitarian organisations like the UZACHI. The capacity generated by the bio-prospecting agreements produced a better prepared labour force in Oaxaca, trained and equipped to realize their own prospecting projects. The linkage of such technical and human capacities helped to improve the search for novel chemicals on one side, and to generate and equally distribute the benefits and conservation of a diverse environment on the other (Chapela, I. 1997:252). The ongoing discussions in Mexico and South-America, concerning ABS issues shows that some basic problems have to be solved before further agreements can be realized.

There are various conditions helping UZACHI to get in contact with a multinational pharmaceutical giant like Novartis and to negotiate the collaboration contract without pressure in a favourable way. Especially to be mentioned are, (a) the openness of the communities to accept suggestions from “outside”, and the will to strengthen the appropriation of their resources by establishing the appropriate prospecting skills, (b) the strong organisational structure, which is a basic need for all kind of Unions and their communities to manage shared resources successfully, and (c) their relationship with the consultant ERA. Ignacio Chapela and M. Dreyfuss also had a great share in the successful establishment of the agreement.

(a) Openness – This first and very important characteristic of the communities is what allowed the collaboration. According to Chapela, these are very open communities, ready to communicate, make experiences and share them with others. Unfortunately, many Mexican communities have been “burnt” by bad experiences in the past, which are distrustful and anxious.²⁰³

²⁰³ Chapela (ERA), 10. Dec. 2001, personal communication.

(b) Organisational Structure – There are many basic conditions needed to manage common natural resources successfully. The analysis will be based on Ostrom’s criteria, previously introduced in chapter five.

(c) Consultancy from ERA – If access to resources of indigenous people and communities is sought, a consultant or representative usually negotiates in the name and interest of the communities. This is usually the state or an NGO. In this case, ERA was responsible for the collection and forwarding of the according information, providing an extensive complete consultancy service. In almost 20 years of successful collaboration, UZACHI developed a relationship of trust and confidence with ERA. The Union considers ERA’s input in the development and establishment of the existing structures as very important. In the light of the results, the UZACHI members still consider the agreement as justified and good. There are no reproaches against the work of ERA.²⁰⁴

However, and this is very important to mention, the UZACHI was the party to the primary agreement and all the decision have been taken by the communities themselves.

The experience of the collaboration was very important to the community. They gained a lot of confidence in their negotiating capacity, and the importance of maintaining traditional systems of controlled access to natural resources, in contrast to public resources, became even clearer (Chapela, F. and Massieu 2001:25).

10.2. Novartis

Despite several initial problems in negotiating the contracts, Novartis established two effectively running collaborations.²⁰⁵ From these and other expeditions, a high number of biological strains of good quality were obtained, which are still being tested and analysed. Experience was acquired in setting up collaborations under the new regulations of the CBD, and in assessing fungal diversity to answer a general scientific question. The preliminary results do not confirm the initial hypothesis that the tropical biome yields a higher diversity of fungi per sample and therefore a higher frequency of new metabolites. The final statistical analysis remains to be completed and discussions on how to continue collaborations are currently taking place (Novartis 1999:9).

Novartis acknowledges the validity of people’s demand to the industry, to recognise their responsibility to society beyond the process of producing marketable goods, expressed in changing needs of the market. Generally, according to Petersen and Henkel, the PI increasingly recognises the growing need to reflect and incorporate the interests of society and of the stakeholders more directly in their business planning (Novartis 1999:5). The PI

²⁰⁴ Luna (UZACHI), 8. Dec. 2001 and Ramírez (UZACHI), 12. Dec. 2001, both personal communication.

²⁰⁵ According to Dreyfuss (Ex-Novartis, 14. Jan. 2002, personal communication), the collaboration with Panama was running well, while in Oaxaca some problems concerning the scientific project support had to be solved. The collaboration with India had to be cancelled after two years, as no samples had been received. The stakeholders in India (Goa) were very suspicious.

also is increasingly aware of the public relations and charitable potential of bio-prospecting agreements (Laird 1993:104).²⁰⁶

As good example for the importance of traditional know-how and natural products in the early 1990s, was the establishment of Shaman Pharmaceuticals. Shaman was often referred to as a bio-prospecting success story. From the point of view of indigenous people, whose rights were finally considered, and a potential benefit promised, this might be true. But the economical reality Shaman experienced, by trying to use traditional knowledge as their basic source for the discovery of novel compounds and product development, was different. In 1999 they had to stop their activities due to financial problems. There was no benefit for the indigenous communities where Shaman collected the samples, and even less an incentive for conservation activities.

In fact, it is becoming increasingly clear that the potential contribution of bio-prospecting to the biotechnology industry and communities involved may not be as substantial, and certainly not as immediate, as was previously believed. This perception may have resulted in both, in over-expectations of profitability in industry, and in over-expectations with respect to benefit sharing, which, in turn, currently is establishing big hurdles for investments in bio-prospecting (Novartis 1999:5-6). Most authors treating this issue²⁰⁷ and all of the interviewed persons from the PI come to the same conclusion.

Without considering the profits, Novartis recognises that biodiversity has important values, including the inherent value of existence. It is an essential asset to human survival and it can generate ideas for new approaches and products, by providing a great range of compounds.

However, if access to biodiversity becomes too bureaucratic, time consuming and expensive, then the importance of biodiversity may become limited to research and academic arenas, instead of market-oriented industrial applications (Novartis 1999:6). That is why Novartis and Bayer are currently concentrating their activities in China, where the political conditions for bio-prospecting are better than in the Latin-American.²⁰⁸

10.2.1. Communication

An optimal system of communication and flow of information, which has to be established especially by the users of the resources and economically stronger partner, generally the PI, is of enormous importance in establishing a successful agreement. There are different reasons for misunderstandings. They may be cultural or economic, or related to a missing capacity, to the lack of information, or simply to distrust.

²⁰⁶ Confirmed by Henkel (Bayer, 16. Jan. 2002, telephone-interview) and Petersen (Novartis, 25. Jan. 2002, telephone-interview).

²⁰⁷ See Chapela, I. (1997), Simpson (1997), Barret (2000), Day-Rubenstein (2001) etc.

²⁰⁸ Petersen (Novartis), 25. Jan. 2002 and Henkel (Bayer), 16. Jan. 2002, both telephone-interviews.

The communication system in this case, mainly based on personal relationships, was working perfectly, but it can hardly be used as a model for setting up other agreements. It is simply not replicable, but at least it shows how complex such systems are.

10.3. Mexican Government

The participation of the government became more important over the last years with the discussion around the missing national legislation concerning ABS issues. There are two main problems. First, it does not allow anybody to establish contracts and therefore to take advantage of their wealth of biodiversity, and second, there is no possibility to proceed legally against illegal collection expeditions.²⁰⁹

10.3.1. Legislation

It is necessary to regulate the access to biological and genetic resources, because it is the only way to generate a benefit for our country from the utilisation of these resources. The regulation is urgent, considering the proliferation of contracts which are beginning to emerge and being signed in Mexico between indigenous or universities and private bodies of foreign countries, not recognising the authority of the Mexican Nation over its natural resources and not offering very clear benefits, neither to the country nor to concerned indigenous people or rural communities (PAN 2000: 3).

The development of the biotechnology and the related bio-prospecting activities in the recent decade has been enormous. Conversely, the legislating process, agreements and regulations have stayed far behind. The result was that most of the concerned agreements in Mexico failed, after the discussion was raised at the end of 1999. The reason was mainly that no common consent of all the involved parties could be achieved (Adame 2000:25).

In Mexico the initiative for a law regulating ABS issues was already designed at the end of the last governing period (1994-2000) and presented recently in April 2001 to the Senate. According to Nordhausen, the initiative will hopefully be approved this year.²¹⁰ The LGEEPA, an important instrument in this issue, provides some legal principles and dispositions, but there are still deep legal gaps to be filled (Torres 1998:6). The missing legislation has given room to different interpretations of the existing articles in the environmental legislation (LGEEPA), and therefore the violation of the rights of communities and nations in general.²¹¹

UZACHI invited members of the SEMARNAP to the signatory ceremony in 1995 and supplied them with information about the ongoing process, without having an obligation to do so. The LGEEPA who links the “exploitation of biological resources with the aim to be used

²⁰⁹ Chapela (ERA), 10. Dec. 2002, personal communication.

²¹⁰ Nordhausen González, 17. Jan. 2002, E-Mail.

²¹¹ Ribeiro (RAFI, 13. Dec. 2001, personal communication) argues that the LGEEPA and the General Law of Wildlife do not mention the genetic resources and recognizes the communities as social objects, only as owners of land plots.

in biotechnology” with the authorization of the Secretariat emerged in 1996.²¹² The LGEEPA, applied, for the first time, in Article 87bis, some basic ideas of the CBD. The need for a PIC and the right for an equitable sharing are mentioned here. Thus, the local community is guaranteed a significant authority on whether or not to allow access to their resources.

The absence of an appropriate legislation is the reason why all bio-prospecting activities have been presently cancelled. The government lacks the basis to issue licences and sign permits, which are accepted by the owners and source providers, the indigenous people and communities. In any case, civil participation in the policy process should be strengthened. Torres (1999:1) sees the reason in the lack of an appropriate law, ten years after the CBD suggested to the countries to establish such a framework, in the fact that there is no consensus between the different social and production sectors involved, between the providers and users.

10.3.2. Civil Participation

Without a strong (financial) support of the government, and adequate civil participation, discussing issues like bio-prospecting or national ABS terms concerning genetic resources is not possible.

The near approbation of the ABS law, as well as an expected update of the local environmental laws, has possible value in promoting the participation of civil society in these subjects. Such a process will accelerate the capacity to implement the CBD and achieve what many call “genetic democracy” (Torres 1998:6).

Unfortunately, in many cases civilian participation in Mexico is often understood by the authorities as a legal proceeding filling a one or two day event, generally taking place in Mexico City. This makes an adequate representation and participation of most of the communities from other parts of the countries impossible. On the one hand, Mexico is a country with three million km², a population of around 100 million people, of which 30% live in total poverty and marginalisation, and with a remarkable deficit of democracy, and, on the other hand, it is a country blessed with an enormous biological wealth. (Torres 1998:2). To reach effective acceptance and implementation of the government’s policy, civilian participation should be wide and decisive in such an important debate, realising workshops all over the country to accomplish a series of proposals.²¹³

As long as there is no law and detailed regulation concerning the handling of micro-organisms, genes and molecules, there is strong pressure on the government to establish such a frame and legalize this topic from both sides, from the side of the users and the side of the providers of these resources. CONABIO should try to coordinate the government secretariats, inform them about the biodiversity topic and try to implement the objectives of the CBD. It is their responsibility to process the existing experiences and to establish detailed initiatives and make proposals.

²¹² It is not clear if this project considered a research project falls under this article.

²¹³ Marielle (GEA), 22. Nov. 2001, personal communication.

For Larson, the moratorium against bio-prospecting activities, as proposed by various social and environmental organizations at the forum about biopiracy and bio-prospecting, does not seem to him a way to reach a consensus. He thinks that, even if there would be a consensus, it is very likely that the development of an adequate politic and legislation takes 8-10 years. (Anonymous 2000 (b):4).

10.3.3. Generated Experiences

The group in favour of a moratorium, some of whose participants are against the logic of the capitalistic systems out of a principle, considered the experiences of the recent bio-prospecting cases as very poor. On the other hand, mainly representatives of governmental agencies, see the generated information as valuable and helpful to develop further strategies and regulations.²¹⁴

Larson also regrets that there is so much ignorance among scientist. He mentions, as an example, that one of the advantages of the UNAM-Diversa case would have been to have a genetic collection, allowing Mexico to arm objections against the registration of this material. According to his knowledge, the UZACHI case demonstrated, that the local communities can reach a sustainable use and appropriation of their resources, and therefore could serve as example (Anonymous 2000(b):2). The Novartis-UZACHI BioLead agreement had been observed by many with great interest.²¹⁵

10.4. Additional Stakeholders

Within the period of negotiations and execution of the contract, no agreements or changes of policy made it necessary to involve other stakeholders. Only with the discussion emerging at the end of 1999 on the UNAM-Diversa contract, first accusations against UZACHI and ERA appeared.²¹⁶ External parties such as RAFI and Ceccam, attacked the agreement retrospectively, considering y typical case of biopiracy.

²¹⁴ Jorge Larson (CONABIO), 21. Nov. 200, Jose Carlos Fernandez (INE), 19. Dec. 2001, and Antonia Azuela (Ex-Profepa), 21. Nov. 2001, all personal communications.

²¹⁵ Larson (CONABIO), 21. Nov. 2001 and Anta Fonseca (SEMARNAT), 5. Dec. 2001, both personal communication.

²¹⁶ Most of them due to the lack of information.

11. ABS Regulations

Overview

The presently examined case is very special and exhibits unique attributes. From the stakeholders (see previous chapter) and property rights up to the PIC and the benefits derived by the stakeholders, all the parts of this case work together in achieving the three goals of the CBD, which are the conservation, sustainable use and equitable sharing of the benefits arising of their use.

To understand how effective this case was, the following analysis has to go beyond its special characteristics and study some basic themes, developments and issues. This chapter discusses the most important ABS issues like property rights, PIC, benefits, compliance and impact upon conservation.

11.1. Property Rights

Columbia University (1999:70) associate three different types of property rights with genetic resources. Namely, (a) the real property rights associated with the land and anything attached to it, including plants, animals and micro-organisms; (b) the rights over the resources isolated from the resource, such as genetic resources and secondary metabolites; and (c) the intellectual property rights as an intangible resource, created by using the corresponding resource.

11.1.1. Real Property Rights and...

11.1.2. ...Isolated Resource Rights

According to Article 15.1 CBD, the state has the sovereign rights over their genetic resources and with it the task to establish appropriate national regulations. In Mexico there do not exist detailed regulations concerning the property rights over micro-organisms as a resource of interest for research institutions and the PI.

Until today, the rights over the resources are generally attached to the property rights of the land where they are found. In Mexico there are different types of property regimes: private property, public property and common property.²¹⁷

The difference between private and common property does not lay in the nature of the relevant rights and obligations, but only in the number of individuals or social groups to which the rules for the management are applied (OECD 1996:201).

Therefore, UZACHI, composed by the four communities, who are represented in the General Assembly, can be considered as a private property owner with the same rights. The Agricultural Revolution returned the rights over their land to the communities. Thus, they are also free, just like private owners, to sell whatever grows or exists on their land.²¹⁸ Further, they are free to establish any kind of private contracts they feel comfortable with, concerning their resources, always within the existing legal framework. What goes against bio-

²¹⁷ There are two forms of management of common resources: the communal and “ejido” management.

²¹⁸ See also Article 27 of the Mexican Constitution.

prospecting contracts today are the political discussion and the insecurity concerning the changing policies.

Public property, like biosphere reserves and national protected areas, on the other hand is generally not restricted to the use or possession of an individual person or institution. That is the reason why the discussion around the UNAM-Diversa contract was raised. The research institute of the UNAM, as the Mexican partner in the agreement, did not have the right to give the PIC, because they are legally unable to represent the public giving the PIC. In that case, the SEMARNAT would have been the responsible authority of issuing the appropriate permits.

It must be considered that, according to Article 15.1 CBD, the property over the genetic resources and its derivatives (a public good) should not be attached to the property right over the land. However, ownership is important for purposes of efficiency. Property rights systems of important mechanisms within the society to create incentives for obtaining the efficient levels of investment (Göschl and Swanson 2000:90).

11.1.3. Intellectual Property Rights (IPR)

IPR create rights over intangible information produced by humankind. There are different forms of protection in the form of patents, PBR, trade secrets, copyrights, trademarks and so on. The idea is that they offer protection to new innovations creating incentives for research activities.²¹⁹ The TRIPS agreement together with appropriate national laws set the standard for national protection. TRIPS requires signatories to recognize patents on most products and processes, making an exception for patents of plants and animals. However, Torres (1998:5) does not consider Mexico's IPR system ideal, neither for the regulation of the use and exploitation of genetic resources, nor for the distribution of benefits.

In the present case, no intellectual property was involved: on the contrary, it was explicitly excluded by UZACHI²²⁰, taking into account the experiences of InBio-Merck, while searching for appropriate terms of a possible agreement.

Ribeiro, in opposite, says that Novartis used the pool of traditional knowledge by assigning the communities to define the best sites for the collection of the samples. She said that they used their traditional knowledge even without knowing it. Ribeiro argues that Novartis would never have been able to generate results of such quality, even employing a dozen of their scientists.²²¹

²¹⁹ Ribeiro (RAFI, 13. Dec. 2001, personal communication) argues that protection by patents has the opposite effect, in that it prohibits an adequate search for further products with similar protected compounds. A possible solution for patent problems could be to reduce the time of exclusive use, or to prohibit patents with implications on the health and nutrition system of earth's population.

²²⁰ Further guidelines of UZACHI: No access to strangers should be allowed, the exploitations should be non-extractive and a technology and know-how transfer should be allowed to add value to the products within the Union (see Table 15).

²²¹ Ribeiro (RAFI), 13. Dec. 2001, personal communication.

The recent experiences made in Mexico with the ICBG-Maya case also show that the consideration of intellectual property immediately raises problems. The level of self-identification is quite high, while dealing with micro-organisms, as a never seen nor even known resource did not raise major conflicts.²²²

According to the contract, UZACHI keeps the right over the resources delivered to Basel, while Novartis has the right to apply for patents from innovations realized during the study, consisting of or containing any compounds derived from these resources (Table 15).

The development of a comprehensive property rights regime is important for successful access legislation and further agreements. Additionally, property rights ensure the fair and equitable sharing of the benefits derived from the use natural resources and its derivatives. According to Fernandez, Mexico is still attempting to define an appropriate legislation.²²³

11.2. Prior Informed Consent (PIC)

According to the CBD, the providers of genetic resources must be informed about the potential of the resources, their future use and how they will be compensated.

The structure and organisation of UZACHI allowed all the participants, the community members to be informed, through the regularly held assemblies. Due to the fact that ERA, responsible for the exchange of information, which were local people with a good insight into the possibilities of the source-users (provided by I. Chapela) and an appropriate trustworthy link to the industry (M. Dreyfuss), there were no problems concerning the language or cultural barriers. The interviews realized within the communities showed that they were properly informed about the contract and its terms, having the possibility to raise objections, discuss them and contribute their own ideas.²²⁴

According to Ramírez and Francisco Chapela, one of the biggest problems of the contract was its continuation and the handling of the generated information. The supply of information to the communities, after completion of the contract, concerning the investigations and results Novartis obtained, had not been mentioned in the contract.²²⁵ In this point, the Union completely depends on the goodwill of Novartis, i.e. if they are willing to announce the finding of an active compound or not.²²⁶ In fact, Novartis seems to be willing to maintain a good relationship with their partners in Oaxaca. In April 1999 Novartis organized a workshop in New York about bio-prospecting and benefit-sharing, to provide a platform for discussion on “neutral land”, sharing their results with invited community members.²²⁷

²²² This situation changed due to the recent discussion on bio-prospecting in Mexico.

²²³ Fernandez (INE), 19. Dec. 2001, personal communication.

²²⁴ Ramírez (UZACHI), 1. Dec. 2001, Luna (UZACHI), 8. Dec. 2001 and Ruiz (UZACHI), 9. Dec. 2001, personal communications.

²²⁵ Ramírez (UZACHI), 12. Dec. 2001 and Chapela (ERA), 10. Dec. 2001, both personal communications.

²²⁶ Strub (Novartis), 11. Jan. 2002, personal communication: There is no reason for Novartis to hide the discovery of active compounds. In the first place, if a new product reaches the market, it is almost impossible to hide provenience of the compounds, and secondly Novartis is interested in publishing a finding, especially in such a case, for promotional purposes.

²²⁷ See Novartis 1999.

11.3. Benefits

11.3.1. UZACHI

“The project has led to more solid land tenure for the communities in question, and a greater political status of the community in terms of their ability to participate actively in decision-making process” (Novartis 1999:10). By participating in the General Assembly, the community members had every possibility to express their opinion. Thus, they played a central role in setting up the management plan and in the development of a framework for the investment needs. This process of common decision-making led to the broad acceptance of the agreement and its benefits among the community members. For the collection activities, a broad range of ecological systems had been considered, consolidating and becoming aware of the existent knowledge and acquiring new information about these ecosystems. The improved recognition of the values of their natural resources is considered to be a very important result of this agreement (Novartis 1999:10). The establishment of a research institution with a trained team can be regarded as a huge and extraordinary progress in the history of Mexican communities.

Mechanisms for Sharing Benefits

To understand how the benefits have been shared, the established mechanisms for benefit-sharing will be presented shortly. According to the Constitutional Act²²⁸ of UZACHI, chapter ten about “Social Funds and Distribution of the Benefits” (De los Fondos Sociales y Reparto de Utilidades), the distribution of the benefits between the communities is regulated as follows.

- Art. 49: The benefits the Union obtained are used for an operational project. 40% of what remains is used for a reserve fund, 30% for a precaution fund and 30% for projects and tasks of regional development.
- Art. 50: The percentage intended for the construction of the reserve or capitalisation fund cannot be distributed between members or used for another aim, if the necessary capital for self-financing of the operation is missing.
- Art. 51: The fund of reserves and capitalisation will be converted to what serves to the members of the Union, and in all of the cases the accordance to convert such funds is taken by the General Assembly.
- Art. 52: The fund for social precaution will be used to satisfy the social goals of the agrarian nucleus and its members.
- Art. 53: The fund for projects and tasks of regional development will be used in accordance with the General Assembly and in co-ordination of the regional authorities.
- Art. 54: The net utilities will be distributed by the Union, in proportion to the volume of operation realized by the agrarian nucleus members.

According to Ramírez, the benefits for the communities are divided in four equal parts, while the funds used for ongoing projects are distributed in proportion to the volume of operation realized by the communities.²²⁹

²²⁸ According to Ramírez (UZACHI, 1. Dec. 2001, personal communication), the constitution act never has been adapted or changed, so in some points it might be quite outdated.

²²⁹ Ramírez (UZACHI), 1. Dec. 2001, personal communication.

Project Results

Different benefits can be identified. Namely, (a) the technology and know how transfer; (b) annual payments; (c) sample fees; (d) salaries for three persons working at the laboratory for four years; and (e) a “success-fee”, which will be paid, if Novartis discovers active compounds among the samples delivered by UZACHI and develops a marketable product. A fixed payment was agreed upon, knowing that it would last years to develop such a product and that the chance for success would be infinitesimally small.

- (a) **Technology transfer:** An inventory of the laboratory, carried out by Pérez, led to the conclusion that around US\$ 100'000.- had been invested by Novartis for the equipment sent to Oaxaca only, not including the transport costs. Today, this equipment is used to produce mycelia of edible fungi and to conduct basic research on other local fungi-species, preferably macro-fungi.

Knowhow transfer: Two scientists of UZACHI went to Switzerland for a stage of four weeks each, to acquire the appropriate skills to prepare the samples. According to Dreyfuss, the search for a scientist to accompany the project was difficult. Both of the mentioned scientists left the project after a few months. The one who finally led the laboratory (and with it basically the project) was Lilia Pérez. She had to generate the according information by reading and talking with the trained scientists. Luis Toti went to Oaxaca for six weeks to help the project start.²³⁰

- (b) **Annual Payment:** This was an amount of US\$ 10'000.- yearly, which had to be shared by the four communities in four equal parts.²³¹ This was the only payment the communities directly received for their use to satisfy short term needs. This money was used for investments in the health or education system, equipment for forest exploitation or funding systems. In Trinidad the established funding system is still working, making small credits available for private projects of the community members (Adame 2000:14). It was also mentioned that the financial contribution was important to establish the production of orchids, today amounting to 80 species.²³²

UZACHI insisted on having a term in the contract, defining the amount of the money to be invested in research projects or programmes for conservation of biodiversity. For Novartis this was an unnecessary term, but it shows the awareness of UZACHI for environmental problems and their readiness to revert to biodiversity conservation.²³³

- (c) **Sample fees:** Additionally to the annual fee Novartis had to pay a productivity quote, a sample fee. The amount of this fee is not known to the author.

²³⁰ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

²³¹ According to the Constitution Act of UZACHI, there is no difference made as to the size of the communities number of inhabitants, size of the forests, etc.

²³² Luna (UZACHI), 8. Dec. 2001, personal communication.

²³³ Strub (Novartis), 11. Jan. 2002, personal communication.

(d) **Salaries:** Three persons were paid by Novartis for the work in the laboratory for four years. Namely, Lilia Pérez (5800 Pesos/month) and her assistants Clara Villanueva and Amparo Martínez (2400.- Pesos/month each). This means, costs of approximately US\$ 50'000.- for Novartis.²³⁴

(e) **Success sum:** The problem concerning the success of the bio-prospecting project in terms of discovering a new medicine or some important compounds was solved by defining a fix amount of money which should be paid.²³⁵ In case of a success, UAZCHI will receive a sufficient payment to form a patrimonial fund for the Union, with which it is possible to maintain a community owned basic technical equipment in perpetuity. According to Gonzalez (2000:4) this was between US\$ 1-2 million for each active compound. For the communities this was considered a “lottery ticket.”²³⁶

The communities distribute the benefits from their activities fairly. Generally, they invest profits back into the business (logging business, fungi) or the project it was derived from, or they spend them on collective goods such as road improvement, the health-care system, education, an auditorium for community assemblies etc.

Novartis spent approximately US\$ 200'000.- for their project in Oaxaca, not including the expenditures for the rehearsing project, the transport, the salaries of the Novartis scientists, the cost of the know-how transfer, and the sample fee. A small expenditure compared to the annual revenue of several billions of dollars of Novartis, while it does seem a lot for a “blind random search” with 100% uncertainty of finding anything useful.²³⁷

Benefits from Present Activities

Today, the laboratory is used to produce mycelia of fungi, realizing investigations of other local macro fungi, ornamental plants and the contamination of maize with transgenic DNA in the surroundings of Oaxaca.

²³⁴ Approximately 510'000.- Mexican pesos.

²³⁵ Gonzalez (2000:4):It may take years to develop a medicine and bring it to market, while the providers often have immediate basic needs, which must be satisfied. The “success fee” was set between 1-2 million US\$.

²³⁶ Ramírez (UZACHI), 12. Dec. 2001, personal communication.

²³⁷ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.



Photo 5: Bag of Shitaki mycelia on pine-timber substrate.

The laboratory mainly produces mycelia of Shitaki (*Lentinus edodus*) and *Pleurotus ostreatus*, two edible mushrooms. The Shitaki is grown on a pine-timber substrate and *Pleurotus* on cereal. According to Pérez approximately 250kg of Shitaki-mycelia is sold yearly in bags of one or half a kilo for 100 Pesos/kg and around 160 kg of *Pleurotus ostreatus* are sold each month (around 2000kg/year) for 30 Pesos/kg. (Photo 5). UZACHI sells the mycelia together with the relevant information how the fungi are being produced. The mechanism of commercialisation is still improving.

According to Pérez, by working only on fungi, considerable profits could be made. But as a centre of investigation, their main task is not to concentrate on profits but to do research.²³⁸ The ornamental plants did not reach the market yet, but there was an exhibition in December 2001 in the City of Oaxaca, where the UZACHI presented their different products (furniture, fungi, orchids, epiphytes, etc.) as first intent to bring their new products to market (Photo 6).

The direct monetary benefits in this agreement are low, while the non-monetary benefits, like capacity building and technology transfer, have been emphasized strongly. There was no third party taking advantage of the communities' efforts as mentioned by some critics. The communities not only have been the providers of the PIC and the resources, they also received the negotiated benefits directly.

²³⁸ Pérez (UZACHI), 5. Dec. 2001, personal communication.



Photo 6: Epiphyte on a young pine tree trunk.

There are also others, who can be perceived as beneficiaries, such as research and academic institutions, the government and the international community. *There is a hierarchical relationship among them, so that higher geographic and administrative levels include the subsequent lower ones. As a result of this hierarchy, benefits at a higher level, such as the international community or state government, could be perceived at each one of the levels below. [...], this potential may or may not be realized depending on the type of relationship that exists between these different levels. (Columbia University 1999:75).* Surely, it also works the other way around. If a lower level benefits, institutions and organizations on the same and on higher levels will also benefit. This is clearly shown by the present activities. UZACHI is selling mycelia and with it the package of knowledge needed to produce the fungi. This is a benefit on the same level, for all interested neighbouring communities, while the results of the research concerning genetically modified crop must be considered of international interest related to the question of the world's food safety, and therefore a benefit to humanity (Chapela, I. and Quist 2001:541).

Counting on a secure income from timber products, they do not feel inhibited to try to diversify their product range, also making investments in basic research. The laboratory is a small but important piece in this puzzle of communal activities. They keep on investigating and searching for new projects, this is what makes the case of UZACHI special and interesting.

The community members of UZACHI, despite of all the criticism, are satisfied with the results and the benefits generated by the bio-prospecting agreement with Novartis.²³⁹ Not only because it generated some direct financial benefits, but also because it allowed the creation of a team with a basic know-how to run a laboratory, which is considered important for developing further projects. With the project and the laboratory a further appropriation of, up to then, unknown resources is possible.

11.3.2. Novartis²⁴⁰

A central point of the CBD is the equitable sharing of benefits. With this goal it aims to reach a sustainable use and conservation of the resources accessed, as well as to give local people the possibility to benefit from the natural wealth on their land. Many cases of biopiracy spread a deep feeling of mistrust against bio-prospecting industries. The establishment of rules and laws is expected to have a positive effect on all the participants (Columbia University 1999:74). The benefits obtained by this agreement are of monetary and non-monetary nature, and they also may be temporal.

Scientific Concept

According to the results of the analysis of the isolations, skilful “cherry picking” of strains leads to a higher discovery rate of biologically active and diverse strains than random isolation. Biological assays and metabolic activity turned out to be better parameters for selection than broad morphological attributes, which are not providing enough information for classification.

An important result was that fungal strains in leaf litter samples displayed a higher biodiversity, compared to soil or fresh plant samples, but there was no significant difference found between leaf litter samples from different regions.

The differences over the three countries, assessed by chromatographic methods and activity in biological assays, did not correlate with the climate origin. Overall, there was a slight tendency towards a higher proportion of creative strains in tropical samples compared to sub-tropical ones. Fungi from soil samples were less diverse, but contained a higher proportion of creative strains than those derived from other sample types. In contrast to the expectations, there was no correlation between the diversity of fungi within a sample and the proportion of creative isolates. Only some morphological characteristics, such as colour, showed some correlation with creativity of the strains.²⁴¹

²³⁹ Ramírez (UZACHI), 1. Dec. 2001, Luna (UZACHI), 8. Dec. 200, Pérez (UZACHI), 5. Dec. 2001 and Ruiz (UZACHI), 9. Dec. 2001, personal communications.

²⁴⁰ This part is based on Novartis (1999:8).

²⁴¹ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

Adherence with the CBD

The contract, as far as the author could assess without seeing it, but by talking with the involved persons and revising the documents, it fully adhered to the very general guidelines the CBD gives about ABS problems.

Microbial Strains

Novartis, considering the result from all of the three partners, had obtained more than 20'000 microbial strains from Panama and UZACHI by the end of 1998. More time than anticipated had to be invested in obtaining these strains of good quality. An additional 15'000 strains were collected by expeditions Novartis carried out within the project. Culture broth extracts of 7000 strains have been tested in high-throughput screening, and 60 structurally new compounds had been found until 1999. However, up to date, no lead compound has been nominated so far.

The mentioned numbers of samples collected in Mexico lies between 6000 and 7000 extracts, which have been sent to Switzerland.

Novartis considers this agreement a success. The scientific question could be answered, despite the loss of information during the time of the merger. Further, important experiences could have been made by applying the CBD in collaboration with a rather unusual partner, such as a community organisation without previous scientific skills, and last but not least, the microbial material obtained was considered of a good quality, and the raw material can be used as input for the further research process.²⁴²

11.4. Compliance and Conflict Resolution

At the level of the individual bio-prospecting agreement, compliance depends upon the contractual environment, the particular relationship between the contracting parties and the availability of an established legal system under which disputes may be resolved. In the larger arenas of national and international policy and legislation, compliance to generalized norms and procedures informed by individual access agreements is determined by overall state capacity and the relative strengths of its collaborating institutions. (Columbia University 1999:77).

The compliance and conflict resolution mechanisms in this case are based on the community structure and organization needed for the communal management of common resources.

According to Strub a term in such a contract says that the partner, in this case UZACHI, has to check the terms of the contract and make sure that they agree with the national legislation and international commitments (CBD).²⁴³ On the national level, there was almost nothing to consider so far, because the LGEEPA was revised in 1996.

²⁴² Dreyfuss (Ex-Novartis), 14. Jan. 2002 and Strub (Novartis), 11. Jan. 2002, both personal communication.

²⁴³ Strub (Novartis), 11. Jan. 2001, personal communication.

There are different points encouraging compliance by the communities. The decision for the collaboration had been taken without any economical pressure. It was a common decision and therefore broadly supported. The established communication system (UZACHI-ERA-I. Chapela- Dreyfuss) was frequently used, and therefore reduced the chance of disputes and failure.

The only “Security measure” within the contract concerned the laboratory equipment, which stayed in the possession of Novartis, until UZACHI accomplished their obligations. On the other hand, if Novartis would not have paid the salaries or the annual fee, UZACHI would have been allowed to keep the equipment (see Table 15). According to Strub, there were no enforcement mechanisms like penalties, fines or sanctions.²⁴⁴

11.5. Impact on Conservation

Only one of the objectives of the CBD is the conservation of biodiversity and its sustainable use, meaning that there should not be a long-term decline of a resource.²⁴⁵

If we talk about conservation of biodiversity, the motto of Daniel Janzen, “you gotta know it before you use it, and you gotta use it before you preserve it” (in Chapela, I. 1997:251), includes the basic actions to be considered. Before being able to realize conservation, knowledge and the identification of a use are very important.

With the establishment of the PCMT, the communities defined the areas of exploitation, renovation or protection of their forests and with them the conservation measures. By strengthening the communities and their activities, a direct impact on their conservation activities can be expected, which are considered substantial.

The collection of the samples by the project can be considered non-extractive, because it concerned very small quantities of material. Thus, no negative impact on the biodiversity has to be expected thereof. The benefits generated within the activities of the project, helped to develop alternative activities, as well as an improvement of the sustainable exploitation of the forest, concerning timber. Also important is that, with the further appropriation of the natural resources, an increased awareness of the importance of natural resources was developed.

Interestingly, UZACHI insisted on having a term within the contract, absolutely unnecessary from the point of view of Novartis, clearly defining which amount of money they would spent on conservation activities and programs.²⁴⁶

11.5.1. National Biodiversity Protection

In Mexico, Biosphere Reserves, National Parks, and four other categories form the National System of Protected Areas. The most successful of them are either those so remote or with

²⁴⁴ *ibid.*

²⁴⁵ Ecological Sustainability is directly related to conservation through the concepts of harvest and yield. At species level, for example, ecological sustainability is achieved when the harvest from the population does not exceed the potential yield. At ecosystem level, ecological sustainability is accomplished when harvest does not degrade the capacity of the ecosystem to sustain itself (Robinson, J. (1993) cited in Columbia University (1999:80)).

²⁴⁶ Strub (Novartis), 11. Jan. 2001, personal communication.

very strict conditions as to be almost uninhabited, or those where a strong institutional presence has led to an educational process involving local communities. Non-protected areas with large forest covers are often associated with forestry ejidos or communities, which control their resources and derive an immediate economic benefit from them, like in the case of UZACHI (OECD 1996:199-200).

A clear definition and strengthening of property rights, as mentioned, is a condition for the successful management of protected areas, because it (a) reduces the discount rates of the social actors by offering security and clear rules, (b) it provides a clarification of the roles of the different stakeholders involved in the area, and (c) it reduces the risk of non-co-operative behaviour (OECD 1996:201).

Common property systems, predominant in most of the natural areas of Mexico, may become the major factor in conservation of nature on the local level. According to Chapela (1999(a):455) the presence of organisational systems in Oaxaca makes public parks unnecessary. The management the National System of Protected Areas is cost-intensive and therefore only makes sense in areas where absolutely no incentive exists for private property ownership to preserve areas rich in biodiversity, which consequently are destroyed and converted to other uses.

Unions like UZACHI open the potential to establish private biodiversity maintenance systems. In such communities there exists a strong incentive to maintain and manage their resources and the natural environment in which they are living in a sustainable way. Additionally, their system of monitoring generally works better than the one existing in public parks, where a few hired persons from outside, living on a low salary provided by the state, largely lack the incentive to do a good job.²⁴⁷

Since 1990, several organisations in the state of Oaxaca are reinforcing a system, which encourages innovative biodiversity conservation plans for genes, habitats and landscapes. The BioLead project was just one additional approach in this line of action. Presently, there is a discussion of how environmental services, such as carbon sinks and watershed protection, provided by communities, could be compensated for (Chapela, F. 1999(a):455).

²⁴⁷ Chapela (ERA), 10. Dec. 2001, personal communication.

12. Collective Management of Environmental Resources

Overview

For the successful completion and fulfillment of the contract, the structure and organization of the communities, concerning the collective management of resources, is of paramount importance. The following chapter provides an analysis of the communities, considering their management of the common resources. The analysis was based on the principles and rules Ostrom considers important for a collective management of environmental resources.

The result is astonishing. UZACHI disposes of almost all appropriate conditions. These basic structures are not only important to organize and realize timber exploitation, generating the basic income for the communities, but also to accomplish all further programs and projects. The BioLead project was just one among others. Dreyfuss considers such basic structures as fundamental for the realization of a well-functioning agreement with indigenous communities.²⁴⁸ Another advantage the Union and other communities in this region have is the professional and trustworthy consultancy of ERA.²⁴⁹

The analysis is divided in the basic Principle (P), User-conditions, (U) and the Resource-conditions (R):

Principles

- P1. Clearly defined boundaries: This was the first step and quite a difficulty within the re-appropriation of the resources, after the fight against FAPATUX was won;
- P2. Congruence: The rules were established by the “comuneros” themselves and therefore are respected and considered to be fair;
- P3. Collective choice arrangements: Everybody can propose changes of operational rules, but the decisions are taken by the General Assembly. The structure of UZACHI is very democratic;
- P4. Monitoring: A strong social capital exists, and thus the incentive for opportunistic behaviour is low or leads to the immediate denouncement of rule-breakers;
- P5. Graduated sanctions: It is the task of the Monitoring Council to detect the damage and impose the sanctions, approved by the General Assembly. Some years ago, a commissioner of the common goods broke one of the use-rules and was immediately expelled from his office. The social branding weights heavily;²⁵⁰
- P6. Conflict resolution mechanisms: The arena for conflict resolutions are the different assemblies on communal and Union level. Recently, one of the communities had internal conflict. UZACHI exempted them from the obligation to attend the Assembly until they solved their problem, then they returned to participate in the life of the Union;

²⁴⁸ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

²⁴⁹ Chapela, F. (2000(b)): Francisco Chapela presents in this manual the most important points of the communitarian management of biodiversity, in accordance with the rules and principals of Ostrom.

²⁵⁰ Ramírez (UZACHI), 12. Dec. 2001, personal communication.

- P7. Minimal recognition of the rights to organize: The communities are free to organize themselves as long as their activities lay within the legal framework;
- P8. Nested enterprises: UZACHI is not part of a larger system. They are absolutely autonomous.

Attributes of Users

- U1.Salience: The communities of UZACHI generate their basic income with their timber industry. Thus, at the time of establishing the bio-prospecting agreement, they never expected this contract was going to solve their basic needs. It was established as a possibility for an additional income, and to develop their know-how and technological skills. Thus, they could take their time to think and discuss the agreement terms, and to express their opinions;²⁵¹
- U2.Common understanding: Experiencing the destruction of their forests, caused by the bad management of FAPATUX, they lived through the impact of exploitation, and also observed the abilities of regeneration of “their” ecosystems. Thus, they decided not to allow any more extractive activities in the protected areas;
- U3.Discount rate: The communities are very careful in handling the forest, mostly cutting less timber than suggested by their sustainable management plan;²⁵²
- U4.Distribution of interests: Everybody is similarly affected by the lack of coordinated action, independent of economic and political differences;
- U5.Trust: It exists, raised by the positive experiences that the members made within the established system. Persons from all over the state visit UZACHI and its communities, interested in learning from their successful way to manage community life;
- U6.Autonomy: There are no external authorities having influencing on the communal rules of access and use of the resources;
- U7.Prior organisational experience: The contributions of ERA are very important, as it helped the communities to build up and implement an organisational structure, always providing the appropriate information.

Attributes of Resources

- R1.Feasible improvement: The management of the system by particular persons is impossible. On the contrary, the collective management leads to a substantial improvement (construction and maintenance of roads, re-planting forests etc.);
- R2.Indicators: With a repetitive stocktaking, the annual timber growth and therefore, the sustainable yield, can be calculated easily. The management of this kind of temperate forests is easy and the regeneration is quite fast. The pine-oak forests of this area are considered a stable ecosystem with high productivity;
- R3.Predictability: It is easy to predict the flow of resources, because the stock and the annual increment of each area is known;

²⁵¹ Chapela (ERA), 10. Dec. 2001, personal communication.

²⁵² *ibid.*

R4.Spatial extent: The system is not too big. Every community manages their own forests easily with their own employees, supported by an excavator, to pull the logs out of the forest. As long as the mechanization is not more sophisticated, the forests are big enough to provide work for a team in every community.

UZACHI is one of the communities, which successfully established an effective democratic community system to control their resources, especially their forests. They are investing in reforestation and the productivity of their resources.²⁵³ UZACHI has an established system of management rules and institutional characteristics.

Vigorous, regular and well attended community and Union Assemblies are one of the standard features for a successful community. As above described, UZACHI organizes each month an assembly with a strict management and monitoring system not allowing deviation.

The collective management of their resources presents advantages in establishing other institutional relations and agreements. The forest is the fundamental productive capital of UZACHI, and surely an element of identification. Thus, it is not surprising that local communities like UZACHI plan the management of their resources in the long term. It is not the immediate and high income they are trying to reach, but the sustainable reproduction of their resources (Merino 2000:13).

According to Merino, a big social capital exists in the communities of UZACHI, maintaining the potential for opportunistic behaviour low, and thus reducing the costs of monitoring.²⁵⁴

The existence in UZACHI of the majority of the above mentioned user- (U) and resource- (R) conditions is a very positive indicator of their social capital, and thus, of the favourable conditions for conservation and management of their ecosystems, which have been set up and developed already in an internal process, in co-operation with ERA in the last 20 years.

In the management of biodiversity, the development of these conditions represents a wide area of investigation, education and technical assistance for governmental and non-governmental institutions like ERA.

Hopefully, future policies in Mexico, not only concerning conservation purposes, will be set up on the basis of an understanding of both the strength and limitations of self-governance of common-pool resources (Ostrom 1998:21). However, the lack of an appropriate national legislation was not a problem in this case, because their regulation mechanisms and the positive relationship between the stakeholders made a super-ordinate regulation unnecessary. The contract in this case, though, seems a good instrument to allow the consolidation of the appropriation of the natural resources by the communities and generating a benefit.

²⁵³ Torres (UZACHI), 4. Dec. 2001, personal communication.

²⁵⁴ Merino (UNAM), 23. Nov. 2001, personal communication: Shared norms, relations of confidence and reciprocity, knowledge about the resources, etc.

13. Technological Change and the Value of Natural Compounds

Overview

Not only the policy problems and missing community structures in developing countries are big obstacles for bio-prospecting activities. The new technologies over the last decades led to new methods for research and development. This chapter will argue that such changes in biotechnology are closely related to the value of natural compounds, and thus also to the importance of bio-prospecting activities.

The PI's are not interested anymore in bio-prospecting with the scope experienced in the early 90s.²⁵⁵ Pharmaceutical firms realized that they overestimated the returns; therefore other ways of financing conservation have to be found.²⁵⁶

This chapter will try to objectively assess the current status and future potential of bio-prospecting.

13.1. Technological Change

In the traditional western culture, biological species in the wild were always of limited economic interest. The only species with great value have been the ones providing immediate uses like food, fibre, fuel and transportation. The colonial exploitation since the 15th century, nevertheless, underscored the potential of many wild species. The developments of techniques of extraction and Mendelian genetics enabled the use of other species from the wild. Recently, DNA splicing and the techniques of high-throughput screening have extended the field of useful wild species even further. By developing screening methods and analysis, the capacity to value more species at each step increases, finally valuating biological diversity from an economic point of view (Chapela, I. 1997:241).

Biodiversity prospecting in the past was the collection of plants and other material in source countries, sometimes depending on where people went on vacation.²⁵⁷ Dreyfuss, realized himself in the years between 1976 and 1989 various collections for Sandoz. No legal protection existed to protect genetic information from unfair appropriation (Cottier 1997:7). This activity concentrated on collection and identification of natural chemicals, which organisms and plants may use to protect themselves against predators or diseases.²⁵⁸ In recent decades, as mentioned, biotechnology added considerable value to genetic resources, reaching profits of billions of dollars with some genes or organisms. This, nevertheless, concerns only a few genes.

²⁵⁵ Eisner (1991:202): He sees chemical prospecting or bio-prospecting, the search for novel products, as a possibility for the conservation of biodiversity.

²⁵⁶ Barrett (2000:297): In February 1999, Shaman realized that it had overestimated the expected returns of bio-prospecting, and announced the cessation of its unprofitable pharmaceutical business.

²⁵⁷ Möller (Novartis), 14. Nov. 2001, personal communication.

²⁵⁸ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

According to Macilwain (1998:535) “there is not much more bio-prospecting going on than there was ten years ago” and “the (expected) rush has not materialized.” He mentions as a reason for the current slow-down concerning bio-prospecting, the growing reliance of the pharmaceutical companies on combinatorial chemistry, which presently is their favoured source in the search for biologically active compounds with the potential of being tested for new drugs. Dreyfuss, Petersen and Henkel also mentioned that the search for natural compounds and investment in this sector tend to decrease. Most of the PIs are reducing their investments in natural compounds or just closing the concerned department. In contrast, Novartis is presently developing its natural compound department. Nevertheless, the share this department has and its importance in R&D is quite small.²⁵⁹

Thus, the “research arms of most drug companies now see the systematic testing of synthetic molecules as the most promising route to tomorrow’s therapies” (Macilwain 1998:535). But Dreyfuss argue that interest is likely to return to natural prospecting in the future, because it can provide new classes of materials that supporters of combinatorial chemistry would never imagine, particularly in the search for new genes.²⁶⁰

Macilwain (1998:537) mentions, in accordance with Dreyfuss, Petersen and Henkel, that neither pure combinatorial chemistry nor solely bio-prospecting will produce the best results, but that a combination of natural and synthesised products will lead to future drugs.²⁶¹

13.1.1. Product Development

Combinatorial chemistry, gene technology and genomic research are very powerful tools for the generation of “new” substances and large substances libraries for screening. Combined with “high-throughput-screening” thousands of substances can be screened per day (see Table 14). In comparison, the period between the initial stages of bio-prospecting (negotiating contracts) to analyzing substances is a long, drawn out and haphazard process. While it is true that there are many more organisms unknown than known – micro-organisms, insects and plants – it is not so clear whether this can be translated into a breathtaking source for “new” substances as it is believed by the public (Novartis 1999:5).

Today, drug prospecting entails collecting samples that are screened²⁶² for their activity of efficiency to cure a certain disease (cancer, AIDS etc.). Random collection is a preferred method by drug companies, because it yields more diverse samples.²⁶³

²⁵⁹ Petersen (Novartis), 25. Jan. 2002, and Henkel (Bayer), 16. Jan. 2002, both telephone-interviews and Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication. According to Macilwain (1998: 535), the emphasis in the future will lay on the collection of genetic information for application in drug discovery or genetic medicine and genetic engineering of crops.

²⁶⁰ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

²⁶¹ Petersen (Novartis), 25. Jan. 2002, and Henkel (Bayer), 16. Jan. 2002, both telephone-interviews and Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

²⁶² Lesser (1998:34): Screens = Tests for biological activity. Until recently, screening involved a slow expensive process of subjecting growing cultures to the materials and observing any destruction. More recently, the process has been automated by using probes containing the structure of the target organisms (bacteria, cancer cells, etc.), to see if the extracts are of a shape, which will bind themselves. Screens are increasingly specific, with the most particular ones held by companies as valued property secrets.

The search for new lead-substances for pharmaceutical or agrochemical purposes was mainly based on chemical approaches. Novartis for example, generated and assessed more than 300'000 samples by chemical synthesis over the last 30 years. These molecules were analysed and their properties screened for e.g. antibiotic action, disease treatment, as well as agrochemical potentials. The focus is generally laid on small molecules due to biological and economic reasons, as they can be produced on a large scale at low costs.²⁶⁴ This classical approach is also labour intensive and often of random design, suggesting a clear need for more focussed efforts to obtain lead substances with appropriate potential to develop new pharmaceuticals or agrochemicals. This implies the need for a more structured and formalised R&D procedure (Novartis 1999:5).

Table 16: Microbial Strains for the Lead Finding

Drug R&D is a labour intensive, time-consuming and increasingly expensive process. Novartis estimates that it takes in average of 11.5 years from the point of discovery of a substance to its Introduction in the market, which is a long time for an industry figuring with short term periods. Further, such a product would cost approximately US\$500 million, a comparatively expensive process. The microbial culture broth extracts enter the discovery process today by the high-throughput screening, where 100'000 samples per assay are analysed. Most are represented by crude microbial culture broth extracts; others are pure, mainly synthetic compounds and combinatorial libraries (Novartis 1999:7).

It must be understood that there is not an endless supply of new molecules for screening and more time will be needed in the future to find new promising leads (see Table 16: Present average time for product development and monetary input). Novartis argues that in addition to the chemical approach, an enormous number of soil extracts, animals, plants and micro-organisms, the most important resource in the present case, obtained through bio-prospecting activities, have been screened. Nevertheless, only a few substances have made their way into pharmacy, a statement which is strongly challenged by several NGOs, which argue that natural resources are the main suppliers of pharmaceutical products (Novartis 1999:5). The fact is that work with natural compounds is very time consuming, as there are only limited capacities exist in this sector. At Novartis, of around 2000 scientific researchers only 15 work with natural compounds.²⁶⁵ A great stock of resources waits processing. This leads to the conclusion that in the next years there is basically no need to realize further collections.

²⁶³ Simpson (1996:180) argue that this is not true, that, on the contrary "pharmaceutical researchers do not generally conduct random searches; rather, they begin searching in the most promising taxa".

²⁶⁴ Henkel (Bayer), 16. Jan. 2002, personal communication: Larger and more complicated molecules often have the disadvantage that they cannot penetrate into body cells (biological limitation). Further, too many steps are required for their chemical synthesis, producing a comparatively small overall yield (price aspect).

²⁶⁵ Strub (Novartis), 11. Jan. 2002 and Petersen (Novartis), 25. Jan. 2002, both personal communication.

13.2. Value of Natural Compounds

The opinion exists, as mentioned, that biodiversity prospecting offers a compelling reason and possibility to save the world's biodiversity. The search for genetic and biochemical resources should lead to the discovery of a cure for diseases, such as cancer or Aids. This, together with the need for other pharmaceutical and agricultural applications, should provide an incentive strong enough for conservation of nature. This is the idea. The persons interviewed in the pharmaceutical business expressed considerable doubts about the correctness of this opinion.

According to Simpson (1997:1), many studies have been made by RFF (Resources for the Future), showing that the loss of biodiversity has little to do with the discovery of the next miracle drug. Furthermore, there are many different resources (animals, plants, micro-organisms) researchers can examine, and thus the sources of useful products might turn out to be either redundant, or so rare as to make discovery unlikely.

That natural compounds are less attractive to PI does not mean that they are not important. They are the products of a long evolutionary process, of organisms or micro-organisms developing many interesting compounds to defend themselves, and to adapt to a special surrounding. Further, they really do work in nature, while combinatorial chemistry can produce any quantity of molecules, not even knowing what they could be used for. Many of the natural compounds have proven to be of great value in the agricultural or PI. In the USA nearly 25% of the prescription medicines contain active ingredients derived from plants, while many others are synthesized or improved forms of natural compounds.²⁶⁶ Thus, it is not surprising that in formulating policies concerning the conservation of nature, medical reasons are considered to be most important.

Researchers have shown that (...) the value of marginal species is negligible, when there are large numbers of species available for testing. The value of the marginal species is equal to the expected payoff from testing it times the probability that all other species fail to provide the product researchers seek (Simpson 1997:2).

The numerical estimation on the value of the species depends on (a) the quantity of species available for testing, (b) the quantity of sought products, (c) the financial rewards, and (d) the relative value placed on future, as opposed to current, earnings. Even if these conditions are favourable, the estimated value of biodiversity for use in new product research is small (Simpson 1997:2).

Investigations show that the willingness to pay for preservation of biodiversity is very low, even in biodiversity hot-spots (see Table 17).²⁶⁷

²⁶⁶ Simpson (1997:2): Today leukemia is treated with medicines derived from the rosy periwinkle of Madagascar and the Pacific yew tree is the source of a promising treatment for ovarian cancer.

²⁶⁷ Simpson (1997:4): The estimated prices in this table have been calculated by using a formula biologist often employ to predict how species distinction is related to habitat loss to estimate the effect of a marginal hectare in preserving species.

Table 17: Pharmaceutical company willingness to pay to preserve a hectare of land in a dozen biodiversity „hot spots“ (Simpson 1997:6)	
Hot spot	Value in dollars per hectare
Western Ecuador	\$ 2.29
Southwestern Sri Lanka	\$ 1.67
New Caledonia	\$ 1.38
Madagascar	\$ 0.70
Western Ghats of India	\$ 0.53
Philippines	\$ 0.52
Atlantic Coast Brazil	\$ 0.49
Uplands of western Amazonia	\$ 0.29
Tanzania	\$ 0.20
Cape Floristic Province of South Africa	\$ 0.18
Peninsular Malaysia	\$ 0.16
Southwestern Australia	\$ 0.14

The idea that the prospecting activities will follow an incentive for conservation covering larger areas is wrong. Prospecting activities are seldom, limited in time and the input (monetary as well as non-monetary) is comparatively small.

The benefits derived by UZACHI, mainly of non-monetary kind, are very valuable to them for different reasons (appropriation of the resources, development of new products etc.), but its impact is limited. Comparing them to the timber business, whereof their basic income is derived, they are marginal, and therefore no major impact can be expected concerning conservation.

Though the commercial value of biodiversity is estimated to be low, which does not mean that its overall value, i.e. ecological, aesthetical and ethical values, is low as well (see Chapter 2)? In fact, such values are not considered in economic thinking and cannot be compensated by the PI. Other more applicable incentives for conservation, such as the compensation of environmental services, must be developed.

The compensation of environmental services (carbon sinks, watershed protection, maintenance of landscapes, habitats, vegetable varieties, etc.), as presently discussed in Oaxaca, can be expected to generate funds which will be equally distributed for the achieved conservation efforts at national or state level. “Biodiversity of Oaxaca”, a sustainable use and management program for biodiversity for the Sierra Norte of Oaxaca for example, proposes the establishment of community by community long term voluntary contracts, realizing their own strategy for the use and development of the local resources. A regular evaluation will annually control the fulfilment of the responsibilities. Their financing shall be guaranteed through various channels, such as Clean Development Certificates, fees for the use of water, eco-tourism, sale of seeds and plants, etc. (Chapela, F. 1999(a):457-460).

Presently, the importance of natural compounds is decreasing throughout the PI. Novartis and Bayer, both still working on this sector, maintain agreements in Asia, waiting for better legal

conditions in South and Central America.²⁶⁸ A few personal statements of scientists working with natural compounds will provide a more profound insight:

Dr. F. Petersen (Novartis): According to him, the importance of the research in natural compounds has decreased in the recent years. He says that bio-prospecting may make some contributions fostering existing incentives, but it is definitely not a way to generate enough financial resources to create sustainable conservation activities.²⁶⁹

Dr. M. Dreyfuss (Ex-Novartis): He explains the changes in technology in a graphical form. He argues that the inputs from natural compounds in the screening process were, comparatively, higher in the past, in relation to the screening methods or filters available.

Figure 7 depicts the two situations, past and present. The left funnel shows, that many samples (input) in the past were screened for few activities (filters), while today (right inverse funnel), the input is smaller, compared to the quantity of screening methods (or filters).

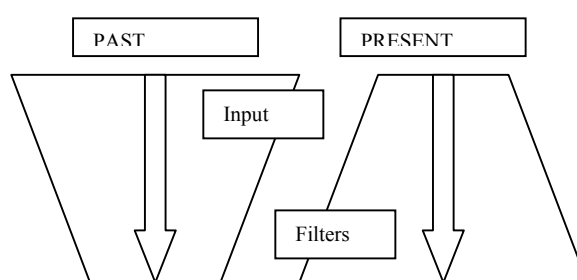


Figure 7: Comparison of present and past concerning input and filters used in the screening process.

Dreyfuss considers bio-prospecting activities as just having a small potential for the conservation of biodiversity in a larger context. But he is convinced that some important contributions fostering conservation incentives on the local level can be realized.²⁷⁰

Dr. T. Henkel (Bayer): According to him, the charm of natural compounds is, that they are evolutionary pre-selected substances with a much higher “hit” rate than synthetic compounds, but the recent development emphasises clearly the combinatorial chemistry. Retrospectively it can be said, that natural compounds were successful. Looking at the “development-pipelines”, where the future pharmaceuticals are developed, almost no natural compounds can be found. He states, that the expectations, that bio-prospecting will open a significant income for source countries, will not be fulfilled. The fairytale of the “green gold” raised a lot of misunderstandings. He considers the incentive for conservation created by the PI to be small.²⁷¹

Natural compounds and their derivatives may continue to be of interest for the PI, especially in combination with combinatorial chemistry, while, hopefully, bio-prospecting becomes a recognized (by all the stakeholders) and “fair” activity concerning the distribution of the benefits. But bio-prospecting, at least within the next years, will not have the potential to create or support conservation incentives to a larger extent.

²⁶⁸ Henkel (Bayer), 16. Jan. 2002 and Petersen (Novartis), 25. Jan. 2002, both telephone-interviews.

²⁶⁹ Petersen (Novartis), 25 Jan. 2002, telephone-interview.

²⁷⁰ Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

²⁷¹ Henkel (Bayer), 16. Jan. 2002, telephone-interview.

PART E – CONCLUSIONS AND RECOMMENDATIONS

14. Lessons Learnt and Transferability of Experience

Overview

The aim of this study was to examine the ABS terms of the BioLead agreement between Novartis and UZACHI, as well as to analyze what conditions, which are important in the accomplishment of such an agreement, and to investigate if bio-prospecting is a viable method of finance biodiversity conservation. This chapter will present the lessons learnt, especially by the Mexican partner, and judge if this case or the appropriate conditions are replicable.

14.1. Lessons Learnt

The Novartis-UZACHI BioLead case is an interesting example of how local community structures, supported by a regional consultant, and including their personal network of relationships, can establish a working agreement with a multinational pharmaceutical giant, like Novartis, and design a locally tailored response to the objectives of an international convention such as the CBD. It may be useful to other countries, to enhance the understanding of the problems and capture the necessary conditions to formulate their own policies, always taking into account that the political realities and the property rights issues are constantly changing and depend on who the stakeholders are.

The following lessons can be drawn from the BioLead project:

Communities

- Capacity building in local communities is the clue to every participatory process, and to an adequate use and management of the natural resources in their areas;
- Bio-prospecting can be seen as a possibility for resource providers to generate benefits from biological diversity, even if it is a small one with a limited impact. Bio-prospecting agreements, however, are a step forward, compared to previous collection methods by the PIs;
- Communities should always have the last word concerning the use and protection of their resources, and their decisions should be respected.
- The resource providers and the resource users (mainly PI) should be able to communicate as equal partners, without any economic pressure;
- Communities can play an active role in the use and management of their resources, as well as in establishing collaborations with PI, such as in the present case;
- The existence of basic organizational and institutional structures (and social capital) is essential for the successful completion of such collaboration;
- Non-monetary benefits, like know-how and technology transfer, are far more important than monetary benefits, to achieve a long-term impact on the development of the source providers. Monetary benefits may be important to satisfy short-term needs.

External Consultancy

- External consultancy and development programs are essential for the establishment of community structures and of sustainable management;
- The external consultancy can provide conciliation, translation and assessment services, but should not intervene in decisions of communities, nor act as commercial intermediary in such an agreement;
- The external consultancy can help to reduce tensions between providers and users, by establishing an information and communication system.

Pharmaceutical Industry

- Cultural differences must be considered, and accurate information should be provided by resource users about aim and purpose of the agreement (PIC);
- Traditional know-how, as well as plants and animals, have a great potential of personal or cultural identification. Thus, these types of resources are very susceptible to conflicts;
- The instability, considering the frequent mergers nowadays, of the large industries is high. Therefore, the financing of such agreements must be ensured at the time of signature;
- The economic value of natural resources lay way below the social value of biodiversity (See Figure 1, including all types of values), and therefore is not high enough to create or support the conservation of biodiversity in its entirety. Other incentives for conservation must be found;
- Prospectors require certain pre-existing conditions to conclude contracts. These are, among others, clearly established property rights, high biodiversity, a limited number of stakeholders, basic institutional organization, a management plan for the resources, and, preferably, previously established research facilities and trained staff.

Governments

- Adequate regulations and legislation concerning ABS issues should be set up at least on a national (and regional) level;
- A responsible authority at a national level, with the task to develop and monitor appropriate guidelines for bio-prospecting activities, and clear juridical procedures for respective inquiries, should be established;
- National authorities should intervene as little as possible, if existing structures allow an optimal legal process and conclusion of collaboration, as observed in the presently studied case;
- The civil participation in setting up policies concerning genetic resources should be strengthened. Especially the question the PIC, the access terms, and the equity, talking about benefits, must be discussed;
- As long as there is no national basis to participate in the trade of genetic resources adequately, like programs, plans, strategies and national research institutions with the

basic biotechnological skills, it is difficult for Mexico to strengthen their position in bio-prospecting and to maximise the benefits;²⁷²

- The government should explore new forms of protection for IPR.

The present project was also highlighted by different Mexican government officials as an example of good practice and of important value for the local experience, and its contribution to the ongoing discussion about the handling of the resource “biodiversity” was emphasised.

14.2. Transferability of Experience

This case is a unique experience for many reasons. Firstly, Novartis established this agreement to answer a scientific question, while most of the bio-prospecting agreements clearly lay the emphasis on the economic aspect.²⁷³ The project itself emerged from a personal interest and effort, in trying to establish a first collaboration according to the CBD terms. Secondly, UZACHI was the only of the three partners (Goa, Panama, Oaxaca), lacking the very basic know-how and equipment, while the two others already had functioning research institutions. Thirdly, the organisational and administrative structures established by UZACHI in the last decade are exemplary. In the fourth place, the two stakeholders would never have established contact without the personal relationship between Ignacio Chapela and Michael Dreyfuss. In general, the personal and friendly relationship between the stakeholders (or their representatives) was almost a guarantee for success. In the fifth place, the public interest for this topic, which was one of the reasons for the failure of the UNAM-Diversa and the ICBG-Maya agreements, had not awakened yet.

There were more reasons for the successful conclusion of the present agreement, but the points mentioned above seem the most crucial ones.

According to Merino, Ramírez and Francisco Chapela, comparable conditions can hardly be found in other parts of the state or the country, and therefore this experience, at least in Mexico, is not transferable as such.²⁷⁴ This, however, does not make it less valuable. It provides important information about the requested conditions, the key-players, their relationships and the flow of information.

²⁷² The recently set up alliance (February 2002) of twelve mega-biodiverse countries against biopiracy is certainly a step in the right direction.

²⁷³ Möller (Novartis), 14. Nov. 2001, personal communication.

²⁷⁴ Merino (UNAM), 23. Nov. 2001, Ramírez (UZACHI), 12. Dec. 2001 and Chapela (ERA), 10. Dec. 2001, personal communications.

15. Policy Recommendations

Overview

This chapter provides policy recommendations for ABS terms based on the experience of the BioLead case in Mexico (see previous chapter), considering too inputs from interviews concerning other cases and countries. Further, some concluding remarks will be made, evaluating the importance of bio-prospecting as a tool to realize biodiversity conservation.

In the future, contracts have to be developed, which are interesting for all of the stakeholders, the source providers as well as the users.²⁷⁵ To develop appropriate frameworks, experiences like the BioLead agreement in Oaxaca are important as a point of reference and have a certain potential to serve as a model for a general process.

The lack of a legal framework was not a problem in this special case, due to the positive relationships between the stakeholders and the institutional power of the communities.

The CBD as a legal framework offers only weak protection for communities and indigenous people. Within the boundaries of a country, generally the government has the authority to decide whether and how to protect the natural resources. The political climate and their policy towards indigenous people are important. In Mexico, considering the multitude of ethnic groups and the long lasting problems in Chiapas, the political atmosphere is merely bad. Civil participation can be considered as deficient or inexistent. Indigenous groups, important stakeholders in this issue, are not yet adequately included in the political discussion concerning the interpretation and implementation of the CBD. “If states are to be effective in conserving the world’s species, their strategies must be build on the participation of the custodians of biodiversity, not imposed from the capital downwards” (Moran 1998:22).

Therefore, the regulatory regimes and experiences of regional institutions should be considered and the civil participation should be promoted when developing a legal frame.

After gaining legal control over their resources, the UZACHI communities started to manage them in a sustainable way.

The legal recognition of the rights of the communities over their resources creates a strong incentive for sustainable exploitation, where the appropriate support exists. This is an important step in the direction of biodiversity conservation through traditional land and resource management (Moran 1998:22).

According to the CBD, the country keeps sovereign rights over genetic resources. In Mexico, following the LGEEPA says that for the collection of species of wild flora and fauna, as well as other biological resources for scientific research, and resources used in biotechnology, Secretariat authorisation is required (Art. 87 and 87bis). The law about wildlife contains regulations concerning flora and fauna, but does not mention, for example, how to proceed with micro-organisms.

²⁷⁵ Chapela (ERA), 10. Dec. 2001, personal communication.

Therefore, national policy should address, on the one hand the conflict between property rights over land and the legal rights over genetic resources, and on the other hand, establish an official authority and establish clear regulations of how to proceed within bio-prospecting agreements.

The participation of all the relevant stakeholders is necessary for a successful agreement.

Every human can be considered as a stakeholder, because we all are affected by the loss or misuse of biodiversity. A correct selection of stakeholders must be made for a successful implementation of the contract, also considering possible stakeholders which may be included, should changes in policy be made.

The stakeholders in the Novartis-UZACHI case were not many. The accusations by the neighbouring communities emerged two years after the contract was expired. This was too late to consider them.

A national policy should therefore make the identification of the stakeholders possible, considering that political borders and natural ranges of the resources are not congruent. The land-owners making efforts to protect their resources should especially be supported.

Bio-prospecting agreements help more to strengthen already existing conservation activities then to create new ones.

As mentioned, bio-prospecting agreements require certain pre-existing conditions, which prospectors need to conclude contracts. These are, among others, clearly established property rights, high biodiversity, and a limited number of stakeholders, basic institutional organization, and a management plan for resources. The search for a project environment characterised by these kinds of specific conditions, would lead prospectors mainly to national research organizations, realizing their collections in national parks and protected areas.²⁷⁶ The fact that the partner in this case was a Union of communities, with all the appropriate characteristics, made the interesting for Novartis.²⁷⁷

Bio-prospecting agreements on private or communal land, outside of nationally protected areas, should be encouraged. Not only to gain experience in setting up appropriate ABS regulations, but especially to strengthen communal structures and to support their efforts in conservation activities.

²⁷⁶ Like in the UNAM-Diversa case.

²⁷⁷ In any case, they would never have gotten in contact without the personal relationship of Francisco Chapela, Ignacio Chapela and Michael Dreyfuss in Basel.

Established local and regional NGOs working for the resource providers as consultants play an important role in negotiation of such agreements.

Indigenous communities mainly lack the appropriate skills and know-how to negotiate suitable agreements by themselves. That is why NGO's play an important role in most development projects in source-providing countries. NGO's such as ERA, which are considered trustworthy by local communities, can play an important role in establishing bio-prospecting agreements, guaranteeing the information flow by filling the cultural gaps, as well as preventing the foreign party from negotiating the specific local aspects of the agreement. Without the professional engagement of ERA in Oaxaca, it would not have been possible to conclude the present contract. According to community members, ERA did a valuable job.

Experiences of NGO's must be integrated into policy proposals concerning ABS issues, and their objections should be considered.

The difference made between research for commercial purposes and basic research as a means to value biodiversity, has not been worked out clearly.

With the commercialisation of genetic resources access has become restrictive. This is a problem for basic non-profit research. It is thus important to give these resources a value. Knowing-using-preserving, this triad of actions is considered important by Daniel Janzen (Chapela 1997:251), to permit the preservation of biodiversity. It is important to understand the natural processes to be able to set up an effective conservation strategy. The problem is that it is difficult to make a difference between a commercial orientated and a purely scientific research, because every scientific research has the potential to lead to commercial discoveries. It is a fact, that the most scientific research institutions are linked with contracts to one or several PIs, which are financing their activities. In any case, the possibilities for source-providing countries to monitor and sustainably pursue the activities and processing of "their" resource, and ensure compliance, are limited.

The BioLead project was basically a research project, with an option that Novartis, in case of the discovery of an active compound, could use it for pharmaceutical purposes in exchange for a fixed payment.

A clear difference has to be made between the different research strategies. Columbia University (1999:86) proposes the establishment of two different research agreements. One type is a simple and restrictive research permit, and the other is as more complex contractual agreement, containing a variable number of clauses concerning ABS issues.

The benefits obtained in this agreement by the source-provider, the Union, were mostly of non-monetary nature, such as capacity building, training and technology transfer.

It is still debated if bio-prospecting can add an important economic value to genetic resources and thus, create an incentive for conservation. Some agree, while others consider the generated benefits to be marginal.

The monetary benefits in this arrangement were quite small²⁷⁸, while the non-monetary benefits have led to the development of alternative products and are still used for basic research.²⁷⁹ The establishment of the scientific know-how and a team working in the laboratory was, according to Dreyfuss, strongly emphasized by Novartis and the Union, but it was one of the biggest problems to overcome, while in Panama and India (Goa) the basic know-how and a team of scientists already existed. Therefore the training and capacity building was considered more important by UZACHI for the long term than monetary benefits.²⁸⁰

This experience clearly recommends that non-monetary benefits should be strongly emphasized in such agreements, providing basics for long-term benefits.

This agreement lacked the procedures to assess the achievement of CBD objectives.

Even though there was no impact to nature due to the fact that the collection of micro-organisms is a non-extractive activity, an assessment of how the derived benefits have been invested in CBD objectives, like the conservation of nature, would be important for a comprehensive evaluation of the agreement. Improved socio-economic conditions for example, could lead to increased immigration, producing higher pressure on the resources.²⁸¹ This case was a collaboration of only a few years, not having a negative impact on the biological resources, but a positive impact on the productive capacity of the communities.

Prospecting agreements should contain specific provisions and terms making it possible to assess their impact related to the CBD objectives (ABS, conservation, sustainable use etc.).

As long as there are no clear regulation exists, concerning the property rights to biological resources, the political discussion will make it difficult to realize prospecting activities.

The discussion about property rights is closely related to the one about political borders vs. natural ranges. The complications arise, because of the previous ownership regime, in which no restrictions existed, and all the rights over the land and its resources were linked to the property right over this land. The different property rights systems in Mexico are making prospecting activities and the efficient establishment of projects even more difficult.

The recommendation is that, considering the local conditions, the property rights have to be addressed by the national policy and regional frameworks.

²⁷⁸ The chance that an active compound will be discovered and 1-2 million US\$ “success-payment” will be paid is infinitesimally small.

²⁷⁹ Pérez (UZACHI, 5. Dec. 2001, personal communication) is presently trained in screening and analyzing DNA sections.

²⁸⁰ Dreyfuss (Ex-Novartis), 14. Jan. 2001, personal communication.

²⁸¹ Schaik C.P. (1997) in Columbia University (1999:82).

15.1. Concluding Remarks

At this point, it may be asked again if biodiversity prospecting is a way to finance biodiversity conservation, and if such an agreement successfully achieves the three goals of the CBD. The answer is yes. Prospecting activities can contribute a share to conservation activities. But this share is quite small, due to the fact that the PIs presently are more interested in combinatorial chemistry than natural compounds. Natural compounds do have an importance in R&D activities; nevertheless, their monetary value is marginal.²⁸²

Only if the acquired skills of such collaborations are managed and developed adequately will they contribute to the long term objectives of source-providers. For UZACHI this bio-prospecting agreement was just a “by-product” initiative, with the intention of generating a certain know-how and appropriate equipment for other projects, within their biodiversity program. This must be emphasised. Bio-prospecting is only one, among various activities, to reach the goal of a conservation of biological diversity.

The BioLead project is one of the first agreements of this kind, and a first attempt within the Mexican history of prospecting, started in the 15th century by the Spanish conquerors, to regulate bio-prospecting activities.

Hopefully the present research, by providing detailed information about the circumstances and conditions of this case, contributes to a better understanding and recognition of this agreement.

²⁸² Petersen (Novartis), 25. Jan. 2002, Henkel (Bayer), 16. Jan. 2002, both telephone-interviews and Dreyfuss (Ex-Novartis), 14. Jan. 2002, personal communication.

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PART F – APPENDIX

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A INTERVIEWS

Anta Fonseca, Salvador, 5. Dec. 2001, SEMARNAT, Oaxaca, Mexico

Azuela, Antonia, 21. Nov. 2001, UNAM, Mexico City, Mexico

Chapela, Francisco, 28. Nov./ 30. Nov./ 10. Dec. 2001, ERA, Oaxaca, Mexico

Colín Olmos, María, 13. Dec. 2001, Greenpeace, Mexico City, Mexico

De Ita, Ana, 12. Dec. 2001, Ceccam, Mexico City, Mexico

Dreyfuss, Michael, 14. Jan. 2002, Basel, Switzerland

Dueñas, Rosa Maria, 18. Dec. 2001, Ford Foundation, Mexico City, Mexico

Fernandez, Jose Carlos, 19. Dec. 2001, INE, Mexico City, Mexico

Henkel, Thomas, 16. Jan. 2002, Telephone-Interview Zürich, Switzerland

Larson, Jorge, 21. Nov. 2001, CONABIO, Mexico City, Mexico

Luna, Benjamin, 8. Dec. 2001, Oaxaca, Mexico

Marielle, Catherine, 22. Nov. 2001, GEA, Mexico City, Mexico

Merino, Leticia, 23. Nov. 2001, UNAM, Mexico City, Mexico

Möller, Christel, 14. Nov. 2001, Novartis Basel Switzerland

Norhausen Gonzalez, Jorge Ruben, 17. Jan. 2002, E-mail, Zürich, Switzerland

Pérez, Lilia, 1. Dec./ 5. Dec. 2001, Capulalpan and Trinidad, Oaxaca, Mexico

Petersen, Frank, 25. Jan. 2001, Telephone-Interview Zürich, Switzerland

Ramírez, Ricardo, 1. Dec./ 12. Dec. 2001, Capulalpan, Oaxaca, Mexico

Ribeiro, Silvia, 13. Dec. 2001, Mexico City, Mexico

Ruiz Basquez, Reynaldo, 9. Dec. 2001, Trinidad, Oaxaca, Mexico

Strub, Siegward, 11. Jan. 2002, Novartis, Basel, Switzerland

Torres, Roldan, 4. Dec. 2001, Comaltepec, Oaxaca, Mexico

Notes to the research: Szymura Berglas, Danuta, 21. Feb. 2002, University of Basel

B INTERNET

Internet-Sites used in this Research:

University of California, Berkeley (College of Natural Resources)	http://www.cnr.berkeley.edu
Centro de Estudios para el Cambio en el Campo Mexicano (Ceccam)	http://www.ceccam.org.mx
Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO)	http://www.conabio.gob.mx
Confoederatio Helvetica	http://www.admin.ch
Convention on Biological Diversity (CBD)	http://www.biodiv.org
Diversa	http://www.diversa.com
ETCGroup	http://www.etc.group.org
Food and Agricultural Organization	http://www.fao.org
Ford Foundation	http://www.fordfound.org
Instituto Nacional de la Ecología (INE)	http://www.ine.gob.mx
International Labour Organization (ILO)	http://www.ilo.org
International Maize and Wheat Improvement Center (CIMMYT)	http://www.cimmyt.org
LaNeta (Civil Organization providing electronic communication services for NGOs)	http://www.laneta.apc.org
Mesoamérica	http://www.mesoamerica.org.mx
Mexican Government	http://www.mexico.gob.mx
North American Free Trade Agreement (NAFTA)	http://www.nafta-sec-alena.org
Novartis	http://www.novartis.com
Resources for the Future	http://www.rff.org
Rural Advancement Foundation International	http://www.rafi.org (now ETCGroup)
Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT)	http://www.semarnat.gob.mx
Senator Jorge Nordhausen	http://www.jorgenordhausen.com
University of Arizona (College of Agriculture and Life Sciences)	http://www.ag.arizona.edu
World Intellectual Property Organization	http://www.wipo.org
World Trade Organization	http://www.wto.org

Further important Internet-Sites, providing information concerning bio-prospecting and the use of biological diversity:

Biodiversity Action Network (BIONET)	http://www.bionet-us.org
Bioresources Development & Conservation Program	http://www.bioresources.org
Center for International Forestry Research (CIFOR)	http://www.cifor.cgiar.org
Consultative Group on International Agricultural Research (CGIAR)	http://www.cgiar.org
Shaman Pharmaceuticals	http://www.shamanbotanicals.com
United Nations Environment Program	http://www.unep.org
World Conservation Monitoring Center	http://wcmc.org.uk

C LEGAL INSTRUMENTS

International

Convention on Biological Diversity

Cartagena Protocol on Biosafety

International Labour Organization (ILO)

International Treaty on Plant Genetic Resources for Food and Agriculture (FAO)

North American Free Trade Agreement

Trade Related Aspects on Intellectual Property Rights (WTO)

Mexico

Constitucion Política de los Estados Unidos Mexicanos – Political Constitution of the United States of Mexico

Ley General de Equilibrio Ecológico y Protección al Ambiente (LGEEPA) – General Law of Ecological Equilibrium and Environmental Protection

Ley de Propiedad Industrial – Industrial Property Law

Código Penal para el Distrito Federal en Materia de Fuero Común y para toda la República en Materia de Fuero Federal – Code of Penal Justice for the Federal District in communal and federal jurisdiction

Declaración de BELEM. Código de Ética para la Investigación, Colectas, Base de datos y Publicaciones – BELEM Declaration. Ethic Code for Investigation, Collections, Base of Data and Publications

Iniciative de Ley para el Acceso y Aprovechamiento de los Recursos Biológicos y Genéticos - Initiative for a Law to regulate Access and Use of Biological and Genetic resources

The Forest Law (Ley Forestal) and the General Law of Wild Life (Ley General de Vida Silvestre) provide further information.

Switzerland

Verordnung über den Umgang mit Organismen in geschlossenen Systemen (Einschliessungsverordnung, [ESV]) vom 25. August 1999 (SR 814.912).

D A BRIEF HISTORY OF THE COP PROCESS

COP-1 (June 1992, Rio de Janeiro, Brazil): CBD was opened for signature.

COP-2 (November 1995, Jakarta, Indonesia): Decision II/11, requesting the CBD Secretary to elaborate a survey of measures taken by governments to implement Art. 15.

COP-3 (November 1996, Buenos Aires, Argentina): COP urged governments to submit relevant information on possible elements for guidelines and other measures for the implementation of Art. 15. The Secretary called for case studies to prepare a synthesis for COP-4.

COP-4 (May 1998, Bratislava, Slovakia): COP addresses Article 19 and compiles options for developing national legislative to implement Art. 15. In Decision IV/8, COP established a regionally balanced Panel of Experts on ABS (ABS EP). Their mandate was to develop a common understanding of basic concepts and to explore options for ABS on mutually agreed terms (MAT), including guiding principals, guidelines and code of best practices for ABS arrangements. COP decided to hold a preparatory discussion on access to genetic resources at the Intercessional Meeting on the Operations of the Convention (ISOC) to provide input into COP-5.

ISOC (June 1999, Montreal, Canada): Recommendation for the preparation of the Experts' Panel on ABS were made, concerning a common appreciation of the relationship between IPR and relevant provisions of the TRIPS.

ABS EP-1 (October 1999, San Jose, Costa Rica): The meeting, co-hosted by the governments of Costa Rica and Switzerland, focused on ABS arrangements for scientific and commercial purposes; legislative, administrative and policy measures at the national and regional level; regulatory procedures and incentive measures; and capacity building. Significant discussion revolved around issues of IPR and the use of terms of contractual ABS agreements.

COP-5 (May 2000, Nairobi, Kenya): COP adopted Decision V/26, which established an *Ad Hoc* Open-ended Working Group (ABS WG) to develop guidelines and other approaches on: PIC; MAT; roles and responsibilities and participation of the stakeholders; aspects of *in situ* and *ex situ* conservation and sustainable use; mechanisms for benefit-sharing; and the preservation and maintenance of traditional knowledge.

ABS EP-2 (March 2000, Montreal, Canada): The panel produces a report and conclusions on: user and provider experience in ABS processes; approaches for stakeholder's involvement in ABS processes; and complementary options to address ABS within the CBD's framework.

ABS WG-1 (October 2001, Bonn, Germany): Regarding guidelines, issues of stakeholders, discrimination, derivatives and differentiations between user and provider obligations were debated. The meeting also faced the important challenge of addressing sensitive IPR issues, such as PIC, disclosure of countries of origin and traditional knowledge. The final analysis focused on the draft guidelines, IPR and capacity building.

Outlook:

COP-6 (April 2002, La Hague, Netherlands): Hopefully, COP-6 will be able to finalize the Bonn Guidelines and set out next steps toward their use at all levels. This gathering will also serve as the first Meeting of the Parties (MOP-1) or the third Intergovernmental Committee on the Cartagena Protocol (ICCP-3). For further information see <http://www.biodiv.org>.

Based on www.iisd.ca/biodiv/abs-wg1/.

E USE OF TERMS²⁸³

Biodiversity prospecting (=Bio-prospecting) is the systematic search, collection and appropriation of biota for new commercial applications. This term exists since the drafting of the CBD (1992). Bio-prospecting after the CBD requires previous information and prior informed consent of the land owner and an appropriate ABS arrangement. The illegal appropriation of these resources is called biopiracy (see below).

Biological diversity means the variability among living organisms from all sources including, inter alia, 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.

Biological resources includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity.

Biopiracy is the illegal appropriation of biological resources, without previous information of the owner, prior informed consent nor any type of benefit sharing (this term was invented by RAFI).

Biotechnology means any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use.

Common Property means property in which the nature, size and internal structure of the owner group and the definition of those who are entitled to rights, interests, cultural norms and endogenous systems of authority vary. Mostly, the relationships are founded in mutual trust, shared knowledge and culture, some going back centuries (OECD 1996:201).

Community in this context is defined as a group characterized by the management of communitarian attitudes and objectives, which have been developed from shared experiences and common beliefs (indigenous communities and ejidos) (Merino 2000:2).

Country of origin of genetic resources means the country which possesses those genetic resources in *in situ* conditions.

Country providing genetic resources means the country supplying genetic resources collected from *in situ* sources, including populations of both wild and domesticated species, or taken from *ex situ* sources, which may or may not have originated in that country.

Design principles (in CPRs) are conditions that help to account for the success of these institutions in sustaining a common-pool resource and gaining the compliance of generation after generation of users to the rules used in a location (Ostrom 1998(a):14).

Domesticated or cultivated species means species in which the evolutionary process has been influenced by humans to meet their needs.

Ecosystem means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Ex situ conservation means the conservation of components of biological diversity outside their natural habitats.

Forest resources means the forestall, natural, artificial or induced vegetation, its products and remainings, as well as grounds of forest territory or of preferably forest aptitude.

- **Maderable** – constituted by trees
- **Non-maderable** - Seeds, resins, fibre, rubbers, waxes, rhizomes, leaves, “pencas” and stems originating of forestall vegetation, as well as grounds of forest territory or of preferably forest aptitude (Forest Law).

Genetic material means any material of plant, animal, microbial or other origin containing functional units of heredity.

Genetic resources means genetic material of actual or potential value.

Habitat means the place or type of site where an organism or population naturally occurs.

²⁸³ Mainly drawn from Art. 2 CBD

***In situ* conditions** means conditions where genetic resources exist within ecosystems and natural habitats, and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.

***In situ* conservation** means the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.

Intellectual property rights are the rights given to persons over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creation for a certain period of time (www.wto.org).

Protected area means a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives.

Regional economic integration organization means an organization constituted by sovereign States of a given region, to which its member States have transferred competence in respect of matters governed by this Convention and which has been duly authorized, in accordance with its internal procedures, to sign, ratify, accept, approve or accede to it.

Rules (in CPRs) are shared prescriptions of that are mutually understood and enforced in particular situations in a predictable way by agents responsible for monitoring conduct and for imposing sanctions (Ostrom 1996:2).

Screens are tests for biological activity. Until recent past, that involved a slow expensive process of subjecting growing cultures to the materials and observing any destruction. Recently, the process has been automated by using probes containing the structure of the target organisms (bacteria, cancer cells etc.) to see if the extracts are of a shape which will bind themselves. Screens are increasingly specific, with the most particular ones held by companies as valued proprietary secrets (Lesser 1998:34).

Sustainable use means 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 includes biotechnology.

Wildlife are organisms subsisting subjects to natural evolutionary processes and developing freely in their habitat, including minor populations and individuals above human control (General Wildlife Law, Art. 3 XLV).

F TABLE OF DATES

Important events concerning the Novartis-UZACHI BioLead agreement (blue text).

1910-16 Agrarian Revolution: Distribution of 20 millions of hectares. Percentage of landless people decreased from 68 to 36%. Large rural property was forbidden, small properties were legal as long as under exploitation (OECD 1996:197). Situation of free access to resources. Legal recognition by the Constitution of the different types of property rights; common, ejido-based and private property besides the public property (Chapela (ERA), 10. Dec. 2001, personal communication).

1926-1940: Antecedents of forest law of 1926 and the agrarian reform.

1940-1982: Licenses for forest exploitation and prohibitions.

1947: Revision of the forest law; with a governmental decree the issue of concession to private industries for forest exploitation is possible.

1956-81: Paper industry FAPATUX receives a concession for 25 year over an area of 251'000 hectares of forest in the northern Sierra of Oaxaca, including the forests of the later UAZCHI.

1976: Dreyfuss starts to work at Sandoz. Until 1989 he realizes various collection expeditions to different mega-biodiverse countries around the world.

1979: Building of ODRENASIJ, an Organisation for the Defence of Natural Resources and Social Development in the Sierra Juárez.

1982: The judge decides in favour of the communities (ODRENASIJ) against FAPATUX, the first step of the re-appropriation of the resources is done.

1982-1992: Establishing of the communitarian forest enterprises.

1982: Foundation of ERA. First collaboration with the communities in the Sierra Juárez.

1982-84: One of the communities sells its wood to FAPATUX, but this is not the solution. Problems with SARH, had organized and distributed the principal forest areas of the country in Units of Conservation and Forest Development (Unidades de Conservación y Desarrollo Forestal - UCODEFO's), employing external forest professional to provide technical services and support concerning the exploitation and management of the forests.

1986: Revision of the forest law; allowing that concessions for Technical Forest Services (TFS) can be issued to certain forest engineers (SEMARNAP 2000:22).

1986 ERA and UAZCHI: Search for possibilities to generate income from the protected areas, first with emphasis on plant products. Start of an intense communication with Ignacio Chapela (finishing his Ph.D. in Wales, England in 1987). Establishment of a communitarian land management plan and design of the forest industry (sawmills, carpentries, etc.).

1988/89: M. Dreyfuss refuses to realize further collection expeditions and starts to develop the BioLead project. Ignacio Chapela makes important suggestions.

September 14th, 1989 UZACHI acquires the legal status, formed by four communities (La Trinidad, Capulalpam de Mendez, Santiago Xiaciu y Santiago Comaltepec).

October 25th, 1989: Foundation of the non-governmental, non-profit, scientific research institute of InBio in Costa Rica.

1989-92: Ignacio Chapela works for Sandoz in his post-doc, where he meets Mike Dreyfuss.

1989/90: Ignacio Chapela participates in the negotiations of the InBio-Merck agreement in Costa Rica, making valuable experiences concerning bio-prospecting.

November 1st, 1991: Signature of the INBio-Merck agreement.

1992-2000: Retreat of the Mexican State from the forest sector.

1992: Revision of the forest law: TFS can be rendered freely, according to implemented rules for the market of technical service (SEMARNAP 2000:22).

June 5th, 1992: Rio Conference. The CBD is adopted and signed by 150 states.

1992 First formal contact with Sandoz. M. Dreyfuss was very interested in what were doing Merck and Ciba Geigy. The communication and information transfer between UZACHI, ERA, Ignacio Chapela and Michael Dreyfuss at Novartis in Basel through the following two years worked well.

1993: Foundation of the program ICBG-Zonas Áridas.

December 29th, 1993: The CBD entered into force.

August 1995: Signature of the contract. Technology and know-how transfer.

1995: Incorporation of Mexico in the program ICBG-Zonas Áridas.

1996/97: Merger of Sandoz and Ciba Geigy to Novartis.

1998: Expiry of the contract Novartis-UZACHI.

August 1998: Foundation of ICBG-Maya program.

November 1998: Signature of the contract UNAM-Diversa.

April 22nd, 1999: Novartis Workshop on Bio-prospecting and Benefit-Sharing in New York.

July 1999: Signature of the ICBG-Maya agreement.

October 30th, 1999: First accusations against the UNAM-Diversa case by Dr. Alejandro Nadal in La Jornada. The discussion about bio-prospecting in Mexico is launched.

2000: Establishment of an Electronic Forum “Corsario” by Ceccam.

June 7th, 2000: The “Denuncia Popular” concerning the UNAM-Diversa case is turned in at the Profepa.

2000: Personal attacks against ERA (above all F. Chapela) by Hernandez Navarro and others.

October 10th, 2000: Article by F. Chapela in La Jornada; Aprovechar la “farmacia selva”.

November 8th, 2000: Meeting on the topic of “biopiracy and bio-prospecting”, organized by Ceccam.

November 29th, 2000: Recommendation of the Profepa concerning the UNAM-Diversa case, considering it illegal.

November 29th, 2001: Article in the Journal Nature from Ignacio Chapela and David Quist about transgenic maize in the remote mountains of Oaxaca. This research was realized in collaboration with the laboratory of UZACHI.

February 18th, 2002: Building of an alliance of twelve mega-biodiverse countries against the biopiracy of northern industrial countries at a meeting in Mexico City.

G INTERVIEWED PERSONS

Mexico City – Official Institutions and Funding Organisations

Name	Organisation	Title/ Function	Relation to the case
Azueta, Antonio	UNAM Until 2000: Profepa	Lawyer – Ex environmental attorney	He wrote the recommendations of Profepa in the UNAM-Diversa case
Dueñas, Rosa Maria	Ford Foundation	Personal Assistant of Deborah Berry until Dec. 2001	Funding of ERA and Ceccam
Fernandez, Jose Carlos	INE Until 2000: Project ICBG-Maya	Department of Environmental Economics	He knows the ICBG-Maya by heart and the governmental efforts
Larson, Jorge	Assessor CONABIO	External adviser for the CONABIO and Consultant at Fordfoundation	He followed the process, as representative for CONABIO and knows the governmental efforts
Merino, Letica	UNAM	Prof. Dr. Antropologa	Friend of ERA, knows UZACHI since the 80s
Nordhausen Gonzalez, Jorge Ruben	PAN	Senator	Initiative for a law for access and use of biological and genetic resources

Oaxaca – Persons involved in the Project

Name	Organisation	Title/ Function	Relation to the case
Anta Fonseca, Salvador	SEMARNAT Until 2000: SEMARNAP	Biologist Federal Delegate in Oaxaca since 1995	Was repeatedly informed about the process by ERA
Chapela, Francisco	ERA	Agricultural Engineer, specialised in forest management	Consultant of UZACHI and brother of Ignacio Chapela
Luna, Benjamin	UZACHI		President of UZACHI and Commissioner of common Lands in Capulalpam since 1998
Pérez, Lilia	UZACHI	Agricultural Engineer	Working at the laboratory in Trinidad since 1995. Comunero of Capulalpam
Ramírez, Ricardo	PROCYMAF Until 2001: UZACHI	Forest Engineer	Comunero of Capulapan and Forest Engineer of UZACHI from 1992-2001
Ruiz Basquez, Reynaldo	UZACHI		Commissioner of common Lands in Trinidad
Torres, Roldan	UZACHI	Forest Engineer	Working for UZACHI since 2001

Critical Group – Most of them asking for a moratorium for bio-prospecting

Name	Organisation	Title/ Function	Relation to the case
Colín Olmos, María	Greenpeace	Lic. in law, specialised in environmental law	Got involved in relation with the accusations
De Ita, Ana	Ceccam, Mexico City		Accusations against ERA and UZACHI at the end of 1999
Marielle, Catherine	GEA, Mexico City		Got involved in relation with the accusations

Ribeiro, Silvia	RAFI or ETCGroup, Mexico City		Considers all kind of bio-prospecting as biopiracy
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Pharmaceutical Industries

Name	Organisation	Title/ Function	Relation to the case
Möller, Christel	Novartis until 2000		Was involved in the BioLead project writing his post-doc
Dreyfuss, Michael	Novartis until 1998		Project Manager BioLead
Strub, Siegwand	Novartis	Lawyer	He set up the contracts for the BioLead project
Petersen, Frank	Novartis	Manager Natural Compound Unit	Not involved
Henkel, Thomas	Bayer	Manager Natural Compound Unit	Not involved

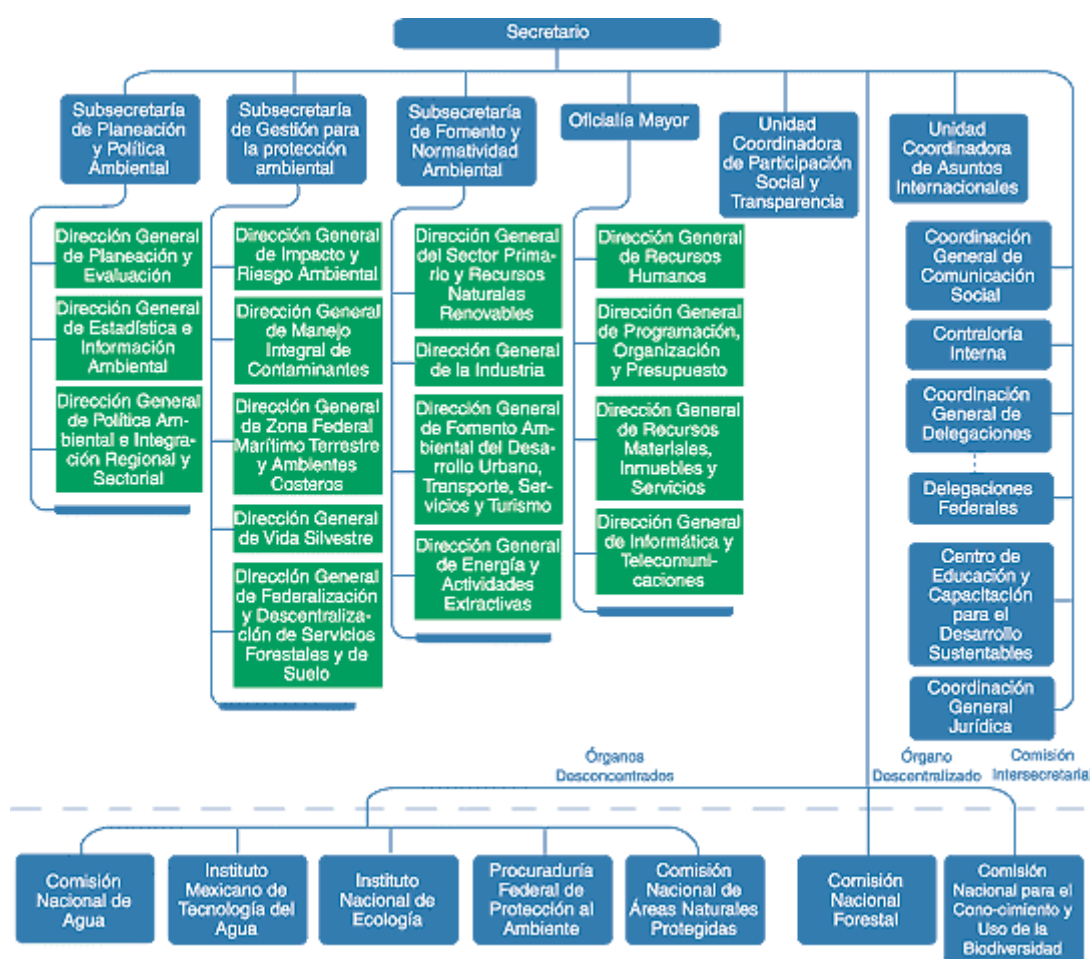
Pablo Farias (Ford Foundation, before ECOSUR), Jorge Soberon (CONABIO), Excequiél Excurra (INE), Ignacio Chapela (Berkeley), Luis Hernandez Navarro (Director La Jornada), Alejandro Nadal (Colegio de Mexico), Aldo Gonzalez (Municipio de Gelatao) and Liza Covantes (Greenpeace) could not be reached for a statement.

H ENVIRONMENTAL MANAGEMENT AND STRUCTURE OF SEMARNAT

The first measures taken by the government concerning environmental questions were institutionalised in 1972 with the Sub-Secretariat for improvement of the environment (Subsecretaría de Mejoramiento del Ambiente – SSA). In 1976 it was integrated into the Sub-Secretariat for Urban Development (Subsecretaría de Desarrollo Urbano – SAHOP), in 1982 it was called the Sub-Secretariat of Ecology (Subsecretaría de Ecología – SEDUE) and in 1992 the National Institute of Ecology (Instituto Nacional de Ecología – INE), lead by Dr. Julia Carabiaz, was integrated with the Federal Attorney General for the Protection of the Environment (Procuraduría Federal de Protección al Ambiente – Profepa) into the Secretariat of Social Development (Secretaría del Desarrollo Social).²⁸⁴

Finally, in 1994, SEMARNAP, the Secretaria of Environment, Natural Resources and Fishing (Secretaría de Medio Ambiente, Recursos Naturales y Pesca), joined all the existent departments of federal environmental management. The first Secretary of INE, under President Salinas, was Dr. Julia Carabiaz.

In 2001, with President Fox, the name of SEMARNAP was changed to SEMARNAT (Secretaría de Medio Ambiente y Recursos Naturales), but the organization of the Environmental Secretariats stayed basically the same. Below follows the structure of SEMARNAT.



Drawn from <http://www.semarnat.gob.mx/estructura/index.shtml> .

²⁸⁴ See: SEMARNAP (2000 (b):69): La Gestion Ambiental en Mexico, or www.semarnap.gob.mx.

I BIODIVERSITY PROSPECTING IN MEXICO

The main three recently discussed bio-prospecting cases will be presented here shortly. Namely, the UNAM²⁸⁵-Diversa²⁸⁶, ICBG²⁸⁷-Maya and ICBG-Zonas Aridas agreement

1. UNAM-Diversa

The contract between the Biotechnological Institute of the National Autonomous University of Mexico (UNAM) and the US Company Diversa Cooperation²⁸⁸ was denounced by a few publications in the press at the end of 1999, accusing it of violating the environmental law (LGEEPA).

This agreement was signed in November 1998 with duration of three years. According to the contract, Diversa could have access to all of the samples (mostly micro-organisms) collected by the UNAM in various ecosystems, owned by the Mexican Federation (public property), and the right to their commercial exploitation.

Dr. Alejandro Nadal (Colegio de México), who led the accusations, supported by various social and environmental organisations²⁸⁹, argued that the benefits for UNAM were very small²⁹⁰ and that the contract violated the federal environmental law in some points. They placed a “Denuncia Popular”, a popular denouncement at the Profepa.²⁹¹

Basically, no law was violated, but the problem was that UNAM is not the owner of the resources they wanted to sell to Diversa, and therefore cannot provide the required PIC, needed from the owner of the resources to realize such a collection.

The biosphere reserves in Mexico, where collections were realized, are federal inhabited land. The people living there of course did not know this contract. Alberto Székely, legal assessor of the UNAM, considered it sufficient that the INE and the CONABIO was informed. Nevertheless, it was not.

Profepa finally recognized that different irregularities did exist. They released a recommendation in November 2000, saying that the collection of micro-organisms requires, according to Article 87 LGEEPA, the PIC of the Federation and an equitable sharing of the benefits for the exploitation of the national biological resources in Mexico (Chapela 2001:18-19).

²⁸⁵ Universidad Nacional Autónoma de México.

²⁸⁶ For further information see www.diversa.com.

²⁸⁷ International Cooperative Biodiversity Groups. For further information see;

<http://www.ag.arizona.edu/OALS/ICBG/publications/aspectos/contenidos.html>.

²⁸⁸ For further information see www.diversa.com.

²⁸⁹ Chapela (2001:19) Greenpeace, Asociación Nacional de Abogados Democráticos (ANAD), Grupo de Estudios Ambientales, A.C. (GEA), Unión Nacional de Organizaciones Regionales Campesinas Autónomas (UNORCA), Red de Permacultura México, Centro de Estudios para el Cambio en el Campo Mexicano (CECCAM), Coordinadora Ciudadana en Defensa del Patrimonio Cultural y Natural.

²⁹⁰ Chapela (2001:18): 50 US\$ for each sample, 5000 US\$ for equipment used for the collections and between 0.3 and 0.5% of the royalties of derived products.

²⁹¹ Profepa (2000): “Denuncia Popular” against INE, CONABIO and UNAM on June 7th, 2000, as well as the Recommendation of the Profepa, applying Art. 189 LGEEPA.

2. International Cooperative Biodiversity Groups – ICBG

The ICBG program was established by three agencies of the USA government in 1992, the National Institute of Health (NIH), the National Science Foundation, the US Agency for International Development (USAID) inspired by the spirit of the CBD. It was based on the belief that “the discovery and development of pharmaceutical and other useful agents from natural products can, [...], promote sustained economic growth in developing countries, while conserving the biological resources from which these products are derived”(Rosenthal 1998:1). There are five groups working in eight countries in Latin America and Africa. The five ICBG groups consist of different public and private institutions including universities, environmental organizations and pharmaceutical companies. The groups are linked by a series of research and benefit-sharing agreements, addressing a set of operational and benefit-sharing principals outlined in the “ICBG Request for Applications”, providing financial support for multidisciplinary five year projects.²⁹²

The two projects Mexico was involved are the (A) ICBG-Maya (Drug Discovery and Biodiversity among the Maya in Mexico) and the (B) ICBG-Zonas aridas (Bioactive Agents from Dryland Biodiversity in Latin America).

(A) ICBG-Maya

Since 1998 the biotechnological company Molecular Nature Limited (MNL), the University of Georgia in Athens through its Research Foundation (UGARF) and ECOSUR (El Colegio de la Frontera Sur), tried to start a program of pharmaceutical investigation and sustainable use of ethnobotanical know-how in the maya region, in the heights of Chiapas.²⁹³ Dr. Brent Berlin from the University of Georgia coordinated this program. The INE, as external consultant, the SEMARNAP as governmental institutions, and the PROMAYA A.C., as a civil non-profit organisation participated in the negotiations concerning the distribution of the benefits, the issuing of the licences, as well as, the technical and legal support regarding the investment of the benefits in sustainable activities. The main objectives were the identification of active leads, focussing on the main 600 plants, used in this region for medical purposes, thus the project focussed on the use of indigenous knowledge.

In July 1999 the agreement was signed. The OMIECH (Organización de Médicos Indígenas del Estado de Chiapas), an organization of traditional healers, made their participation in the project dependent on the existence of a legal framework protecting their know-how and plants. Between September 1999 and January 2000, the COMPITCH²⁹⁴ sent several letters to the Environmental Secretary (Dr. Julia Carabias), asking to suspend the project, despite the

²⁹²See also: <http://www.ag.arizona.edu/OALS/ICBG/publications/aspectos/contenidos.html>.

²⁹³ Chapela (2001:21): The heights of Chiapas are one of the richest areas concerning biodiversity. Over centuries the Mayas and there descendants accumulated know-how about the environment and developed a complex medical health system.

²⁹⁴ Fernandez (INE), 19. Dec. 2001, personal communication: The head organization and representatives of traditional healers in Chiapas, COMPITCH (Consejo de Médicos y Parteras Tradicionales de Chiapas), consists basically of the same members of the OMIECH, which is, by far, the largest group of traditional healers in Chiapas.

promise that the CBD and the LGEEPA would protect their sources and their traditional knowledge. In December COMPITCH invited RAFI (Rural Advancement Foundation International, now ETCGroup) as a consultant.

On the other hand, the project was promoted vehemently, and workshops as well as informative events were organized. According to Fernandez (INE), enormous efforts were made, trying to inform the communities and convince them, in order to obtain the PIC from all of them.²⁹⁵

However, COMPITCH continued to reject the bio-prospecting project, supported by 13 other organisations, criticising the position of ECOSUR.

On the one hand, RAFI accused ECOSUR of biopiracy, and on the other hand, the investigators questioned the right of COMPITCH to decide over all the traditional knowledge existing in Chiapas. However, SEMARNAP refused to issue the permit for the collection of plants to the University of Georgia in October 2000, after intending to act as mediator in the conflict. The project finally was cancelled in November 2001.

(B) ICBG-Zonas Áridas

This program was started in 1993. Emphasizing the principals of the CBD, the objectives were to discover and develop pharmaceuticals, veterinary products, environmentally-safe crop protection agents and herbicides, looking at plants from semi- and arid ecosystems²⁹⁶ in Latin America as potential sources, and promote a sustainable economic activity while conserving the biological resources in these fragile ecosystems (Timmermann 1999).

The participants in this project are (a) Argentina with three research institutes, (b) Chile and (c) Mexico with the UNAM, incorporated in 1995. The two responsables in Mexico are Robert Bye (Botanical Garden) and Rachel Mata (Faculty of Chemistry).

It adapts an combination of random and bi-rational strategies for the collection of plants, also using ethnobotanical knowledge. In all of the regions where the project has been developed, local people have been involved by working with NGOs or local governments. In Mexico the work takes place in the centre and eastern parts of the country, including deserts, tropical forests with dry periods and pine-oak forests (Timmermann 1999).

This ICBG is designed in such a way that plant collections, inventories and other activities are in agreement with the appropriate national and international laws, such as laws on endangered species (CITES) and plant conservation. Import licences and phyto-sanitary certificates are obtained for each sample.

The permission for the collection is always sought on national and local level. In Mexico at national level, through the INE, and at local level, the project is presented to the president of

²⁹⁵ Fernandez, 19. Dec. 2001, personal communication.

²⁹⁶ Timmermann (1999): These plants are well known to produce a variety of secondary metabolites as defensive agents and poisons, but they received less attention than plants from tropical rainforests as potential source for biological agents.

the municipality or an equal authority, and a signed letter of agreement is made, which contains the objective of the project, and establishes the PIC and the terms of the sharing of the benefits (Timmermann 1999).

The project also contributes to rural development and to the *in situ* the conservation of resources. With the goal to add the projects of conservation with the priority areas, the areas selected coincide with regions where SEMARNAP (now SEMARNAT) established projects for regional development. In all of these regions local NGOs were incorporated.²⁹⁷

The problem of this case was that there is almost no accessible information compared with Chile and Argentina. Following the principals of the ICBG, the existing information should be distributed frequently. The project started in 1995, and up to now, the public has not been informed about it, what is negative. This case has no political and social implications like the one in Chiapas, which does not, however, justify that lack of information (Adame 2000:23-24).

²⁹⁷ In Oaxaca for example the Organización de Médicos Tradicionales.

J PHOTOGRAPHS



Photo A1: Community La Trinidad



Photo A2: Community Capulalpam de Mendez



Photo A3: The City of Oaxaca lies at 1500 meters above sea level, and is quite dry. Going up the mountains (in the background), the pine-oak forest are slowly replacing the vegetation adapted to dry climates.



Photo A4: Finally in the mountains, the pine-oak forests are characterizing the landscape.



Photo A5: Pine forests are very susceptible to fire damage. The photo shows an area burnt twice. First in 1986 and again in 1997, two extremely dry years.



Photo A6: Oak tree in Comaltepec, mostly with a lot of epiphytes.



Photo A7: The regeneration of the trees in this ecosystems is very easy, as this *Pinus patula* on an old forest road shows.

All Photographs by Ueli Baruffol

- Nr. 30 *Baruffol Ueli*
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