On Biocultural Diversity from a Venezuelan Perspective: tracing the interrelationships among biodiversity, culture change, and legal reforms

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Introduction

The phenomenon of rapid biodiversity decline was transformed in the late 1980’s from a purely academic problem to a discourse for social, economic, and political change thanks in large part to the communicative skills and scientific authority of distinguished biologists such as E.O. Wilson, Paul Ehrlich, Thomas Lovejoy, Norman Myers, and Peter Raven. They expressed alarm that natural habitats were being modified and species eliminated at a pace and scale unprecedented in the earth’s history, with potentially dire consequences for long-term planetary health and human well-being (Wilson 1988). This discourse has since become firmly implanted in the general public consciousness, propelling a powerful global environmental movement, persuading governments to take conservation measures, and giving birth to the “crisis discipline” of conservation biology. The effective result has been a concerted research, policy, and action agenda that encompasses: scientific efforts to catalogue, classify, and map biodiversity throughout the world, inquiries into the ecological processes that regulate biodiversity, projects aimed at monitoring the rate of habitat alteration and species extinction, attempts to identify the threats as well as to anticipate the outcomes, and the search for effective policies that will
halt or hopefully reverse this destructive trend. At about the same time that the biodiversity crisis came to public light, several linguists and anthropologists began to voice concern that the state of the world’s indigenous languages and cultures was suffering a similar process of extinction, endangerment, and erosion caused by the forces of economic globalization, cultural modernization, and linguistic assimilation (Krauss 1992; Harmon 1996). Though less well publicized, the catastrophic loss of cultural diversity also touched a sympathetic nerve and stimulated a pulse of salvage research projects, cultural preservation and revitalization initiatives, and reappraisals of the value and application of traditional knowledge. Although initially formulated as analogous issues, it was not long before scientists, policymakers, and local communities began to view biodiversity loss and ethnolinguistic loss as not merely parallel trends but rather as interlocking processes (Maffi 2001). This key insight has since penetrated the discourse on biodiversity at the levels of research, policy, practice, and ethics.

The interrelationships and synergistic loss of biological, agricultural, and cultural diversity is a theme that is voiced increasingly in the scholarly and technical literature on development and conservation topics in the past decade. Several strands of empirical evidence have been held up to support this argument: (1) the spatial overlap between biodiversity hotspots and centers of cultural and linguistic diversity (Nietschmann 1992; Durning 1992; Wilcox and Duin 1995; Harmon 1996; Maffi 2001); (2) the anthropogenic creation and maintenance of heterogeneous landscapes through traditional low-tech resource management practices (Posey 1984, 1998; Denevan and Padoch 1987; Baleé 1993; E.L. Zent 1998); (3) the large contribution of traditional farmers to the global stock of plant crop varieties (Brush 1980; Boster 1984; Oldfield and Alcorn 1987; Thrupp 1998); (4) the countless examples of customary beliefs and behaviors that contribute directly or indirectly
to biodiversity conservation such as sustainable resource extraction techniques, sacred
groves, ritual regulation of resource harvests, and buffer zone maintenance (Moock and
Rhoades 1992; Posey 1999); and (5) the dependence of sociocultural integrity and survival
on traditional territories, habitats, and resources (Maffi 2001). The linkage between
biodiversity and cultural difference has also become well established in various policy-
oriented discourses and instruments that pay lip-service to the need for parallel
conservation of biodiversity and associated local knowledge and practice systems. These
include: professional society codes of conduct (e.g. Declaration of Belem in Posey and
Overal 1990), multilateral agendas and treaties (e.g. Brundtland Report, Convention on
Biodiversity, Global Biodiversity Assessment), indigenous congress draft declarations (e.g.
Charter of the Indigenous-Tribal Peoples of the Tropical Forests; Indigenous Peoples’ Earth
Charter; Statement from the COICA/UNDP Regional Meeting on Intellectual Property
Rights and Biodiversity; International Workshop on Indigenous Peoples and Development;
see Posey 1999:555-601), development agency guidelines (e.g. Consultative Group for
International Agricultural Research, the International Board for Genetic Resources, the
International Plant Genetic Resources Institute, the International Institute for Environment
and Development, the Latin American Consortium on Agroecology and Development, the
U.K. Department of International Development, and the U.S. Agency for International
Development; see Cashman 1989; Warren 2001), and national laws regulating
environmental use and conservation (see below). In the action arena, many
nongovernmental organizations in the conservation business have begun to treat indigenous
and local peoples as crucial allies and partners in their efforts to conserve wildlands and
their biodiversity, promote sustainable use of natural resources, and prevent pollution.
These include a number of high-profile organizations such as the Worldwide Fund for
Nature (WWF), Conservation International, the Nature Conservancy, World Resources Institute, Wildlife Conservation Society, and the Environmental Defense Fund. Thus one of the major trends in conservation practice over the past decade has been to support people-inclusive, use-based projects, especially in developing countries, as an alternative and supplement to people-exclusive parks and protected areas (e.g. the Biodiversity Support Program’s Integrated Conservation and Development Project initiative, Brown and Wyckoff-Baird 1995). Finally, environmental philosophers and advocates are increasingly convinced that the key to successful conservation of ecosystems and constituent biodiversity lies in the moral enlightenment of human society toward greater appreciation of all life forms. An emerging position in this field considers that reinforcement and enhancement of culturally rooted social and spiritual values offers the most effective approach (e.g. the Alliance of Religion and Conservation undertaking or so-called Assisi Process, see Posey 1999). The holistic cosmovisions and lifestyles of indigenous peoples, many of which express the deep physical and metaphysical connections between the cosmos, life on earth, and human society, are frequently cited as inspirational models for the new environmental ethic (Posey 1999).

The point we are trying to make here is that at scientific, policy, practice, and ethical levels of discourse it is no longer possible to separate discussions of biodiversity loss/preservation from the matter of local cultural knowledge protection, such that the very concept of biodiversity is being supplanted by a more complex paradigm of biocultural diversity. Maffi (in press) defines biocultural diversity as “the diversity of life forms that has been jointly shaped by both natural and cultural forces through coevolutionary processes.” The conceptual breakthrough offered here goes beyond the mere recognition that nature and culture are inextricably linked but also that diversity itself must be
understood as a historical and processual phenomenon (cf. Brookfield 2001). It therefore follows that from a biocultural perspective the question of what biodiversity are we losing and why, and what is to be done about it must be answered by focusing on the cultural-historical processes affecting it. Accordingly, the goal of the present chapter will be to describe the pertinent processes taking place in Venezuela.

**Biocultural diversity in Venezuela**

Proportionate to its size, Venezuela is regarded as harboring outstandingly high biodiversity, being ranked among the top twenty countries in the world for plant, amphibian, bird, and reptile species (Table 1). A major portion of the biodiversity in the country, including an estimated 75% of plant species, is located in the southern Guayana region (Amazonas, Bolívar, and Delta Amacuro States) (Figure 1). Different types of deciduous, semi-deciduous, and evergreen forests cover approximately 83% of the surface of this region, amounting to over 375,000 km² of forested land area (Huber 1995), making this one of the largest continuous blocks of frontier forest existing in the world today (Miranda et al. 1998). From an ecological standpoint, the forested ecosystems of Guayana are characterized not only by a high degree of taxonomic (species, genus, family) and ecological diversity (interspecific relationships, life history patterns), but also by poor soils, a tropical climate, and nearly closed nutrient cycles, which means that they are especially vulnerable to degradation as a result of exogenous alteration (cf. Herrera et al. 1978; Jordan 1982; Uhl & Jordan 1984). Although most of the Guayan forests remain intact, certain focal points of development and deforestation are beginning to appear due to population growth and migration and the expansion of agricultural, mining, and logging frontiers (Bevilacqua et al. 2002). This trend is troubling, not least because relatively few botanical
and zoological inventories have been carried out within this vast region and therefore the true and full extent of biodiversity is still unknown.

<Insert Table 1 about here>

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The Venezuelan Guayana also contains a large fraction of the cultural diversity existing in the country. 23 of the nation’s 28 indigenous ethnic groups are found in this region and most of them have lived there since pre-columbian times (OCEI 1992). The majority of the indigenous population resides in small communities located in rural forested areas and they are for the most part self-sufficient in subsistence matters, displaying the typical tropical forest economic complex of shifting cultivation, hunting, fishing, and collection although variations from group to group in terms of specific resources exploited and techniques employed are also normal (Huber and Zent 1995). The ethnographic-ecological literature confirms the popular impression that they possess extensive knowledge and use of the biodiversity of their local environments and are skillful manipulators of ecological relationships and processes (Fuentes 1980; Wilbert 1996; Finkers 1986; Zent 1992; Hernández et al. 1994; Heinen et al. 1995, Zent, E.L. 1999), but it is also true that few groups have been the subject of detailed studies so their knowledge is still largely untapped. For example, Bevilacqua et al. (2002) report 505 wild species being directly used by local groups in a survey of the available literature for all groups inhabiting this region but in our research of the Hotï we were able to document as many species being used by a single group (Zent et al. 2001; see below).
Although it is irrefutable that the indigenous peoples maintaining a traditional lifestyle are very knowledgeable and skillful environmental managers, it would be inaccurate to generalize their situation to everyone and thus portray all of them as ecologically noble savages living in perfect equilibrium with nature. In fact many indigenous groups of the Venezuelan Guayana have been experiencing profound demographic, technological, economic, and cultural transformations during the past 30-40 years which are seriously altering their customary relationships with habitat. Lured by government-sponsored social services (housing, education, health care) and economic incentives (public servant jobs, subsidies, credits) as well as by the exotic western goods available in regional and national markets, many indigenous communities have migrated away from the remote upriver and interfluvial zones where they were traditionally settled and toward more accessible downriver, roadside, mission-based, or peri-urban locations where contact with the national criollo (i.e. mestizo) population or other ethnic groups is much more frequent. Settlements in the interethnic contact zones are typically much larger, more nucleated, and more sedentary than they were under the traditional pattern. The indigenous population is also growing rapidly as a result of high birth rates and declining mortality. Accompanying this demo-geographic transition, the former economic focus on subsistence production is being replaced by a market-oriented economy in which people are increasingly dependent on wage-labor, cash-cropping, or commercial forest product extraction in order to obtain money to buy industrially-manufactured items for basic consumption (food, fuel, clothes) or luxury goods. Greater contact with the national society has also brought about the widespread diffusion and assimilation of nonindigenous knowledge, customs, values, and ideologies at the expense of native traditions. Of particular importance in this regard is the erosion of traditional environmental knowledge
among the younger generations which reflects diminishing interaction and experience with the local biota and growing dependence on imported foods, medicines, tools, and materials (Zent, S. 1999, Heckler 2002; Wilbert 2002; Zent, S. and Zent in press a). Another type of knowledge decline, though less well documented, concerns the sacred and symbolic significance attached to place. Local landscapes are becoming less meaningful in such terms and hence less revered and respected as a consequence of territorial shifts, religious conversion, and the devaluation of native oral histories. While not all communities and ethnic groups have been equally affected by these generalized trends, nevertheless it is exceedingly rare nowadays to find any group that has not experienced some degree of demographic transition, socio-economic integration, and transculturation along the lines described above. This process is the direct outcome of a state-sponsored development policy aimed more at geopolitical integration by means of the cultural colonization of the culturally separate native population (i.e. making the Indian more criollo-like) rather than the more conventional approach of promoting the expansion of national demographic or economic frontiers (Zent 2003).

The multiple changes outlined above are accompanied by significant shifts in traditional patterns of land use and resource relationships which in some localities are upsetting the balance between the human population and natural environment. Population migration and growth as well as settlement aggregation and sedentarization have effectively raised local population densities in certain areas, leading to greater environmental impacts such as depletion of wild resource species and fragmentation of the primary forest cover (Kingsbury 1996; Medina 2000). The shift to cash-cropping has meant the expansion of land areas under cultivation, more intensive planting practices, and shorter fallow periods, which in turn are associated with disruption of the natural succession, decline of local
biomass and biodiversity, greater susceptibility to fire damage, and soil degradation (Zent 1994; Fölster 1995; Melnyk 1993; Freire 2002). Commercial extraction of forest and river products, though not extensively practiced, has been blamed for severe reductions in the natural populations of certain commercial species due to unsustainable harvesting practices (Montilla 1994; Sánchez 1999; Wilbert n.d.). Meanwhile, the acquisition of introduced technology such as shotguns, flashlights, outboard motors, and chainsaws has augmented the local capacity to intensify resource extraction beyond the natural regenerative rates (cf. Gorzula 1995; Ojasti 1995). Some groups have become heavily involved in the small-scale placer mining of gold and diamonds, which has been associated with deforestation, soil erosion, sedimentation of rivers, and mercury contamination (CENDES et al. 1998; Gorzula 1995; Bevilacqua et al. 2002). Others have become part-time workers in the tourist industry, guiding tourists to biologically unique and ecologically fragile sites, such as tepui (tabletop mountains) summits, an activity which has also had negative collateral effects such as upsetting traditional swidden systems (Medina 2000). In sum, culture change among the indigenous population of the Venezuelan Guayana is producing numerous deleterious ecological effects which add up to raising serious questions about the viability of their traditional role as the nation’s custodians of biodiversity.

Caught somewhere between tradition and modernity as it were, many indigenous peoples face the dilemma of how to preserve and adapt time-tested ecological knowledge and resource management practices to meet the new challenges of rapidly shifting demographic, economic, social and cultural realities. One of the main obstacles to managing this complicated balancing act is the present uncertainty regarding land security, given that their land rights have historically gone unrecognized and even recent advances in this area exist more on paper than on the ground (Zent et al. in press; Freire in press; see
below). Another obstacle is the persistence of state-directed social and economic programs designed precisely to bring about the cultural integration (read homogenization) of the native population (Zent, S. 1999). Whereas commercial farming, mining, and logging operations have been identified as the main causes of deforestation in the Venezuelan Guayana today (Bevilacqua et al. 2002), most of which is occurring at the forest peripheries, it is also true that some of the more acculturated and displaced local groups have provided (willingly or not) one of the principal labor pools for such activities and throughout the vast interior the native forest residents continue to be the main frontline protagonists of rural development and environmental disturbance. In that sense, one of the biggest threats to biodiversity is arguably local cultural extinction. In making this argument, it is not our intention to blame indigenous peoples for the demise of their own native culture and habitat but rather to point out that this degenerative process needs to be confronted (and not ignored) as a key variable of the current developmental and environmental situation, that reduction of cultural diversity implies dangers to biodiversity, that if left unchecked constitutes a potential problem for the stated goal of conservation, and therefore that the cultural issue must be addressed in environmental protection policy. But this dynamic situation is perhaps more visible when viewed at the local level so two relevant ethnographic cases will briefly be described to develop our point.

**Piaroa**

The Piaroa are an indigenous horticultural-hunter society of the Middle Orinoco region who are celebrated in the popular and academic literature for their mastery of the forest environment, colorful ceremonies, and powerful, drug-taking shamans (Dupouy 1953; Wilbert 1966; Boglar 1971; Anduze 1974; Monod 1975; see Figure 1). Prior to the
In the 1960’s, most of them were settled in inaccessible upriver areas of the Cuao-Sipapo massif and for the most part they purposely maintained a safe distance from the encroaching criollo colonists whose settlements and movements were mainly confined to the Orinoco fluvial zone. In the traditional habitat, the Piaroa resided in small, semi-nomadic, one-house settlements and were largely independent in subsistence and social affairs although they also traded certain goods with neighboring Indian groups. Between 1960 and 1980 they migrated *en masse* downriver attracted by missionaries, modern medicines, market opportunities, schools, and various social and economic aid programs offered by the government. Nowadays most people live in small, permanent villages which are distributed along the downriver peripheries of their traditional tribal territory, effectively within the former colonization zones. There they live in much closer proximity and contact with the criollo towns or cities as well as other Indian settlements, because numerous other groups have also moved toward and into these areas (for many of the same reasons). A few small, isolated communities remain in the tribal heartland, conserving many of the cultural traits of their forefathers (Zent 1992).

The Piaroa still provide for most of their food needs, with three quarters of dietary energy being supplied by cultivated crops. Their staple crop is cassava (*Manihot esculenta* Cranz) and they cultivate literally hundreds of landraces of this species. In the Upper Cuao River (UC in Figure 1), which corresponds to the tribal heartland and is one of the few areas where traditional communities are still viable, it is not exceptional to find up to 40 varieties growing in a single swidden field. Meanwhile in the Manapiare region (Mp in Figure 1), a multiethnic colonization zone into which the Piaroa have moved in the past few decades, a number of new varieties originating from other ethnic groups have been adopted
and incorporated into their gardens, thus indicating that their knowledge and propagation of agrobiodiversity is neither a static nor a closed system (Heckler & Zent in preparation).

But what explains hyperdiversity in the first place? Primarily culture, at least in this case. The impressive inventory of varieties is deeply embedded in a traditional food culture which puts a premium on taste diversity and displays a creative menu of cassava-based food items, such as tuber dishes, breads, flours, soups, and beverages (Table 2). Cultivar diversity is also stimulated by social value system in which the number of varieties in a woman’s garden is taken as a positive sign of her work ethic and enhances her social status (Heckler in press). However, this impressive biocultural legacy is beginning to change. For most Piaroa communities, cassava is now grown as much for sale as for home meals, diets are gradually becoming more dependent on store-bought foods, and traditional notions of social status are being distorted by the acquisitive power of money and the penetration of a foreign consumer culture. A major consequence is the decline in the number of varieties cultivated in Piaroa gardens, as shown in Figure 2 by comparing the number of varieties censused in 100 m² plots in more traditional, isolated communities in the Upper Cuao (UC) region (the diagonally hatched bars on the left) versus in more acculturated, integrated communities of the Manapiare (Mp) region (the checkered bars on the right). Furthermore, at Manapiare girls and young women, traditionally the main cultivators, rarely go to work in the fields anymore because they are too busy with school studies, paid domestic labor, babysitting, or watching soap operas on TV, and consequently are they hard-pressed to name more varieties than they can count on a single hand and even less able to tell them apart out in the garden (Heckler & Zent in preparation; see also Royero et al. 1999).

<Insert Table 2 about here>
Hotï

Another revealing case study involves the Hotï, a traditional nomadic hunter-gatherer group who inhabit the slopes and intermountain valleys of the remote Sierra Maigualida mountain range (Figure 1). They maintained a nomadic, foraging existence, organized into very small, fluid, acephalous bands, and were entirely isolated from westerners until the late 1960’s when they were contacted by missionaries. At the time of contact, they were found to be carriers of a simple autochthonous material technology, including stone tools, and possessed very few items of western origin. But then two missions were established in the Hotï territory, at Caño Iguana in the 1971 and on the Río Kayamá in 1983, and they have since drawn more than half of the formerly dispersed, mobile population to come and settle permanently at these fixed locations. The missionaries have taught the Indians about the Christian religion and basic educational skills (such as literacy in the native or national languages) and provided western trade goods and medicines. Since the 1990’s, social and economic interaction with neighboring Indian groups, miners, adventurers, and government agents has expanded substantially as some Hotï bands have moved down the rivers toward the lowland fringes of their mountain territory. The sum result is that within the space of a generation the Hotï have gone from total isolation to more or less permanent contact with outsiders with the consequence that they are now experiencing a rapid phase of culture change, including the introduction of new technology, changes in settlement pattern and economic focus, and ideological conversions.
In the late 1990’s, we carried out quantitative floristic inventories and ethnobotanical studies at four Hotï communities: Caño Majagua (MA), Caño Mosquito (MO), Caño Iguana (IG), and Río Kayamá (KA). The first two communities correspond to smaller, independent, less acculturated communities while the latter two communities refer to the larger, mission-based, more acculturated communities. The results of the floristic study indicate that the forests occupied by the Hotï exhibit surprisingly high levels of species richness. Three out of four 1-ha forest plots contained >180 sps. of large trees/ha (Figure 3). These figures are remarkable for two reasons. First, they show the highest levels of tree diversity thus far recorded for the Guayana shield region of South America (Zent, E.L. and Zent in press). Second, all of the plots from which the figures are drawn are within a few minutes walk of a Hotï community. Thus one may conclude that the Hotï demonstrate that human occupation, exploitation, and disturbance (in the form of low-impact fruit, leaf, and bark harvesting, seed dispersal, and gap creation) are not necessarily incompatible with high diversity maintenance.

The ethnobotanical study revealed that these people possess an extraordinarily extensive knowledge and use of primary forest species, including > 220 edible species, > 180 medicinal plants, and 550 species known to be eaten by wildlife (upon which people depend for food) (Table 3). However, it also appears that the availability of western medicines is beginning to impact traditional patterns of knowledge transmission especially among the younger generation which has grown up with imported aspirin and antibiotics. We compared interinformant knowledge patterns across the four communities, two of them
independent and self-reliant in materia medica and the other two mission settlements where western medicines are widely and freely available. One result was that age correlates positively with the number of medicinal plants known to an individual in the two mission communities (i.e. younger people know less) whereas there is no such correlation in the two independent communities (i.e. younger people know as much as older people) (Figure 4). Further analysis of this divergent trend demonstrated that most of the medicinal plants learned by young people at the missions are more commonly known cures (as measured by higher consensus levels) whereas the knowledge of more exotic, less shared medicinals is held almost exclusively by adults who spent their formative years outside the mission setting (see Zent, S. and E.L. Zent in press a for the details of this analysis). A plausible explanation of this result was suggested by one of our informants: young people at the mission are not bothering to learn as many plant medicines because it is easier to go to the local dispensary and ask for a pill. Looking further into this dynamic process, we then ran a multidimensional scaling analysis of the (dis)similarity of the specific medicinal plant inventories among individuals tested in the mission communities in order to see how the individuals with more extensive inventories compared among themselves and with all other individuals making up the community sample (Figure 5). The results of this operation show that the more knowledgeable individuals (represented by the solid black circles in Figure 5) displayed somewhat divergent inventories by virtue of the fact that they do not cluster together. This seems to indicate that at least a portion of this type of knowledge is acquired through individual experimentation and/or passed down within small family groups and does not correspond to what may be considered a uniform corpus of specialist knowledge. This finding has important implications for the dynamic process of intergenerational knowledge retention: if only some but not all younger people fail to learn the traditional
medicines used by their parents or grandparents then some portion of the traditional
ethnopharmacopiea will nevertheless be lost – i.e. the smaller the chain of transmission, the
more fragile it is. What will be the impact of this loss when the missionaries pack up and
leave? No more free pills and who will revive the forgotten native cures? In any case, as the
number of plants considered to be useful shrinks, the value of the forests for their lives will
also be diminished.

<Insert Table 3 about here>
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**Legislative Progress and Research Problems**

Until recently, Venezuela has demonstrated remarkable success at preserving its
megadiverse frontier forests (especially in comparison with other Amazonian nations),
largely because population, industry and commerce have been historically concentrated in
the northern half of the country but also thanks in part to a strong environmental protection
policy applied especially to the southern Guayana region. The cornerstone of this policy is
an extensive network of protected areas (*ABRAE*), ranging from strictly protected (i.e. no
use) to permitted natural resource use, that cover 72% of the Venezuelan Guayana. Not
surprisingly, many of these areas overlap with Indian-occupied lands, but surprisingly the
aboriginal inhabitants have largely been ignored in conservation policies and plans. At the
same time, it has been noted that the Venezuelan State has been considerably less
appreciative and protective of the nation’s diverse cultural patrimony and instead has
actively sought to transform and indeed eradicate cultural distinctions among the native
peoples, often with nefarious environmental consequences. Elsewhere I have argued that the prevailing policy of active cultural colonization of the indigenous population may in fact undermine the goal of environmental conservation over the long run and instead a policy aimed directly at the integration of cultural diversity and biodiversity as well as the direct incorporation of the native peoples into conservation programs may prove to be more effective (Zent 2003; Zent and Zent in press). Indeed recent indications that deforestation rates in the Venezuelan Guayana have surged dramatically over the past few years, such that they are now among the highest in South America (Miranda et al. 1998; Bevilacqua 2002), should serve notice that the time for a policy shift has come.

Fortunately, the past policy of neglecting or even excluding native cultures and peoples from conservation programs has begun to turn around especially since the democratic conquest by populist president Hugo Chavez although some of these changes were actually set into motion before Chavez’ rise to power. Progress toward creating a more coherent and integrated biocultural conservation strategy has been made mostly at the level of national legislation, including: ratification of the CBD, Decision 391 of the Andean Community of Nations, Constitution of the Bolivarian Republic of Venezuela, Biodiversity Law, Demarcation and Guarantee of Indigenous Habitat and Lands Law, and National Demarcation Commission Law. But the main effect of such legislation so far has been symbolic and not matched by concrete actions. Furthermore some of the new laws are fraught with definitional gaps, ambiguities, and contradictions that in turn generate special problems for effective implementation as will be discussed below.

The CBD was ratified by Venezuela in 1994 and has had a dominant influence in shaping subsequent environmental legislation. Among other things, this document provided the conceptual basis for recognizing: the strategic importance of biodiversity conservation
for human need satisfaction, the economic value attached to biodiversity, the right to
benefits sharing and technology transfer associated with the use of biological resources, the
sovereign rights of nations over such resources, and the faculty to regulate access to them
(Febres 2002). It also urged States to take measures to preserve the traditional knowledge
of indigenous and local communities that contributes to the sustainable development of
biodiversity, to make wide use of such knowledge, innovations, and practices, and to
foment the equitable distribution of the benefits derived from the utilization of such
knowledge (Albites 2002).

Decision 391 of the Andean Community of Nations (Bolivia, Colombia, Ecuador,
Peru, and Venezuela) “Common Regimen for Access to Genetic Resources” formally
established a legal mechanism for putting into practice some of the guiding concepts sets
down in the CBD. Subscribed to in 1996, it asserts national sovereignty over genetic
resources and their derived products and establishes various legal conditions, procedures,
and obligations that all parties seeking access to genetic resources must follow, including
providing economic or other compensation to the State and/or to local providers. Moreover,
it links regulation of access to genetic resources and access to associated intangible
components, especially where indigenous, Afro-Venezuelan, and local communities are
involved. The measure has been broadly interpreted thus far so that all researchers of
biodiversity and associated local knowledge, whether commercially oriented or not, are
now required to negotiate and sign a contract with the Ministry of Environment and Natural
Resources (MANR). This regulation has had a devastating impact on basic and applied
research, mainly because standard regulations and operating procedures regarding previous
informed consent, benefits sharing, technology transfer, and IPR issues have not yet been
clearly defined. Of 20 applications received between 1997 and 2001, only six were awarded
contracts and four of these have since been suspended due to disputes regarding these undefined issues (Febres 2002).

An illustrative example of some of the unforeseen problems with the present access regimen is found in the controversial case of the BIOZULUA database. The database was created as part of a research project undertaken by the Venezuelan-based, scientific NGO, Foundation for the Development of the Physical and Mathematical Sciences (FUDECI), that was originally aimed at the salvage recording of fast-disappearing traditional knowledge about the agrofood, technological, and medicinal uses and preparations of plants and animals among different ethnic groups of the Venezuelan Amazon, purportedly in support of their sustainable development. Thus one of the objectives was to compile and systematize a broad range of information about useful biodiversity and then reinsert this information system back into the source communities where traditional mechanisms of intergenerational transfer are starting to break down as a result of culture change (Royero et al. 1999). Although the research project actually began before Decision 391 was implemented, FUDECI later applied for and was granted a legal access contract, which included provisions for the equitable distribution of benefits, technical training, and information sharing. Major funding for the project was granted by the National Council for Scientific Research and Development (CONICIT), a branch of the Ministry of Science and Technology. The research was carried out in 24 different Indian communities in Amazonas State and amassed approximately 3,000 biological specimen collections and 20,000 data items. The data was entered into a computerized multi-media database, denominated BIOZULUA (meaning “house of life”), consisting of text, maps, photos, video, and recorded sound (Vivas Egui 2002). However, what happened next is a testament of how noble intentions are too easily perverted under the current legal and economic framework.
Encouraged by the economic potential of the database contents and concerned by the lack of legal protection existing at both the national and international levels, the legally designated proprietors of BIOZULUA, namely FUDECI, CONICIT, and MARNR, decided to register exclusive authorship rights over it and maintain the contents a secret, even from the communities participating in the study, until such time that their intellectual property rights can be guaranteed. Naturally the indigenous communities and organizations that have a stake in BIOZULUA were outraged by this action and also charged FUDECI with failing to secure their informed consent. The consent issue continues to present one of the biggest problems for the present access regimen because MARNR has yet to establish clearly defined criteria for obtaining it. In any case, following the bitter lesson offered by BIOZULUA, ORPIA, the principal indigenous organization in Amazonas State, issued a statement demanding repatriation of all the information contained in the database and calling for a moratorium on all research involving access to genetic resources and traditional knowledge until all the IPR, consent, and compensation issues are worked out at national and international levels (Davies 2002a, 2002b). This decision potentially affects not only scientists, commercial bioprospectors, and government officials, but also local groups themselves, since many of them have become increasingly concerned about the erosion of their traditional environmental knowledge and aware of the practical benefits of conserving it. In fact some indigenous groups have already initiated their own salvage research projects, enlisting scientists to aid them, such as the Dekuana Atlas project among Dekuana groups of the Upper Orinoco (Arvelo-Jiménez and Jiménez 2001).

In December 1999, a new national Constitution was adopted which committed the State to preserving and protecting the safety and health of the natural environment as well as the cultural integrity of the indigenous peoples, and implies links between the two sets of
responsibilities. Article 127 obligates the State to protect the environment, biodiversity, genetic diversity, ecological processes, national parks, natural monuments, and other areas of ecological importance for current and future generations. The same article also prohibits the patenting of the genomes of living organisms. Article 119 recognizes the original collective rights of indigenous peoples over their ancestral and traditional habitats and calls for the demarcation of Indian lands in a timely fashion. Article 121 recognizes the right to separate ethnic identity and maintenance of cultural traditions, and commits the State to foment the appreciation and diffusion of these. Article 124 guarantees the collective intellectual property of the knowledge, technologies, and innovations of indigenous peoples, requires that all activities related to genetic resources and associated knowledge produce collective benefits, and prohibits patents over such resources and knowledge. Some analysts regard that the IPR protection and patent prohibition provisions contained in the last article create a fundamental contradiction between national (or State) and local interests (Febres 2002), a problem that seems to be at the heart of the BIOZULUA controversy. Meanwhile the prohibition of patents over the genomes of living organisms provides a disincentive for research and may conflict with existing IPR laws (Febres 2002). Obviously these issues will have to be resolved if rational and sustainable utilization of biodiversity is to be optimized.

The Biodiversity Law, passed in 2000, contains various provisions designed to promote biodiversity conservation, such as: (a) the recognition that forests harbor a large portion of the nation’s biodiversity and therefore favors their conservation, (b) the regulation of access to genetic resources for sustainable management, (c) the recognition and preservation of knowledge and uses of biodiversity by local communities, and (d) the just and equitable participation in the benefits derived from such utilization. Moreover, this
is the first national law that explicitly acknowledges the importance of traditional knowledge held by indigenous and local peoples for biodiversity conservation and even suggests that they should be compensated for this contribution. The State is required to institute programs designed to protect traditional knowledge, control activities that utilize such knowledge, and promote the development and innovative capacity of local communities. It remain to be seen what concrete measures will emerge from this law.

In January 2001, the Demarcation and Guarantee of the Habitats and Lands of Indigenous Peoples was passed (see Gaceta Oficial Año CXXVIII, IV No. 37.118), laying the legal framework of basic dispositions, participating entities, responsibilities, general procedures, list of indigenous beneficiaries, and other eventualities for implementing the constitutional mandate of Indian land rights. The law establishes that the executive branch of the national government, whose authority is delegated to MARNR, is in charge of the planning, execution, supervision, and financing of the national process of demarcation but also assigns a participatory role to the indigenous communities and organizations. Later that year, the National Commission for the Demarcation of Indian Lands was created by decree (see Gaceta Oficial Año CXXVIII, X No. 37.257) with the function of promoting, advising, and coordinating all aspects of the demarcation process. As a result of these measures, Venezuela may rightly be considered to have the most progressive legislation in all of Latin America in the area of Indian land rights but in terms of implementation little real progress has been made. Although the national constitution stipulated that this process be completed within two years, after more than three and a half years since its passage no land has yet been officially demarcated. Moreover, although the Demarcation law commits the national government to funding the work, no monies have actually been allocated so far. The response of several Indian groups to the government’s sluggishness has been to
undertake their own independent demarcation projects, including biodiversity inventories and detailed mapping of natural resource areas, with the help of NGO’s and outside technical advisors.

The Hotï-Eñepa Self-Demarcation and Ethnocartography Project, in which the authors are personally involved, provides a case in point of the latter. In early 2001, members of the Kayamá community contacted us and asked us to help them demarcate their land. In September of that year, we traveled to Kayamá to discuss the proposed project in person and the result of that meeting was an agreement to collaborate and formulation of a work plan. Our role is to provide technical and conceptual advice and training in the use of mapping technology to be used while the Indians themselves perform the main data collection and processing work. The main research objective is to produce a map of the community lands showing the locations of all pertinent cultural and physical features, including territorial boundaries, settlements, gardens, natural resources, sacred sites, ancestral areas, topographical landforms, and local toponymy. The training phase began in December 2001 and has included instruction in basic cartographic principles, GPS machine operation, recording of georeferenced field data, and computerized data processing (Microsoft Windows operating system, Excel spreadsheet, and Arc-View GIS programs). Data collection began the following month and has continued up to the present day. The work is generally divided between GPS-trained teams who go out to different areas near and far and record the geographic coordinates, place names, and all relevant cultural and physical information about the locality on specially designed data sheets and computer-trained teams who enter the field data into an electronic database using the Excel program and then generate map projections of the data points using the Arc-View program. The project was expanded in April 2002 to include the Hotï community at Iguana upon their
request. As of the date of this writing, the work is well advanced and a combined total of 4500 data points have been recorded and entered into the computer. At the most recent meeting between the authors and the Kayama community, the latter expressed their desire to develop the growing database into an educational project for their local school so that the children of the community can learn everything of cultural and ecological importance about their habitat and territory.

**Conclusion**

While other chapters in this section have stressed the importance of economic development, moral beauty, innovative environmental law, or modern biotechnology, either as a problem or solution for biodiversity conservation, in this chapter we have focused instead on the crucial link between biodiversity and *local culture* as embodied in the traditional low-tech knowledge and practice systems of indigenous peoples. A processual perspective of the changing interrelations between culture and environment has been emphasized, in which traditional knowledge loss is seen as a major threat to biodiversity conservation. Thus from a dynamic biocultural perspective, *adaptive cultural management* in the service of sustainable resource management – referring specifically to the blending, or even hybridization, of useful traditional knowledge and practices and beneficial cultural and technological innovations – rather than genetic engineering, molecular synthesis, or protected area extension - constitutes the tip of the lance for defending biodiversity in Venezuela. Several new laws have been passed to realize this biocultural revolution but at the same time have created problems for carrying out the research and planning that is also needed. Until the legal gray areas can be cleared up as well as the contradictions between existing law and practice resolved, which could take many years, the best hope for research
relevant for biocultural conservation lies at the grass roots level, that is with the Indians themselves acting as the PI’s and scientists as the field and lab assistants.

Bibliography


