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Third meeting
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Item 4 of the provisional agenda*

COMPOSITE REPORT ON THE STATUS AND TRENDS REGARDING THE KNOWLEDGE, INNOVATIONS AND PRACTICES OF INDIGENOUS AND LOCAL COMMUNITIES

Regional report: Central America

Note by the Executive Secretary

1. The Executive Secretary is circulating herewith, for the information of participants in the third meeting of the Ad Hoc Open-ended International Working Group on Article 8(j) and Related Provisions, the regional report for Central America on the status and trends regarding the knowledge, innovations and practices of indigenous and local communities, which was used as input to the first phase of the composite report on the same subject (UNEP/CBD/WG8J/INF/1).

2. The report is being circulated in the form and language in which it was received by the Secretariat.

* UNEP/CBD/WG8J/3/1.

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For reasons of economy, this document is printed in a limited number. Delegates are kindly requested to bring their copies to meetings and not to request additional copies

REGIONAL REPORT: CENTRAL AMERICA (INCLUDING MEXICO)

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Asociación de Comunidades Indígenas ACOIN (Argentina)

Coordination of the People and the Communities of the Great Chaco COPIRECHA (Argentina – Bolivia – Paraguay)

Ayahuayco Aymara Community –La Paz (Bolivia)

Asociación Aymará Taypi Ceqe (Bolivia)

ANIPA – Nahua Organisation (México)

1 State of retention of traditional biodiversity-related knowledge

1.0 Overview – regional issues

In the course of processing the information contained in national and thematic reports submitted by the Parties to the Secretariat of the Convention on Biological Diversity, important disparities were revealed in the national-level treatment of traditional biodiversity-related knowledge, for a suitable retention and protection of traditional knowledge and practices to take place.. These disparities are due to a gap in resources and to institutional limitations which jeopardize the implementation or the coordination of measures of preservation and enhancing of traditional knowledge.

Table 1. Reported relevance of the governmental policies and actions in relation with Traditional Biodiversity-Related Knowledge

NATION	Ratification Date	Submitted Reports	TBRK Relevance		
			LOW	MDM	HIGH
BELIZE	30/12/1993	First National Report	-	-	-
COSTA RICA	26/08/1994	National Biodiversity Strategy and Action Plan		X	
		First National Report	-	-	-
		Second National Report		X	
EL SALVADOR	08/09/1994	First National Report	-	-	-
		Second National Report	X		
GUATEMALA		National Biodiversity Strategy and Action Plan	X		
	10/07/1995	Second National Report	X		
HONDURAS	31/07/1995	Thematic Report on Alien and Invasive Species	-	-	-
MÉXICO	11/03/1993	National Biodiversity Strategy and Action Plan			X
		First National Report	-	-	-
		Second National Report			X
		Thematic Report on Alien and Invasive Species	-	-	-
		Thematic Report on Forest Ecosystems	-	-	-
NICARAGUA	20/11/1995	None report is registred			
PANAMÁ	17/01/1995	National Biodiversity Strategy and Action Plan			X
		First National Report	-	-	-
		Second National Report			X
		Thematic Report on Alien and Invasive Species	-	-	-
		Thematic Report on Access and Benefit Sharing	-	-	-
		Thematic Report on Forest Ecosystems	-	-	-

1.0.1 Traditional Knowledge holders

Today, the Mesoamerican Indigenous territory corresponds to Mexico, Guatemala and Belize, three markedly different countries. Mexico, nucleus of the old area, is one of the most developed and dynamic countries of Latin America, with its Indigenous population reaching close to a third of the total population. Guatemala‘s Indigenous population reaches close to 50% of the total national population. In Belize, a comparatively new English-speaking republic, ethnic groups represent almost 15% of the total population.

However, in Central America, traditional knowledge is a concept not only associated to the Indigenous people who inhabited the area before the arrival of Europeans, but also to the Afro-Americans who developed their own culture within this region: the Garifunas are widely and internationally recognized as local people. Of the 35 millons inhabitants in the region, 8 millons are Indigenous people (including the Garifunas). According to academic statistics (I.G. UNAM 1999), the ethnic groups that surpass the 100

thousands individuals are: the Mayas, the Nahualt, the Zapotecos, the Mixes, the Otomis, the Misquitos, the Garífunas, the Su btiavas, the Totonacas, the Lencas, and the Ngöbes. In the last years the region has been the scene of intense organizational activity and demand by these Native groups, such as territorial and traditional land claims, self-defense against the intrusions of colonizers, forestry companies and other agents.

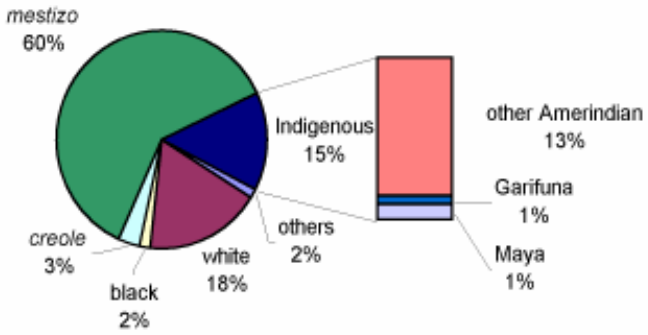
Table 2. Population and Ethnic Groups of the Central America Region by Countries (Parties of the CBD)

SOURCES:	**CEPAL (2000)**	**World FACT BOOK 2002 (U.S.A. Goverment)**		
COUNTRY	**POPULATION (TOTAL)**	**POPULATION (TOTAL)**	**ETHNIC GROUPS**	**RATE**
CENTRAL AMERICA	**135.203.000**	**141.632.613**		
Belize	226.000	262.999	*mestizo* (1)	48.7%
			creole (2)	24.9%
			Maya	10.6%
			Garifuna	6.1%
			others	9.7%
Costa Rica	4.023.000	3.834.934	white (including *mestizo*)	94%
			black	3%
			Amerindian	1%
			Chinese	1%
			others	1%
El Salvador	6.276.000	6.353.681	*mestizo* (1)	90%
			Amerindian	1%
			white	9%
Guatemala	11.385.000	13.314.079	*mestizo* (called Ladino) (1)	55%
			Amerindian	43%
			whites and others	2%
Honduras	6.485.000	6.560.608	*mestizo* (1)	90%
			Amerindian	7%
			black	2%
			white	1%
Mexico	98.881.000	103.400.165	*mestizo* (1)	60%
			Amerindian	30%
			white	9%
			others	1%
Nicaragua	5.071.000	5.023.818	*mestizo* (1)	69%
			white	17%
			black	9%
			Amerindian	5%
Panama	2.856.000	2.882.329	*mestizo* (1)	70%
			Amerindian and *mestizo* (1) (West Indian)	14%
			white	10%
			Amerindian	6%

1. *mestizo* mixed Amerindian and European
2. *creole* mixed white and black

Globally the ethnic composition in this region may be estimated as shown in the following graphic:

Graphic 1. Central America Ethnic Composition.



Traditional knowledge has also been linked to language; and retention of the former is a reliable indicator of the conservation of the latter and vice versa. It appears that acquiring a superior command of the Spanish language also contributes significantly to diminishing the knowledge of plant names and plant-naming competences, which are indicators of correct knowledge of use. This type of links gives added meanings to the analyses of the status of retention of traditional biodiversity-related knowledge by demonstrating the practical importance of developing adequate perceptual and taxonomic categorization skills; young people who fail to learn how to identify plant taxa are likely to be unable to specify how plant can be used effectively (Zent, S; 2001). From Table 3. It may be inferred that traditional biodiversity-related knowledge might be endangered in contexts where traditional languages face near extinction. Language retention status would then become a significant predictor of loss in retention of TBRK.

Table 3. Languages nearly extinct, *only a few elderly speakers are still living*

Source:	**S.I.L. 1998 if no other is indicated**			
COUNTRY	**LANGUAGE**	**SPEAKERS**	**COMMENTS**	**SOURCE**
COSTA RICA	Boruca.	5	women out of an ethnic group of 1.000	(1986 SIL)
EL SALVADOR	Pipil.	20		
GUATEMALA	Itzá.	12		(1986 SIL).
HONDURAS	Lenca.		few speakers out of 100,000 or more ethnic population	(1993 Ramon D. Rivas).
MEXICO	Chiapaneco.	150	including 17 speakers out of 32 ethnic population in Chiapas	(1990 census).
	Kiliwa.	24 to 32	6 to 8 households	(1994 Stoltzfus SIL) (1994 SIL).
	Matlatzinca, Atzingo. Matlatzinca.	50 to 100	fluent speakers, 642 in the ethnic group, no monolinguals	(1993 SIL) (1990 census).
	Mixteco, Sindihui.	138		(1990 census).
	Náhuatl, Tlalitzlipa.	108		(1990 census).
	Ópata.	15	11 in Distrito Federal, 4 in State of México	(1993 Instituto Nacional Indigenista).
	Otomí, Tilapa.	400		(1990 census).
	Popoluca, Texistepec.	427	out of a population of 15.779	(1990 census).
	Zapoteco, Asunción Mixtepec.	100	out of a population of 2.476	(1990 census).

	Zapoteco, Elotepec.	200	(1990 census).
	Zapoteco, San Agustín Mixtepec.	59	(1994 SIL).
	Zapoteco, Tejalapan.	124 out of a population of 4.656	(1990 census).
	Zapoteco, Tlacolulita.	135 out of a population of 904	(1990 census).
	Zapoteco, Totomachapan.	259 out of a population of 1.009	(1990 census).
	Zoque, Tabasco.	40 out of 367 in the ethnic group	(1971 García de León) (1960 census).
NICARAGUA	Rama.	24 out of 649 population	(1989 Holm).
PANAMA	San Miguel Creole French.	3	(1999 SIL).

1.1 Plant genetic resources for food and agriculture

Oral traditions of seed selection and storage handed down from mother to child have enabled Mayan descendants to conserve an astonishing range of maize varieties. However, with the introduction of new and 'more advantageous' crops, some families have given up growing maize entirely and buy all their food. Without seeds to exchange, the traditional support structures wither away (FAO and the International Plant Genetic Resources Institute in a series called Gender and Genetic Resource Management, June, 2000). Recent research carried out in Guatemala's northwestern department of Huehuetenango, explores the relationships between **Mayan** traditions, plant genetic diversity and the role of women in the conservation of both. Huehuetenango, an area hard hit by the civil war that ended in 1996, starkly illustrates the correlation between indigenous peoples, poverty and genetic diversity. A high proportion of the population is of **Mayan** origin, and the department has a wealth of genetic resources - including teosinte, said to be the ancestor of maize itself. There are 47 different classes of maize in the region, including at least 8 races, or subvarieties, and 4 subraces. In terms of both maize genetic diversity and cultural diversity, Huehuetenango is one of the richest areas in Guatemala. In the maize fields and at the hearths of Huehuetenango, women's specialized skills preserve the country's genetic resources.

Box 1. The milpa among the Q'eqchi Mayan (Belize)

A Cultural Diary

By Curtis Gillet

[…]

Of the 36 Maya villages in the Toledo district (Belize), 29 of them are Q'eqchi'. These are mainly subsistence farming communities that plant corn, beans and rice through the milpa system. But contrary to popular belief not all is for personal use. Excess crop is sold -either at the market in Punta Gorda (Belize) or across the border in Guatemala- whichever happens to be closer. And the money earned is used to buy staples like coffee and sugar for early mornings at the milpa, as well as clothes and schoolbooks for the children.

Most Maya villages in the South of Belize are still relatively isolated. Family milpas - roughly 6 acres of land each- are located about 3 miles outside the village. During harvest, they'll walk -back and forth from the milpa- several times a day carrying heavy bags of corn to be stored in the family home.

[…]

Source: Simply Belize. http://www.simplybelize.org/episode03.html

1.2 Animals and micro-organisms for food and other purposes

Traditionally people have attached a great deal of emotional and cultural significance to animals. The pastoralist view that animal use is permitted as long as humans provide diligent care for animals, and as long as our relationship to animals is mutually beneficial. In the indigenous traditions human beings are part of a gigantic animal that embraces the totality of things, such as Itzam-Na, god of Mayan cosmogonical mythology, as we have already indicated. Furthermore, animals represent an energy called 'master' or lord of the animals. The animals as symbols refer to determinate cosmic energies, this is the case with the eagle-serpent-jaguar complex, and its integration into particular conceptions such as the plumed serpent. (Dragons with wings, and winged tigers or lions, are frequent in various traditions.). In the indigenous cosmovision, these energies were interrelated by the promotion of the harmonious balance of the world precisely by way of the imbalance and dissonance of its parts or forces. Hunting and cattle ranch are delicated actions that cannot be addressed without sacred permission and according especific rites.

In inhabited areas, where people used to hunt, harvest rates have been exerting pressure on such species as the paca and the iguana (*Iguana iguana*). Tapirs (*Tapirus bairdii*), white-lipped peccaries (*Tayassu pecari*) and jaguars (*Panthera onca*) have become extinct in the area because of habitat fragmentation (Carbonell. November 2000). The Guaymí people, called **Ngöbe** in their own language, are one of the nine tribes living in Costa Rica and Panamá who still preserve their traditional culture. The Guaymí live mainly from hunting. They generally prefer to hunt in primary forests and forests alongside rivers and streams. The exact areas depend on the time of year. Recent investigations found that there seemed to be a trend towards hunting farther and farther away from the areas of forest inhabited by humans, where red brocket deer (*Mazama americana*) and other larger species can be found in greater numbers.

1.3 Ecosystem categories

These categories have been considered within the other conceptual items.

1.4 Traditional medicinal knowledge

"I asked village plant authorities how and why a plant got its name and about the traditional knowledge of the plant's uses. I concluded that plants are most often named after the fruit they produce or after the illness treated with the plant. An example of this is the plant called rompe piedra (rock breaker). The root of this plant, when ground and placed on a rock, will facilitate cracking of the rock, and similarly, when placed on an aching tooth, the tooth is killed to its roots and can be easily removed. The nomenclature and taxonomic system for plants are therefore developed from practical and utilitarian criteria" (McAndrews, G.; 1995).

Knowledge about the medicinal uses of plants is an individually developed skill that is regarded as a person's particular interest or gift, although a certain store of generalized medicinal plant knowledge is shared by the village population. Certain individuals are recognized as special authorities on healing, and they are consulted on a regular basis for remedies to serious and/or persistent illness.

The Mesoamerican Corridor is also the area where coffee, vegetables and medicinal plants are bred in domestic gardens. From 1998 to 2001, under the auspices of CATIE, various multidisciplinary studies, have been focusing on traditional tropical homegardens in Central America. A total of 100 gardens, mainly in Costa Rica, Honduras, Nicaragua and Panama, were included in the research. The gardens presented a total of nine main management zones, named after their principal function or component. In this case, the zones are also discriminated though the gender access or responsibility. For instance, the residential zone, close around the house, usually falls under the responsibility of the woman. It is a clear zone with some ornamentals, vegetables and medicinal plants. Camalote is a small rural community at 900 masl. near the **Mayan** ruins of Copan in Honduras. It is located in the Life Zone classified as Subtropical Humid Forest –according with the Holdridge's classification-, with a dry season of about four months a year. In a sample of ten gardens, 253 medicinal species were identified, with an average of 60

species per garden (House, P. and L. Ochoa. 1998). Usually the man is in charge of the production of its main component, the coffee, but the woman tends and discriminates the different vegetables and medicinal plants. The limited access of women to areas like the coffee zone can have negative consequences which affect their potential participation in development and management of the medicinal garden, as well as affecting their self-esteem (Lok, R. July 2001). However, in other areas of the ancient Mayan Empire, traditional medicine has been preserved and it is actually performed by healers and midwives of the Altos de Chiapas (Mexico). They are well organized and have published books -in their main languages and in Spanish- with drawing and characterizations of each plants and prescriptions (Organización de Médicos Indígenas del Estado de Chiapas (OMIECH). 1992); though the retention of knowledge and practices is guaranteed, negociations failed between the indigenous organization and the ICGB Maya in 2001, and the sharing of traditional knowledge and commercial benefits seem far from being achieved.

Within Mexico's floristic abundance, plants with curative properties are outstanding due to their popularity in handling several illnesses, a fact that becomes especially important for social groups of the tropical regions. In this paper the results of the project are presented; questionnaires and interview methods were applied with special attention to the use of plants for medical purposes. The relevant results of an ethnobotanical study carried out in 57 rural populations from the Mexican states of Oaxaca, Veracruz and Puebla (Zamora-Martínez and Nieto de Pascual Pola; 1992) showed the taxonomic determination of 237 vegetal species from which 399 curative products are obtained, in order to struggle against 57 illnesses, the most frequent of which are those related to the digestive system, the skin, the reproductive system and those of supernatural origin, which can only be treated by the use of plants in special ceremonies.

Box 2. Plant taxonomic concepts. Medicinal categories of plants

Among the **Zapotec** in Yatzachi el Bajo -Oaxaca, México-, the principal criterion for grouping plants is whether the plant produces edible portions. A secondary criterion is whether the plant is useful to make artifacts (rope, baskets, mats, etc.). Plants are first divided into one of three categories: tree (woody species), plant (herbaceous species) or cactus (spiny, succulent species). People consider 'plants' to be any species that is not a tree or a cactus. Trees are further subdivided according to whether the tree bears fruit or not. Plants are subdivided into five categories: edible, non-edible, ornamental, vines (edible and non-edible) and plants used to make baskets. The cactus group does not have a second division. Medicinal use is separate attribute from the main point of interest about a plant: whether it yields an edible or material product, and no medicinal categories of plants could be systematically superimposed on the basic taxonomic scheme.

There is little indication that the "value" conferred on a plant (as estimated from its tending) is related to the number of purposes it serves, though as expected most domesticated species serve multiple purposes (e.g., the maize and squash plants). Instead, the value of a plant seems to be more closely related to a combination of factors, including the purpose it fulfills (whether for eating, materials or medicinal purposes), its relative abundance and its growth habit. For example, the copal and ocote (Zapotec: Yag dod;Pinus michoacana f. tumida Martínez) trees, whose sap is used to treat dry skin conditions, are moderate to large trees that are abundant in the region, and are not usually cultivated but are sought out in their natural habitats as needed. However, the vara de San José blanco (Zapotec: yag yejeida' syis), a relatively scarce plant in the wild, whose flower is used to prepare a syrup to treat asthma, can be found readily in most home gardens, presumably because whenever it is needed the need is urgent, and therefore it is a valued plant.

In most cases plants are prepared minimally in one of two ways: (1) crushing or expressing fresh material and applying directly to the affected part of the body; or (2) brewing a tea or infusion for drinking. Only in few instances a chemical extraction seems to be the principle of operation, such as when green onions are chopped up and placed on leaves of the floripondio plant (Zapotec: Yag Yej Poroe; Brugmansia suaveoleus (Willd.)) with a little alcohol, following which the leaves are bound to a bodily area to relieve muscular pain. In some cases, sap is the active agent desired (e.g., ocote).

Source: extracted from McAndrews. Gina Marie (1995) Utilization of Medicinal Plant Species in the Zapotec Community of Yatzachi el Bajo, Oaxaca, Mexico. http://www.public.iastate.edu/~rjsalvad/gmthesis.html

Not all medicinal plants used according to the current knowledge of indigenous groups are Native to the area of those groups. Many introduced plants, such as Mexican lime (*Rutaceae*), orange (*Rutaceae*), peach (*Prunus persica*) and banana (*Musa* sp.) trees, play a significant role in herbal remedies (McAndrews, G.; 1995). This indicates an active dynamic for adopting and learning about the complete uses of a plant species. An important item for further pursuit would be the issue of how much of the medicinal knowledge regarding introduced species was developed independently by Indigenous groups, and how much was passed along with the original introduction of the species, dating to the first century following the Spanish conquest in 1521. An example of this is demonstrated in the group of 79 plants on the folowing table. It consists primarily of species well known in the Mexican flora, with about 15% being introduced species, and 52% being domesticated.

Table 4. List of plants used in the Zapotec medicine

Binomial Name	Spanish Common Name	Zapotec Common Name	Medicinal Uses
		Cuan Ye'e Y'e	Bruises, pain, broken bones
		Cuan Yis	Dysentery, strengthen blood, redden blood
		Lage Bolhapj	Swelling
		Lage zesa'	Sore muscles, aches, infections, clean wounds
		Lagua' sholla' blanc	Fever
		Nia Bena Gola	Improve or clear eyesight in older persons
		Xcuan Beza	Cockroaches, ticks, fleas (humans and livestock)
		Xile Lo Yoo	Cuts, wounds, flatulence
		Yej Xoba	
	Aguacate del Campo, Hoja de Cancer	Lagua' Yixa' Yoba	Lesions, infections
	Aguacatillo	Yix Lao'	Bruises, muscular aches, pain
Medicago sativa L.	Alfalfa	Lfalf	Anemia, hemorage
	Algodón	Lagua' Li Xila'	Head or body ache
Annona cherimilla Mill.	Anona	Yag Lobiza'	Head ache
	Arnica		Sore muscles, aches, infections
	Berbena		Colic, stomach ache
	Berro	Cuan Soza	Hemorrhage, clean kidneys, diabetes
Bougainvillea glabra choisy	Bugambilia	Yej Bombil	Cough, sore throat
Zea mays L.	Cabellitos de elote	Lox Yela'	Clean kidneys, diuretic
Cucurbita maxima Duch.	Calabaza	Lagua Set	Diahrrea, dysentery
Citrus grandis L.	Cidra	Gui Tzil	Vomit
	Cilantro	Culantr	Dog bite
Smilax sp.	Cocolmecatl	Yejlox	Lose weight
	Cola de Borrego	Xban Xila'	Eye wash
	Cola de Caballo	Pompobo	Clean kidneys, diuretic
Bursera bipinnata (sesseand Moc. ex DC.) Engl.	Copal	Yag Yal	Clean blood, bloody nose,clear blackheads, cracked skin
	Chamizo Blanco		Susto, headache
Sechium edule Sw.	Chayote	Yapj	Nerves
Cnidoscolus urens (L.)Arthur	Chichicastle	Ley Yesa Xguey	Susto
Prunus persica	Durazno	Yag Tlas	Skin sickness
Chenopodiumambrosioides L.	Epazote Rojo	Bit Axna	Parasites
	Estafiate	Yej Lao	Colic, stomach ache, intestinal worms
	Eucalipto	Yag Lcanfor	Rheumatism, sore muscles, cold, cough
Brugmansia suaveoleus (Willd.) Bercht.E Presl.	Floripondio	Yag Yej Poroe	Relieves pain, insomnia, asthma
	Fruta de Limón	Lmon	Cough, sore throat
Punica granatum	Granada	Za'axtil	Dysentery, fever
	Granadilla	Grandiy Che Bela	Laxative
Leucaena	Guaje	Lobada'	Clean kidneys, intestinal parasites
Psidium	Guayaba	goyej	Dysentery, stomach ache, intestinal worms
Phlebodium aureum (L.)	Helecho	Cuan Gozan	Diabetes

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Smith			
	Hierba Amarga	Yixa' Zla'	Diabetes, stomach ache, diarrhea, heartburn
	Hierba Borracha		Vomit
Solanum nigrum L.	Hierba Mora	Laga Bex	Swelling, pain, boils
Piper auritum HBK	Hierba Santa	Lagua' Xgua	Lesions
Ricinus communis L.	Higuerilla	Yag rzab	Headache, sore muscles
	Huele de Noche	Cuan Xo'	Infant colic
Simmondsia sp.	Jojoba	Yag Biba	Dandruff
	Lechugilla	Cuan Yita'	Clean teeth, ward off dental and gum disease
	Lima Limón	Yag Lima Lmon	High blood pressure
Agave sp.	Maguey	Doa Mas	Alcohol
	Malva	Lagua' Malm	Constipation
Matricaria chamomilla L.	Manzanilla	Mansniy	Colic, diarrhea, conjunctivitis
	Miltomate	Bix Yix	Fever
Byrsonima crassifolia HBK	Nanches del Campo	Xlol Beza	Sensitive teeth
Opuntia sp.	Nopal de Castilla	Bia Syis	Diabetes
Pinus michoacana f. tumida Martínez	Ocote	Yag Dod	Cracked foot skin
	Oregano	Gwreg	Stomach ache
Solanum tuberosum L.	Papas	Gotecw	Clear vision, tired eyes
Carica Papaya L.	Papaya	Yag Pey	Constipation, laxative
Lepidium virginicum L.	Pata de Viejito	Cuan Ni'a Bena Gola	Improve eye vision
Schinus molle L.	Piru	Piru	Susto
Musa sapientum var. ??	Plátano Negro	Yag Yela' Gasj	Diuretic, burns
	Rompe Piedra	Goxj Yej	Tooth ache, tooth extraction
	Rosa blanca	Yeja Ros Syis	Headache
Ruta graveolens L.	Ruda	Cuanarud	Head ache, stomach ache, muscular ache, pain, abortion
Aloe barbadensis Mill.	Sábila	Doa Dao'	Diabetes, antiseptic, clean wounds, heal cuts
	Santa María	Yej Sant Maria	Stomach aches, diarrhea, amoebas, intestinal worms
Nicotiana tabacum L.	Tabaco	Lagua' Yez	Sore muscles, rheumatism
	Te Limón (zacate)	Yix te lmon	Calm nerves
Lycopersicon esculeutum var. leptophyllum (Dunal D'Arcy)	Tomatillo	Bex Las	Fever
Zea mays L.	Totomoxtle	Yela'	Rheumatism in legs
	Vara de San José Blanco	Yag Yejeida' syis	Asthma
Mimosa albida H&B	Vergonzosa	Yesa' adin	Cough, cold
Cuphea aequipetala Car.	Violeta	xcuan de la	Fever, dysentery
	Yerba Buena	Yixgüej	Stomach ache, intestinal worms
Erythrina sp.	Zompancle (Tzompantli, Colorín)	Yag Btosa	Sore throat, swollen nodes, mumps, goitre, insomnia

Source: McAndrews, G. (1995). A triplicate set of each collected species was dried for deposit in each of the following herbaria: Oaxaca City Herbarium of the Instituto Politécnico Nacional (IPN), the National Herbarium of the Universidad Autónoma Nacional de México (UNAM) in Mexico City, and the Ada Hayden Herbarium of the Iowa State University Botany Department. A complete data base is avaible on http://www.public.iastate.edu/~rjsalvad/anonymous/yzplants.txt

Many of the species included in the table are prevalent throughout larger areas of Mexico and share similar medicinal uses, as determined by comparing with authoritative compendia such as Martínez (1990) and Berlin et al. (1974); e.g. hierba mora (*Solanum nigrum* L.) for the treatment of boils and muscular pains. Many others have great historical tradition and can be found in sources as ancient as the Florentine Codex (Estrada Lugo, 1989); e.g. Copal (*Bursera bipinnata* (sesse and Moc. ex DC.) whose sap is used as a balm to "clean blood" and soothe body aches and cracked skin. For most of the plants that could not be satisfactorily identified, the variety of the species is the item in doubt. A very small number of true "unknowns" emerged from the studies. The best example is the *rompe piedra* plant, a *Rannunculeid*, whose unusual use is at the source of its name.

Almost all of the species used by the **Zapotec** people are known by a Native Zapotec name, even in the case where the "Spanish" name of the plant is a cognate of Nahuatl (e.g., *miltomate*, *chichicastle* [*Cnidoscolus urens* (L.) Arthur], *ocote* [*Pinus michoacana* f. tumida Martínez], *copal* [*Bursera bipinnata* (sesse and Moc. ex DC.) Engl.], etc., known in Zapotec as *bix yix*, *ley yesa xguey*, *yag dod* and *yag yal*, respectively). The only exceptions are the names of some introduced plants, such as lime, *Rutaceae*, (*lmon*) and alfalfa, *Medicago sativa*, (*lfalf*), whose names are cognates of the Spanish common name. Even so, many introduced plants have been given true Zapotec names based on some notable attribute or use (e.g., the castor bean (*Ricinius communis* L.), known as *yag rzab* in Yatzachi el Bajo (McAndrews, G.; 1995)..

However, the fact that **Zapotec** names are unique and based on independent nomenclatural principles is clear from the literal meanings of the names. The generic name for "plant" in **Zapotec** is *yag*. Many names begin with this prefix. Other common prefixes indicate the plant part utilized, such as the leaf (*lagua'*) or flower (*yej*). The Nahuatl/Spanish name *cocolmecatl* (most probably a species of the genus *Smilax*; cf. Martínez, 1990:70-73) means literally "vine used for disease" (cf. *cocoliztli* and *mecatl* in Karttunen, 1992), and is reported in Siméon (1988) to be a widely used medicinal plant in central and southern Mexico during the 17th century (date of the original work) for the purpose of losing weight. This is also the primary medicinal use of the plant in Yatzachi el Bajo, where its name is *yejlox*, meaning "white flower." (McAndrews, G.; 1995).

1.5 Knowledge versus practice

"In Yatzachi el Bajo [Mexico]*, a functioning system of plant-based healing that is founded on the accumulation of empirical knowledge over the centuries is in place, and serves an important health, social and economic function. Of the three people primarily invested with this knowledge in this village, two are at an advanced age and have only a single daughter who is not a resident of the village and who has not acquired the medicinal plant knowledge of her parents. The third individual is unmarried and likewise has not tutored anyone in the medicinal plant traditions of Yatzachi. Many villagers express an open sentiment of impending doom regarding the future of the village, and talk openly about the end of the world, an impression obviously related to the fact that many believe that the current generation of Mountain Zapotecs will be the last to inhabit Yatzachi and to live in the traditional way."*
(McAndrews, G.; 1995).

As modern cultures and technologies spread around the world, the breadth of Native peoples' knowledge is diminishing daily as older generations pass away and younger generations slowly set aside their traditional ways and adapt to new lifestyles. We may never realize the full significance of the Indigenous knowledge forfeited in the process.

Even though cultural traditions successfully adap to political and economic contexts, a clear distinction should be made between adaptive processes and the simple translocation of another culture's social and economic standards. If those cultural values, knowledge and traditions are subsumed under notoriously commercial practices – such as deals solely based on monetary exchange – then the enlightening matrix of that traditional knowledge will be inexorably lost.

Many researchers and other interested parties are placing a greater emphasis on recording indigenous cultures and knowledge. Organizations are being formed to preserve and record cultures, language and knowledge of various Aboriginal peoples: descriptions of diseases that can be treated, plant species used for treatments, mode of preparation of plants, and sites where the plants can be found. It is hoped that such projects will not only help to preserve an important store of Native knowledge, but that they will serve to improve the active appreciation and practice of the traditional knowledge system as live ones and not merely as historical artefacts.

1.6 Feasibility of using traditional knowledge to maintain customary purposes

As indigenous peoples are subjected to the pressures of modernization, they are often forced to choose between their native subsistence lifestyles and those that would make them more dependent upon the outside world. However, there are important bodies of knowledge about local resources and traditional practices among indiegenous peoples that can continue to be useful to support customary values such as redistribution, mutual support networks and self-determination even within the context of contemporary industrialized societies.

This category has been considered in 2.1 Regional and national land use practices, and 2.2 Incentive measures & Capacity-building measures

1.7 Summary

The knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity is a convenient shorthand to refer to the complex of ideas embraced by Article 8(j). It is important to remember that Indigenous and local knowledge systems do not merely conserve knowledge but also innovate; they are evolving and dynamic, rather than static.

Indigenous systems are often complex, their various components interrelated. This makes it difficult to accurately measure their efficacy or economic return. To overcome this, western science has tended to pick only bits and pieces of local systems for comparison with their Western counterparts. For example, yields of local crops were compared to those of improved Western varieties. The fact that local crops were well adapted to specific intercropping arrangements was often ignored despite the fact that total economic returns from some intercropped fields is higher than that from improved monocrops. Taking economic processes into account when conceptualizing biological diversity would recognize the fact that most of the world's biodiversity exists in areas where local producers live and work (Gómez-Pompa, A. and A. Kaus. 1992). The recent past of political instability, civil war and ecological devastation has impoverished the region.

Among efforts to bring the region out of paucity, the introduction of large-scale commercial mono-cropping has been threatening original cultures and regional genetic diversity. The best lands were given over to commercial crops, and traditional agricultural production by women was relegated to other fields.

Then again, biological diversity can also be seen as a social construction, in the sense that it refers to the set of values attributed to it by a specific actor. In this line of thought, a meaningful nature is referred to as a 'socially constructed nature' (Ingold, T. 1996). Nature itself and the traditional practices, uses and management of natural resources, are therefore determined by the subistence economies of of local and Indigenous operators (Gerritsen, P. R.W. July 2000). In Central America, economic processes are impacting very seriously on traditional biodiversity-related knowledge and practices, partly because of commercial land fragmentation, and commercial crop replacements.

2 Identification and assessment of measures and initiatives to protect, promote and facilitate the use of traditional knowledge

2.0 Overview – regional issues

Protecting and preserving the Traditional Knowledge of Indigenous people necessarily entails consolidating the fundamental axis of identity-territory-autonomy which allows the generation and perenniality of this knowledge. This trilogy is confronted with the dismemberment of indigenous territories through arbitrarily-defined administrative divisions, significant gaps in land tenure regulations with respect to ancestral forms of possession and management of natural resources. These are generally submitted to regulations that are incompatible with Indigenous peoples' cultures, lifestyle and customary practices.

At the end of the 20th century, Indigenous social and political movements achieved significant legislative goals regarding these issues.

Table 5. Indigenous people's rights in the national jurisdictions

COUNTRY	Identity	Lands/Territory	Self Determination
BELIZE	No special rights are considered	No special rights are considered	No special rights are considered
COSTA RICA	Indigenous persons are tose who constitute ethnic groups, they directly descend from the precolombina civilization and they preserve their own identity. They are not entities of the State *Indigenous Act N° 6172 (1977). Articles 1 and 2.*	The indigenous communities are the propiertors of the lands of the indigenous reservations and the General Procutator of the State runs a special register of them. *Indigenous Act N° 6172 (1977). Article 2.*	The indigenous communities have full legal capacity to adquire any kind of rights and duties. *Indigenous Act N° 6172 (1977). Article 2.*
GUATEMALA		The State protects the indigenous agricultural lands and their cooperatives. The territories of the cooperatives, indigenous communities or any other forms of communal or collective possession of agrarian property, as well as the familiar patrimony and popular house, will enjoy special protection, credit asitence and preferential techniques to guarantee their possession and development, to assure to all the inhabitants better life quality. *Political Constitution. Article 67* By means of special programs and suitable legislation, the State will provide to the indigenous communities with adecuated lands that need them for their development *Political Constitution. Article 68*	The indigenous communities and other that inhabit lands that historically belong to them and that traditionally they have administered in special form, they will maintain their own way of life and system of administration. *Political Constitution. Article 67*

HONDURAS	No special rights are considered	The State protects the rights and interests of the indigenous communities of the country, in special their lands and forests where they traditionally live and develop. *Political Constitution. (1982). Decree N° 131. Article 346.*	No special rights are considered
MÉXICO	The Mexican Nation has a pluricultural composition sustained originally in its indigenous towns. The law will protect and promote the development of its languages, cultures, uses, customs, resources and specific forms of social organization, and will guarantee to its members the effective access to the jurisdiction of the State. Their traditional practices and legal customs in the terms will be taken into account in the agrarian judgments and procedures in which they are part. *Federal Political Constitution (1995) Article 4.*	It recognizes the legal entity of the ejidales (population centers) and the communal property on their lands occupied as much for the slums as for the productive activities. *Federal Political Constitution Article 27. VII* Also, the State recognizes to the indigenous communities... the access to the natural resources of their lands and territories *Political Constitution of the State of Oaxaca. Article 16*	Also, the State recognizes to the indigenous communities... their internal forms of social, political organization, their normative systems, and respects the jurisdiction that they will have in his territories *Political Constitution of the State of Oaxaca. Article 16*
NICARAGUA	The State recognizes the existence of the indigenous people, they enjoy the rights, duties and guarantees briefed in the Constitution, and specially those to maintain and to develop to their identity and culture, to have their own forms of social organization and to administer their local subjects; as well as to maintain the forms of property of their lands, in accordance with the law. For the communities of the Atlantic Coast the Constitution settles down the regime of autonomy. *Political Constitution (1995) Article 5, 3rd paragraph*	The State recognizes the communal forms of property of the Communities of the Atlantic Coast, on their territories. Also it recognizes the enjoyment and use of waters and forests of his communal lands. *Political Constitution (1995). Article 89*	The Communities of the Atlantic Coast have the right to preserve and to develop their cultural identity in the national unit; to equip themselves with their own forms of social organization and to administer their local subjects according to their traditions. *Political Constitution (1995). Article 89* The State will organize, by means of a law, the regime of autonomy for the indigenous people and the ethnic communities of the Atlantic Coast, the one that will have to contain, among other norms, the attributions of their control systems, their relation with the Executive authority and Legislative and the municipalities, and the exercise of their rights. For its approval and reforms, this law, will require of the majority established for the reform to the constitutional laws. The concessions and the contracts of rational operation of the natural resources that the State in the independent regions of the Atlantic Coast grants, will have to count on the approval of the Independent Regional Council. The members of the Independent Atlantic Coast Council will be able to lose their condition by the causes and the procedures that the law establishes. *Political Constitution (1995). Article 181*

PANAMÁ	The State recognizes and respects the ethnic identity of the national indigenous communities. It will develop programs to improve the material, social and spiritual development of the values own of each one of its cultures and will create an institution for the study, conservation, spreading of their languages, as well as the promotion of the integral development of these human groups. *Political Constitution (1994). Article 86*	The State guarantees to the indigenous communities the reserve of the necessary landsa nd the collective property of the same ones for the profit of its economic and social well-being. The Law will regulate the procedures that must be followed to obtain this purpose and the corresponding boundaries within which the deprived appropriation of lands is prohibited. *Political Constitution (1994). Article 123*	Until the Indigenous Regions of the Republic are created and demarcated, the Law will create an electoral circuit formed by the Groups of 'Corregimientos' of the east of the Province of Chiriquí mainly inhabited by the guaymí population. This one will choose a Legislator and his respective substitutes, like members of the Legislative Assembly. *Political Constitution (1994). Article 321 Transitory dispositions*

Also, the political volatility, the disparity in issues like: institutional and political recognition and relevant presence of the indigenous people in the countries of this region have motivated high legal contrasts in the effective protection of the indigenous people's rights.

During the 1980's the Q'eqchi Mayan of Guatemala found themselves in the middle of a conflict between leftist guerrillas and the government. The *ladino* guerrillas, based in the surrounding forests, demanded food and shelter from the Maya. But Guatemalan death squads killed 150,000 people and disappeared another 40,000. Tens of thousands of refugees from the Indigenous communities fled to Mexico and the United States while those who remained were moved into "model" villages were all men were required to enlist in civil patrols. Since 1994, in Chiapas, Mexico, the Mayan people are caught between the Zapatistas rebels and the Mexican government. Despite their nonviolent strategy, fundamentalist missionaries put Mayan culture at risk. Moreover, the harvesting of the great mahoganies in the Lacandon forest is not only destroying a precious rainforest, it is also seriously jeopardizing the remote Lacandon Mayan community. (Criscenzo, J. 1996).

2.1 Regional and national land use practices

"Almost every agricultural system includes both subsistence production and exchange of both products and labor. [And that] the Kekchi [in Belize] have by all accounts not had a 'pure' subsistence lifeway for well over 2,000 years, and for at least 400 years, many have worked off the farm part-time." (Richard Wilk; 2002 Household Ecology, Economic Change and Domestic life among the Kekchi Maya in Belize)

The current Maya system for corn cultivation is basically the same that has been used for 3000 years. Its main activities are to fell the big trees, burn them along with the weeds and their seeds, plant the corn, then weed the plants as they grow, when the ear is mature the stalks are bent and the corn is left to dry in the field, then it is harvested and after a few years the corn field is moved to a new location.

This practice of slash and burn agriculture has been called milpa, an Aztec word for "corn field" that was used by the Spaniards to designate corn fields, even in other parts of Mexico and Central America. The Mayan word used in Yucatan is col, and similar names are used in other Mayan dialects. This activity is still very important to today's Maya population who continue to perform it in the same manner as their forefathers. As the Maya population grew, the need for more food became indispensable and the attempts to obtain a more abundant crop started. This was done mainly by selecting different corn varieties and by carefully coordinating the dates of cultivation with the rain cycle.

The time count used for corn cultivation must have been based on the initial Maya numeration which consisted of the number of fingers on both hands and feet or the number 20, a kal. The observation that 13 kal (260 days) were needed from the choosing of the location for the milpa until the burning of the felled forest patch and equal number of kal elapsed from the planting, through the growth and harvest until the

corn was stored, gave origin to the first Maya calendar. The Tzolkin, Mayan name derived from the word tzol which means "to put in order", and kin that means "day", was a ceremony in which the priests assigned the order of the days to realize the milpa's activities and the ceremonies related to its different phases. One Tzolkin cycle was related to the preparation of the land and a second Tzolkin cycle was directly related to the growing and harvesting of the corn. From a religious point of view this 13 kal time period gave place first to the deification of number 13 and second, to the creation of the thirteen day time period called Oxlahunkin which then became the base of the Tzolkin calendar and thus a 260 day milpa cycle ended up being made of 20 thirteen day periods. (Romero Conde, P. 1996)

Milpa systems make minimal use of toxic agrochemicals, conserving crop genetic resources. Crop genetic diversity is high in communities using milpa systems, with more than fifteen local varieties of corn, five of bean, three of squash and six of chile. In addition, the fallow areas are natural habitats for birds and small mammals, conserving natural biodiversity and creating diverse landscapes.

The intercropping association of corn-beans-squash increases biological N fixation and the biological control of insects and disease. Fallow and mulching periods in Milpa systems are adjusted to manage productive potential, with longer fallow periods increasing biomass production and nutrient recycling that boosts crop yields after cultivating fallow areas. Milpa systems provide entire farming communities with their varied needs including subsistence food crops, forage crops (squash pulp), rural construction materials, fuel-wood, flowering plants and secondary vegetation for apiculture, and animals that may be hunted. Using traditional Milpa systems conserves local knowledge, enables farmers to control their genetic resources, and provides for local subsistence food production.

Box 3. The *milpa* system

The Milpa: Past, Present, and Future

by Anna Kipp

The traditional milpa system in Sarteneja, Belize is evolving in many ways, from its role in society, its affect on the family, the changing government policies to the actual farming techniques and their effect on the moute. My intentions for a project involve documenting and preserving this cultural tradition that has played a central role in the Foundation of Belizean society. It is felt within this community that much of the culture and traditions surrounding the milpa will be lost with the passing of the elders that are still living lives permeated with the ways of the past.

Sarteneja was founded in the 1850s by refugees of the Yucatan Caste Wars.

A. What is a milpa?

1. Defined by Characteristics

a. Intercropping

b. Fallow periods and field rotation

c. Slash and burn technique used to clear and maintain milpa

d. Subsistence farming.

e. low-level technologies employed

1. asada (hoe like)

2. machet (machete)

3. gancho (suake hook)

4. digging stick

5. no machinery

6. no chemical pesticides or herbicides

B. The Milpa of the Sanchez Family (Sarteneja, Belice).

1. focus on 2 key figures in the family

1. Tacan Sánchez -87 years old Rosa's father in law -*suegro*-

a. dedication

b. his role is keep the family together

c. my time with Tacan

2. Rosa Sánchez -mother of 10

a. mother figure

b. strength of family from her (and Tacan)

C. Traditional Roles of the Milpa

1. Within the family

a. entire family helps with the milpa

b. gender roles specific only in that women don't usually do alot of the chopping

c. unifying of the family

2. Society

a. fahiva -community involvement with:

i. clearing the milpa

ii. participation in primesia (prayers and blessings) for the milpa

iii. funerals

iv. interdependence

b. no one goes hungry.

D. Traditional Policies

1. to be citizen of Sarteneja one must produce on a milpa

2. clear the land, gain title or lease and pay through small percentage of crops at each harvest to the village government.

E. Changes in the Milpa

1. Governamental policies

a. no longer: *clear it and gain title*

b. one must go to 3 levels of Governamental to obtain lease.

i. Village lands Committee

ii. District lands Committe

iii. Minister of Lands and Natural Resources.

2. the effects on society and family

a. on the family

i. disputes of over land titles splits up more families than anything else.

ii. changing values

iii. in some families not everyone helps--women afraid of the marte.

b. society's loss of interdependence.

3. Tradition -deserting traditions of milpa and turning to the sea.

4. Introduction of technology

a. chainsaw

b. chemical fertilizers

c. considerably higher in environmental impact

Sources:
http://www.coa.edu/campuslife/work/courseprojects/yucatan/mexwinter/projects/Finproj/AKfinproj.html
Photos: http://www.public.iastate.edu/~vagabond/mexico/milpa.html

2.2 Incentive measures and Capacity-building measures

As one woman from Honduras stated: 'yesterday I planted a medicinal plant there, which I had collected in the forest. But this morning my husband substituted it with a coffee shrub. He says the coffee will be of greater benefit to us. So why should I take the trouble to look and care for medicinal plants?'. Yet many of the 253 medicinal vegetable species identified have been introduced and are managed by the women, making their contribution to the development of the garden and the conservation of invaluable genetic material (Lok, R. July; 2001).

The main opportunity to develop an integral program to preserve and rescue traditional biodiversity-related knowledge would take place within the Mesoamerican Corridor inititaive.

The Mesoamerican Biological Corridor (MBC) is one of the world's largest conservation initiatives, focusing on all Central American countries from Mexico to Panama. Covering only 0.5% of the world's land area, Central America contains 5% of all known biodiversity. The aim is to create ecological corridors that provide freedom of movement for animals and facilitate genetic exchange of species, which is essential to their survival.

Likewise, the region is home to numerous indigenous and Afro-American communities whose livelihood is inextricably linked with their natural environment. Their participation in the programme is being encouraged to ensure that issues such as sustainable development and rural poverty are fully addressed. As part of a long-term strategy, it also must be emphasized the region's vulnerability to flooding and other natural disasters, consequently the impact on the traditional lifestyles should be measured.

A 20,000 hectare area is designed to protect important tracts of forest on the southern coast of **Belize**, most of which have already been fragmented by timber extraction, citrus cultivation and shrimp farming. In late 1998 it became the first area of threatened land to be purchased with support from Flora & Fauna International's Arcadia Fund. Golden Stream's conservation value transcends its intrinsic importance as a haven of biodiversity. This intervention not only try to save the land from conversion to citrus plantations, but also upholds the core area of the Port **Honduras** marine reserve into which the Golden Stream flows. The area also provides a crucial geographical link as the south-eastern **Belize** section of the proposed Mesoamerican Biological Corridor through this and other countries of Central America. In partnership with local NGOs, the private sector and, most importantly, the communities, it has been introduced measures to protect the entire watershed and increase local management capacity. Long-term capacity building will enable the land to revert to local ownership once a sustainable future is assured.

Traditional tropical homegarden systems are the result of complex relations between human and agroecological components. Their layout and management not only reflect local knowledge, they are also

a product of culturally and socially defined differences in gender roles and expectations. From 1998 to 2001, under the auspices of CATIE, various multidisciplinary studies, have been carried out which focus on traditional tropical homegardens in the countries of Central America. A total of 100 gardens, mainly in **Costa Rica**, **Honduras**, **Nicaragua** and **Panama**, were included in the research. These studies have contributed to a better understanding of the system and its relationship to the socio-economic environment of its owners (Lok, R. July 2001). By making use of the existing layout structures, the management zones could promote the understanding and use of homegardens, and facilitate both the research and outreach efforts related to these systems.

The Canadian International Development Agency (CIDA), Pueblo Partisans and Maya-Mam Association for Research and Development (AMMID), Comitancillo Integrated Health Strategy are carrying out a project on traditional medicine. The purpose of this project is to improve the health of the people of Comitancillo, **Guatemala**, by enhancing local capacity to promote health and to treat disease. The project intends to establish a health resource center and deliver a training program to health promoters and pharmacists, and conduct medicinal plant research. The project will use Indigenous knowledge to enhance the use of traditional medicinal plants and decrease both perceived and actual dependence on pharmaceutical remedies.

The Centro de Desarrollo de la Medicina Maya (CEDEMM) is a particular model of assistance to health, which has been developed by the organization representing Indigenous doctors of the State of Chiapas (OMIECH) in Southern **Mexico**, which began operating in the early 80's as an association dedicated primarily to the rescue, defense, development and promotion of traditional Indigenous medicine. OMIECH's membership is formed by indigenous doctors, bilingual technicians and advisors.

2.3 Strategic planning for conservation and sustainable use of biological diversity

The conservation 'in situ' is a joint work with the local communities, trying to maintain systems and adapted practices, that guarantee, on one hand, the conservation of such resources, and, on the other hand, the generation of benefits to those communities. Actually, the conservation 'in situ' through the maintenance of the traditional knowledge and practices has discharge priority, because the economic difficulties of the region, to maintain all the genetic resources at 'ex situ' banks and the information in electronic database.

An example of the retention of the traditional knowledge systems is taking place in **Mexico**. The crops that represent the broad range of genetic diversity still found in this region landraces, are now threatened by increased production costs, technological change, loss of labour and a shorter fallow period. As an example, the strategic planning of the International Plant Genetic Resources Institute in Mexico selected crops for conservation in an in situ project were those of the "milpa" system, the traditional Mayan system of annual crops grown in association. These include maize (*Zea mays*), lima bean (*Phaseolus lunatus*), squash (*Curcurbita*), chili peppers (*Capsicum*) and peanut (*Arachis hypogaea*). The site for project implementation was located in the north-centre of the Yucatan peninsula, in an area where almost 50 000 families still grow "milpa" with slash and burn agriculture and intercropping.(Agroecology Research Group. International Plant Genetic Resources Institute. 1999).

Box 4. Principles and Values of the traditional Mayan system of annual crops

The Full Principles List.
By Agroecology Principles Group

1. Use Renewable Resources

a. Use renewable sources of energy instead of non-renewable sources.
b. Use biological nitrogen fixation.
c. Use naturally-occurring materials instead of synthetic, manufactured inputs.
d. Use on-farm resources as much as possible.
e. Recycle on-farm nutrients.

2. Minimize Toxics
    a. Reduce or eliminate the use of materials that have the potential to harm the environment or the health of farmers, farm workers, or consumers.
    b. Use farming practices that reduce or eliminate environmental pollution with nitrates, toxic gases, or other materials generated by burning or overloading agroecosystems with nutrients.
3. Conserve Resources
    a. Conserve Soil
        i. Sustain soil nutrient and organic matter stocks.
        ii. Minimize erosion.
            1. Use perennials.
            2. Use no-till or reduced tillage methods.
            3. Mulch.
    b. Conserve Water
        i. Dry farm.
        ii. Use efficient irrigation systems.
    c. Conserve Energy
        i. Use energy efficient technologies.
    d. Conserve genetic resources
        i. Save seed.
        ii. Maintain local landraces.
        iii. Use heirloom varieties.
    e. Conserve Capital
        i. Keep bank debt to a minimum.
        ii. Reduce expenditures.
4. Manage Ecological Relationships
    a. Reestablish ecological relationships that can occur naturally on the farm instead of reducing and simplifying them.
    b. Manage pests, diseases, and weeds instead of “controlling” them.
    c. Use intercropping and cover cropping
    d. Integrate Livestock
    e. Enhance beneficial biota
        i. In soils
            1. Mycorrhizae
            2. Rhizobia
            3. Free-living nitrogen fixers
        ii. Beneficial insects
            1. Provide refugia for beneficials.
            2. Enhance benefial populations by breed and release programs.
        iii. Recycle Nutrients

1. Shift from throughflow nutrient management to recycling of nutrients.
2. Return crop residues and manures to soils.
3. When outside inputs are necessary, sustain their benefits by recycling them.

iv. Minimize Disturbance

1. Use reduced tillage or no-till methods.
2. Use mulches.
3. Use perennials

5. Adjust to Local Environments
   a. Match cropping patterns to the productive potential and physical limitations of the farm landscape.
6. Adapt Biota
   a. Adapt plants and animals to the ecological conditions of the farm rather than modifying the farm to meet the needs of the crops and animals.
7. Diversify
   a. Landscapes
      i. Maintain undisturbed areas as buffer zones.
      ii. Use contour and strip tillage.
      iii. Maintain riparian buffer zones.
      iv. Use rotational grazing.
   b. Biota
      i. Intercrop.
      ii. Rotate crops.
      iii. Use polyculture.
      iv. Integrate animals in system.
      v. Use multiple species of crops and animals on farm.
      vi. Use multiple varieties and landraces of crops and animals on farm.
   c. Economics
      i. Avoid dependence on single crops/products.
      ii. Use alternative markets.
      iii. Organic markets.
      iv. Community Supported Agriculture
      v. "Pick your own" marketing.
      vi. Add value to agricultural products.
      vii. Process foods before selling them.
      viii. Find alternative incomes.
      ix. Agrotourism
      x. Avoid dependence on external subsidies.
      xi. Use multiple crops to diversify seasonal timing of production over the year.
8. Empower People
   a. Ensure that local people control their development process.
   b. Use indigenous knowledge

c. Promote multi-directional transfer of knowledge, as opposed to "top-down" knowledge transfer.
    i. Teach experts and farmers to share knowledge, not "impose" it.
d. Engage in people-centric development.
e. Increase farmer participation.
    i. Link farmers with consumers
f. Strengthen communities.
    i. Encourage local partnerships between people and development groups.Ensure intergenerational fairness.
g. Guarantee agricultural labor.
    i. Ensure equitable labor relations for farm workers.
h. Teach principles of agroecology & sustainability.

9. Manage Whole Systems
    a. Use planning processes that recognize the different scales of agroecosystems.
        i. Landscapes
        ii. Households
        iii. Farms
        iv. Communities
        v. Bioregions
        vi. Nations
    b. Minimize impacts on neighboring ecosystems.
10. Maximize Long-Term Benefits
    a. Maximize intergenerational benefits, not just annual profits.
    b. Maximize livelihoods and quality of life in rural areas.
    c. Facilitate generational transfers.
    d. Use long-term strategies.
        i. Develop plans that can be adjusted and reevaluated through time.
        ii. Incorporate long-term sustainability into overall agroecosystem design and management.
    e. Build soil fertility over the long-term.
    f. Build soil organic matter.
    g. Add value to agricultural products.
11. Value Health
    a. Human Health
    b. Cultural Health
    c. Environmental Health
        i. Value most highly the overall health of agroecosystems rather than the outcome of a particular crop system or season.
        ii. Eliminate environmental pollution by Toxics and surplus nutrients.
    d. Animal Health
    e. Plant Health

Source: Principles of Agroecology and Sustainability; 2003. Agroecology Principles Group, UCSC http://www.agroecology.org/principles/princlist.htm

Other programmes contribute to the documentation of biodiversity and the traditional related knowledge. Latin American Ethnobotanical Garden Networks and University of Georgia (USA) maintain agreements with several existing, developing, and proposed sister gardens throughout Latin America and Central America. Agreements involve research and design collaboration, exchange of faculty and students, and exchange of plant specimens (http://www.uga.edu/ethnobot/Sis.html). So far, the Sister Garden in the region are:

Box 5. Latin American Ethnobotanical Gardens Networks

Jardín Etnobotánico El Colegio de la Frontera Sur (ECOSUR) Chiapas, Mexico This sister garden project was the first established and grew out of a long-term collaboration between researchers at El Colegio de la Frontera Sur (ECOSUR) and the University of Georgia. Laid out to follow the contours of ECOSUR's herbarium and library facilities, the medicinal plant garden contains over 100 plants of ethnobotanical significance to the Tzeltal and Tzotzil Maya of Chiapas, Mexico. The garden is used extensively as an educational resource in the community of San Cristóbal de las Casas, where ECOSUR is located. Regularly, school and community groups visit ECOSUR to tour the garden and learn more about the uses of medicinal plants. The garden has also sparked great interest among outlying communities who have gone on to establish their own gardens, facilitating the exchange and conservation of medicinal plants and knowledge of their uses. Eight cooperative ethnobotanical community gardens have been established in Highland Chiapas as part of efforts to promote and maintain traditional knowledge of medicinal plants. Species inventories of three of the fully established gardens average 324 species in 103 botanical families. These gardens are of great importance in the promotion and maintenance of Maya traditional knowledge of herbal remedies.

Source: (http://www.uga.edu/ethnobot/SisMexico.html)

Jardín Etnobotánico y Medicinal. Escuela de Agricultura de la Región Tropical Húmeda Costa Rica There is also a sister garden being developed in Costa Rica in collaboration with EARTH University, an agricultural regional college established by US AID. The garden project involves exchange of faculty and students of both universities, as well as expanding and redesigning the medicinal plant garden at EARTH. This collection features medicinal plants that grow well in the humid tropical lowlands of Costa Rica and tropical America at large. It is a teaching garden where students learn how to identify, propigate, cultivate, and use medicinal plants. The plan for the garden at EARTH follows goals similar to the garden at UGA, using available material and local construction techniques, and emphasizing an organically shaped planting area, benches, and paved areas. The first exchange student from EARTH College began work in Athens in the fall semester of 1999, developing and producing consistent labeling for plant material in both gardens. Our second intern is assisting in technical translation and scientific publication.

Source: (http://www.uga.edu/ethnobot/SisCostaRica.html)

On other hand, the systematic search for new sources of chemical compounds, genes, proteins, micro-organisms, and other products with potential economic value present in biotic resources of **Costa Rica** is one of several activities included among INBio's efforts towards saving, knowing, and using Costa Rican biodiversity. INBio's Bioprospecting Program uses the information generated by the national biodiversity inventory to carry out research that adds value and knowledge to existing resources. But even if one of the primary objectives of INBio's Biodiversity Information Outreach Program is to increase the intellectual value of biodiversity, there are no plans for specific approaches to traditional biodiversity-related knowledge.

2.4 Legislative measures

Protection and preservation of the traditional knowledge of the indigenous people necessarily imply to make reference to the consolidation of the identity-territory-autonomy axis that makes possible the generation and strengthening of this knowledge. That long standing axis is confronted with the dismemberment of indigenous territories through arbitrary administrative subdivisions, a lack of

regulations on the legal property of their lands and territories in the respect of ancestral forms of property. The management of their natural resources, flora and fauna is too often submitted to regulations many times incompatible with their lifestyle and customary purposes.

In addition, Indigenous people have to deal with other aspects such as legal measures related to intellectual property, and the equitable distribution of benefits derived from the access to such knowledge.

Some measures have been announced toward setting the bases for the protection of the Indigenous traditional knowledge, with the purpose to iniciate a process for the determination and registry of Indigenous intellectual rights with the active participation of Indigenous peoples. Although **Panama** has already promulgated the Collective Rights of the Indigenous People in 2000 (Act N° 20), it does not rule on the traditional biodiversity-related knowledge. Its legal scope is restricted to cultural textile and drawings goods.

However, some measures have been taken: **Costa Rica**'s Biodiversity Act punishes with severe fines the non-authorized access to biodiversity and traditional knowledge (section 112), and any agreement on these has to be performed through the Comisión Nacional de Gestión de la Biodiversidad (CONAGEBIO). This official entity is composed of governmental authorities, the Mesa Nacional Indígena and the Mesa Nacional Campesina. Even though the Registry for Traditional Innovations, Knowledge and Practices is anticipated in the law, it will not be developed in the next future (2nd National Report, November 2001).

In **El Salvador,** the development of the Registry of Traditional Knowledge Innovations and Practices is on course. Within the Project PROGULF, an initial basic diagnosis was made which reflected a listing of plants and their respective traditional uses. This listing will be developed to the level of inventories to reflect uses, geographic sources and to propose a strategy (2nd National Report, Marzo 2002)

In **Guatemala**, in the context of activities of the Defensoría Maya and the Defensoría Indígena, the Agreement on the Identity and Rights of Indigenous People (Acuerdos de Paz) and the section 22 of the bill 27/2001 which rules activities of research and researchers of the CONAP, raised some initiatives toward the participation of Indigenous communities settled in the surroundings of sites where activities take place. Nevertheless, any benefit sharing or property registration have been planned (2nd National Report, November 2001). In particular, article 14 of the Copyright Rights law stipulates that expressions of folklore are part of the cultural heritage of the country, and that it would be the subject of a specific legislation (Fourth Session. Intergovernmental committee on intellectual property and genetic resources, traditional knowledge and folklore December, 2002 WIPO/GRTKF/IC/4/15).

Even though **México** considers this matter of high priority, no budget could be allocated for the activities involved; in any case, dissemination programs within Indigenous communities have been addressed by NGOs acreditated at the Instituto Nacional Indígena –INI- (2nd National Report, Marzo 1993). At the Fourth Session of the Intergovernmental committee on intellectual property and genetic resources, traditional knowledge and folklore in December of 2002, its Delegation stressed the important element of facilitating the participation of the Permanent Forum on Indigenous issues in the future work of the Committee, and stated that Mexico had already supported this. Also, the Delegation stated that certain key questions could be identified, such as determining the identity of the rights holders, and expressed the wish for more detail on the use of geographical indications to protect expressions of folklore. The Delegation agreed on the objective of the tool kit for TK, and an explanation was provided about both the benefits and the drawbacks of documentation. Such information would allow TK holders to make informed decisions prior to documentation of their TK. However, the Delegation would also like the tool kit to address the options for TK holders where their knowledge has already been published without the prior informed consent of the original TK holder(s). At present, Mexico is contemplating the establishment of a database of public domain TK to facilitate the work of patent examiners. It would be most useful if the tool kit (WIPO/GRTKF/IC/4/5) could analyze this option, including its advantages and drawbacks. The Delegation proposed that there be more information on the identification of stakeholders

and on community consultations, in particular information from other countries who had practical experience in this difficult area, such as whether there should be a right of veto, or a right to vote, in those cases where the same knowledge belonged to more than one community. Furthermore, in order to fully inform TK holders, the tool kit should state that, at present, TK was not protected in the international arena. The Delegation ended by saying that, having taken part in the meeting of Megadiverse Countries in Cuzco, Peru, it interpreted the findings of the meeting to mean that it was agreed that analytical work and the proposal of initiatives regarding the protection of genetic resources and TK would continue through the setting up of an ad hoc group (WIPO/GRTKF/IC/4/15).

Other than the already mentioned Act N° 20, **Panamá** has promulgated the Act 41 (1998) which rules on environmental issues and contains a special chapter (Título VII, "De las Comarcas y Pueblos Indígenas") protecting and preserving Indigenous environment-related knowledge, innovations and practices. At this moment Act N° 36 is under legislative consideration, which will create the Instituto de Medicina Tradicional (2nd National Report, Enero de 1995; Thematic Report Benefit Sharing November, 2001). Panama expressed great interest in seeing to a future understanding that traditional knowledge in the public domain should have a positive effect of protection, since that was the rationale behind the development of the Panamanian Law (Law No. 20) for the protection for Indigenous cultural knowledge.

Appropriate administrative regulations are not as yet enforced in this region, but there is an awareness of the need to make progress in developing special laws, such as the sui generis system for traditional medicinal knowledge under legislative discussion in Panama. Nevertheless, countries and Indigenous people of this region argue that territorial protection by itself would be insufficient, and that international systems for the protection of traditional knowledge must also be developed (WIPO/GRTKF/IC/4/15).

2.5 Summary

Western science has been slow to develop methods to assess complex systems. Rather than measuring the yields of single crops, methods are needed which can measure economic returns of intercropped fields over extended periods. To assess the productivity of particular livestock species, methods are needed which take into account inputs like cost of feed, medicines and labor. Up to the present, analyses have focused on outputs and neglected the benefits of local breeds which thrive on minimal inputs. The system of rotation of agricultural plots in the slash-and-burn system allows for the regeneration of secondary vegetation; creating ecosystems that are favorable for traditional forest management and subsistence hunting. Nevertheless, demographic pressures and rural development policies are promoting the increased use of agrochemicals and have reduced the agricultural productivity of this system. Comparisons of genetic diversity of crops grown by communities practicing milpa versus those that have modernized agriculture with mechanization, agrochemicals and improved varieties show that traditional milpa systems conserve genetic diversity resources in situ while agricultural modernization erodes them.

Subsequently, the countries shall not just respect, preserve and maintain such traditional knowledge, but they shall promote the lively evolution of those practices and knowledge and their wider application. Another issue that needs to be resolved is to gain the approval and involvement of the holders of such traditional knowledge, insisting on the equitable sharing of benefits arising from its utilization. However willing the Parties are to carry this obligation as far as possible, national legislations are insufficient, and international and regional measures seem crucial.

3 Regional recommendations and targets

Whatever the political sovereignty, initiatives to promote and facilitate the use of traditional knowledge must reflect the traditional landscape of ancient cultures present in the region, if an effective retention and development of indigenous peoples' knowledge and practices is going to be achieved:

Recommendations	**Targets**
Development of guidelines aiming a full and common understanding of traditional biodiversity-related knowledge and practices as subject matter that can be regulated	Ensure the harmonization of definitions and common concerns. Capacity-building in the creation, implementation and enforcing of the protective legislation.
Strengthen indigenous organizational structures on traditional biodiversity-related knowledge and practices	Development of Indigenous ethnobotanical gardens networks Training of Indigenous people for the creation and handling of digital libraries to record their own traditional biodiversity-related knowledge and practices Development and discussion of guidelines on prior informed consent Safeguarding ofendangered Indigenous groups and their traditional biodiversity-related knowledge
Consolidation of regional cooperative structures on traditional biodiversity-related knowledge and practices	Documentation of traditional knowledge in the public domain to identify its contents as prior art Protection of the transboundary communities from biopiracy and biofraud.
Monitoring mechanism under explicit guidelines such as catalogue of indicators built with effective participation of Indigenous and local people	Assess measures and initiatives consistent with: (i) indigenous and local practices code implemented; (ii) satisfaction rate for indigenous and local practices a. cultural/language maintenance programmes; b. amount of land held by indigenous people (iii) landscape analysis tools a. landscape disturbance patterns; b. growth rates for indigenous and local communities.

In regards to the disputes that might arise from the access to traditional knowledge, elaboration of guidelines for a mediation and / or arbitration system	Build mechanisms for the neccesary interface between cultural parties involved. Design of an alternative and specific procedure: (i.) voluntary and consensual, and that does not create any obligatory or compulsory jurisdiction (ii.) alternative to litigation (iii.) neutral and adaptative procedure and forum in relation to jurisdictions, cultures and traditions. (iv.) control the nature and costs of proceedings. (v.) relevant expertise to the subject of traditional knowledge which otherwise would barely be available.

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