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Putting a Price on Indigenous Knowledge

by Jennifer Pepall



Who benefits from commercialization of biodiversity?

A single dose of "dragon's blood" — named after a plant whose stem leaks a red latex — can treat a range of ailments. Taken orally or applied directly to wounds, the latex is used for coughs, flu, diarrhea, open sores, and stomach problems. Its healing properties make it one of the most popular traditional medicines in Latin America.

Consumers in the North may soon be able to buy dragon's blood at a neighbourhood pharmacy. Shaman Pharmaceuticals, a San Francisco drug company, is currently developing SP-303, a derivative of the latex-producing plants. Laboratory tests have shown that SP-303 is an effective antiviral agent.

SP-303 is one of approximately 35,000 plants in the developing world that are believed to have medicinal value. Overall, the South is home to around two-thirds of the world's plant species. This rich biodiversity yields huge amounts of cash as well as new medicines. For example, a report by the Ottawa-based Rural Advancement Foundation International (RAFI) has estimated that in the early 1990s, germplasm from developing countries was worth at least US\$32 billion per year to the pharmaceutical industry.

While the benefits to drug companies are clear, the contributions of indigenous peoples, whose knowledge and innovation are often the key to drug development, generally go unrewarded. "Indigenous people do not gain much [financial] recognition from international organizations for their knowledge. Only laboratory knowledge seems to be worth something," said [Luis Antonio Ortega Miticanoy](#), a lawyer and activist with indigenous groups in Colombia, during a 1995 IDRC development forum held in Ottawa.

Relationship to the environment

But attitudes are changing. At the 1992 Earth Summit, the United Nations Convention on Biological Diversity recognized the importance of traditional practices in the conservation and sustainable use of biodiversity. These practices are rooted in the relationship of indigenous peoples to their environment. For example, the Dene People of Canada's Northwest Territories believe they are caretakers of the land and must pass it intact to their children — a philosophy shared by other indigenous communities around the world. "The land and biodiversity are a loan that has been given to us by future generations. It doesn't belong to us, we are just passing through," explained Miticanoy.

For indigenous groups, the Earth's genetic resources provide more than just food and medicine: they are intrinsically linked to cultural identity. "There is extraordinary overlap between indigenous peoples and their cultures and those areas considered to be of high biodiversity," said [Steven King](#), Vice-President of Shaman Pharmaceuticals.

Not surprisingly, the conservation of biodiversity is closely linked to the needs and aspirations of indigenous peoples. One example is the environmental destruction that results when indigenous people are forced off their land. In Colombia, forests are disappearing as loggers cut trees for timber and clear land for livestock and cultivation, said Miticanoy.

Today, indigenous communities in the South are increasingly joining forces to defend their rights against powerful interests, such as pharmaceutical companies searching for new products and governments desperate for new sources of income. A central issue is their demand for financial compensation for their knowledge.

"Genetic piracy has subjected us to colonialism," said Miticanoy, who is lobbying for a more equitable sharing of technology and resources in which indigenous peoples receive their due. "We know we are part of a larger society, [but] we are few in number. What we want is the larger number to recognize our own things and our own rights," he concluded.

Jennifer Pepall is a writer based in Ottawa.

Sidebars

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Resource Persons:

Luis Antonio Ortega Miticanoy, Lawyer, Organización Nacional Indígena de Colombia (ONIC), Calle 13 No 4-38, A.A. 32395, Santafé de Bogotá; Tel: (57-1) 342-3054 or 284-2168 or 284- 6815; Fax: (57-1) 284-3465

Dr. Steven R. King, Vice-President of Research; Shaman Pharmaceuticals, 213 East Grand Avenue, South San Francisco, CA 92080-4812, U.S.A.; Tel: (415) 952-7070 ext. 475; Fax: (415) 873-8367

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[People, plants, and patents: The impact of intellectual property on trade, plant biodiversity and rural society](#) The Crucible Group, IDRC, 1994

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Shaman Pharmaceuticals: Socially Responsible Drug Development

San Francisco-based Shaman Pharmaceuticals uses ethnobotany — the study of plant lore — as a cornerstone of its drug development process. A pioneer in its approach, Shaman works closely with indigenous communities in the South and strives to compensate them adequately for the use of their traditional knowledge. The company is also committed to the conservation of rainforest resources.

Founded in 1990, Shaman is active in 30 countries throughout South America, Africa, and Asia. In each region, it conducts local studies of the epidemiology, traditional medicine, culture, and ecology of the people and their environment. Based on this research, teams composed of an ethnobotanist, a physician, and a local person identify and collect plants with medicinal potential. Shaman focuses on plants that are used by indigenous people to treat viral and fungal infections, central nervous system disorders, and diabetic conditions.

Targeting plants through ethnobotany saves time and money. Within 24 months of Shaman's launch, two products were ready for clinical trials: one for the treatment of respiratory viral infections and another for the treatment of herpes. By contrast, it can take traditional pharmaceutical firms up to ten years to reach this stage of drug development.

Sustainable harvests

To ensure a long-term supply of plant material for its products, Shaman is developing business relationships with indigenous groups. In Peru, for example, Shaman negotiated with Consejo Aguaruna y Huambisa, an indigenous federation representing 30,000 people, to harvest and supply plant material on a sustainable basis. Shaman recognizes that such a sustainable harvest provides a source of income for indigenous people and contributes to the protection of biological and cultural diversity.

Shaman offers other reciprocal benefits for indigenous communities. Up to 15% of a research expedition's budget is used to meet the immediate needs of local communities, which identify their own priorities. One community asked Shaman to extend its airstrip. Another requested funding for a student hostel.

Over the longer term, when products begin going to market, Shaman plans to return a portion of the profits realized from its pharmaceutical products to the governments and indigenous organizations in countries where it works. These revenues will be distributed through The Healing Forest Conservancy, a nonprofit organization established by Shaman Pharmaceuticals.

Farmaya and Ethnobotany in Guatemala

Working with a staff of fifteen and limited funding, the Farmaya Laboratory in Guatemala is accomplishing what drug companies in North America take millions of dollars and many years to produce.

Farmaya is screening 700 different plants native to Guatemala for their potential medicinal value. Using the accumulated knowledge of indigenous and rural groups, the organization has developed fifteen pharmaceutical products.

The laboratory is building on work by the Centralamerica Centre of Studies on Appropriate Technologies (CEMAT), which has trained rural Guatemalans to identify and cultivate medicinal plants. Lidia Girón Muñoz, a pharmaceutical chemist and cofounder of Farmaya, calls her organization the "daughter of CEMAT" because it aims to create productive rural enterprises based on medicinal plants. The firm's activities include the organic cultivation of medicinal plants, pharmacological research, and the production and commercialization of plant-based pharmaceuticals.

Farmaya has received criticism for making profits from medicines that were developed from the knowledge of poor people, but Girón is quick to defend her firm. "There is no medicine of the poor people. Medicine belongs to [all of] humanity," she says.

Among its achievements, Farmaya has created a National Commission for the Use of Medicinal Plants that includes representatives from nongovernmental organizations, private groups, governments, and universities. The commission meets monthly, facilitating the flow of information among diverse institutions. Other Latin American countries have used the commission as a model in setting up their own medicinal plant bodies.

Farmaya is also part of the IDRC-supported TRAMIL (Spanish acronym for Application, Research and Dissemination of the Use of Medicinal Plants in the Caribbean) project under way in Central America. TRAMIL supports research to identify and document plants with medicinal properties and effective remedies. Its objective is to ensure the safety and efficacy of medicinal plants as well as community participation in sharing the research results. The work draws on available information as well as original research, and the results are shared through electronic links and other dissemination tools. The outcome should be increased community health, and conservation of medicinal plants and traditional knowledge.



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Protecting Mexico's Tropical Forests: The Calakmul Model Forest Program

by *Michael Boulet*



Mexican women display handicrafts during a Calakmul food fair in 1995

Even Disney's animated feature film, "The Lion King," has a role to play in the protection of Mexico's tropical forests. Providing appropriate video entertainment is part of an education strategy developed by environmental educator Gloria Tavera to promote conservation and sustainable forestry practices in the Calakmul area of Mexico's Yucatan Peninsula.

"Lion King" Lessons

According to Tavera, "The Lion King" demonstrates the importance of the food chain and reinforces the idea of individuals working together to promote the needs of a community. In Calakmul communities, particularly those that lack electricity, screening films such as "The Lion King" is a way of encouraging public gatherings where environmental issues can be discussed.

The video screenings are part of the Calakmul Model Forest Program, an initiative that promotes the partnership of environmentalists, industry, and local communities to find ways to manage natural resources in a sustainable manner. Tavera's job is to demonstrate how sustainable forestry practices can benefit local communities. The Calakmul Model Forest is part of an [international network of 18 model forests](#) — that are operating or in development — located in five countries, which is coordinated by a [secretariat](#) at IDRC headquarters in Ottawa.

Sustainable Harvests

The aims of the Calakmul Model Forest Program are to ensure ongoing harvests of food, wood, and other useful products; to enhance the standard of living of the local inhabitants; to raise awareness of conservation; and to promote ecotourism. In support of these goals, Tavera gathered information and conducted demographic surveys to identify the best approaches for her educational activities. Because more than 50% of the local population is under the age of 15, ethnic diversity is high, and literacy rates are low, she realized that written material would not be particularly effective. Preliminary studies also indicated the need to target women and children.

So far, the Model Forest Program has established a wildlife station housing puma, jaguar, and wild pigs. Another initiative is the Calakmul Botanical Gardens featuring nature trails and facilities that showcase an impressive array of local flora, including edible plants and 56 species of orchids native to the region. The six-hectare parcel of land is owned by the region and provides a base for workshops, information sessions, and educational tours to the local Mayan ruins.

Food Fair

Other programs have brought local women together to exchange ideas and share information on the profitable use of forest products. In 1995, a regional food fair provided opportunities for participants to sample and compare food, arts, and crafts — and also to watch a fashion show highlighting a variety of local products. The displays demonstrated how to contribute to the local economy by adding value to forest products.

As a result of the fair, beautifully embroidered clothes incorporating traditional designs are now being sold as souvenirs to tourists visiting the Calakmul ruins. In addition, a cookbook has been published that features 127 recipes — including many exotic dishes made with Calakmul forest products. The 1996 fair, to be held this summer, will likely add more tasty recipes to the savory collection.

Environmental Workshops

As part of the educational strategy, Tavera is indirectly targeting the 2,500 primary school children in the area through environmental workshops for their teachers. The workshops cover everything from ecotourism and insect collecting to the basics of bird watching and are intended to cultivate an appreciation for the environment among children and adults alike.

Michael Boulet is a research analyst at IDRC.

For more information:

Bosque Modelo de Calakmul, Consejo Regional de X'Pujil, Domicilio Conocido, Zoh Laguna, Campeche, Mexico; Tel/Fax: (52-983) 23304

Marc Patry, Twinning Co-ordinator, Calakmul Productive Ecology Model Forest, P.O. Bag 2111, Kemptville, Ontario, K0G 1J0, Canada; Tel: (613) 258-8239; Fax: (613) 258-3920; e-mail: mpatry@emr.ca

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[Going Global: IDRC and the International Model Forest Program](#) *Launched by the Canadian Government during the 1992 Earth Summit in Rio de Janeiro, the International Model Forest Program aims to promote the sustainable and equitable use of forests around the world.*

[Iwokrama: Guyana's Rainforest for the World](#) *In central Guyana, the Iwokrama rainforest offers unique opportunities for sustainable tropical forestry management.*

[Iwokrama International Rain Forest Programme](#)

[Chinese Farm Forestry: Not Just Trees in Fields](#) (April 1995)

[Hosny El-Lakany: Forests in Egypt](#) (January 1995)

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[Vol. 23, No. 4 \(January 1996\)](#)

IWOKRAMA: GUYANA'S RAINFOREST FOR THE WORLD

by Claudette Earle

It is the noon hour in the Guyana heartland. A young woman of the indigenous Macuxi people is baking cassava bread on a slab of slate supported by rounded bricks over a wood fire.

With graceful hand movements, the young woman spreads the damp cassava meal evenly in concentric circles, the way her ancestors have done for centuries. Her actions reflect a people who tend to care more about the rise in the river following rainfall than what day of the month it is.

This is one typical scene in a village skirting the borders of the Iwokrama rainforest reserve. The 360,000 hectares of rainforest were selected for a unique experiment in sustainable tropical forestry management and biodiversity conservation. The experiment is the Iwokrama International Rainforest Programme, which had its genesis in a 1989 meeting of the Commonwealth Heads of Government in Kuala Lumpur. The offer to set apart such a large portion of rainforest came from the then President of Guyana, Hugh Desmond Hoyte.

Early in 1990, a Commonwealth Expert Group led by Dr M.S. Swaminathan, then President of the International Union for Conservation of Nature (IUCN) and now interim chairman of the Iwokrama board of trustees, began working jointly with a Guyanese inter-agency committee to establish the outlines of the program.

The area of central Guyana selected for this singular experiment is almost entirely surrounded by rivers -- the mighty Essequibo, the Siparuni, the Takatu, and the Sipariparu. In the north lies the Iwokrama Mountain Range, which lends its name to the site. Iwokrama means "place of refuge" in indigenous language. The site's pristine forests, scarcely touched by human hands, represent about 2% of the country's tropical rainforest.

IDRC has assumed a key role in Iwokrama, to advise on the establishment of the institutional, operational, research, and strategic framework for the program as well as to develop the program's information and communication unit.

"The overall idea of Iwokrama is to demonstrate how to manage the tropical forest correctly and for economic benefit and yet to keep it as a forest and sustainable," says Dr Henry Tschinkel, the Interim Director-General of Iwokrama.

"The point is to train people to demonstrate that the forest could produce more than just timber. And even so, we could produce timber in better ways so that the forest is sustainable," says Dr Tschinkel.

In Dr Tschinkel's view, Iwokrama is a unique project. "I don't know of any other case in the world where one could find this combination that we have here in Guyana. I don't know of any other case in which an institution has its own forest on a commercial scale where people practise what they preach."

Currently, most of the Iwokrama funding comes from the Global Environmental Facility and is administered by the United Nations Development Programme. According to Dr Swaminathan, Northern countries will have to invest in the program if it is to succeed. "There's no use in saying the global village or our common future if they are not going to invest in a common future," says Dr Swaminathan. "If the international community doesn't take advantage of this extraordinarily generous and unique offer, I think what will happen -- God forbid -- is the Guyanese forests may go. The same way as the neighbouring forests."

Iwokrama's core activities will focus on the sustainable utilization of the tropical rainforest, biodiversity and biofuture, ethnobiology and human ecology, education and training, and information and communication. The knowledge gained promises to be applicable far beyond the boundaries of Guyana.

According to Dr Tschinkel, carrying out these activities will not disrupt the indigenous communities that immediately adjoin the site -- Kurupukari at the northern end, Sarama at the southern end, and Annai, 20 kilometres off site. "There is no intention of displacing people," says Dr Tschinkel. "On the contrary, what we are doing is working with the people to develop their communities."

Within the boundaries of the Iwokrama site, a field station staffed by local persons has been established and already employs some indigenous people. Other forms of employment are foreseen, including work as scientific consultants, forest rangers, and tree and plant identifiers.

Fred Allicock, the field station manager, is an Amerindian who has spent most of his life in the vicinity of the Iwokrama site. He too recognizes the unique nature of the reserve and the opportunities it offers. "Iwokrama is an untouched forest Nobody has ever done any research, no logging, no mining. This program is not only for Guyana. It is for the Commonwealth and the international world as a whole."

TELLING THE WORLD ABOUT IWOKRAMA

In the Caribbean, Iwokrama is almost unheard of outside scientific and environmental circles. Even in Guyana not many people know of Iwokrama and the benefits this environmental experiment can bring to the nation and to the world. Therefore, it will be important to the success of the experiment that the Centre for Environmental Information and Communications be implemented quickly.

Among its functions, the proposed Centre will establish a number of databases from which information could be retrieved and stored. It will be a clearing house for keeping track of the numerous studies that have been undertaken and results of research that are relevant to the program worldwide. It will also be responsible for disseminating the work being carried out through the Iwokrama program.

YIELDING MORE THAN TIMBER

One of Iwokrama's objectives is to document the ecological knowledge of Amerindian communities living near the project area. To this end, a number of research projects, including ethnobotanical and ethnomedicinal studies, have been launched. Already, an eight-member team of specialists in ethnobotany and ethnomedicine, organized by the Amerindian Research Unit of the University of Guyana, has collected some 400 types of medicinal plants that will form part of the Iwokrama inventory on plant life and will be analyzed by the University's Biodiversity Centre.

The team has also identified 33 varieties of bitter cassava -- well known to Amerindians but almost indistinguishable to an outsider.

Perhaps, in time, the Macuxi woman may be able to share her esoteric knowledge of cassava varieties and their properties with the rest of the world.

Claudette Earle is a journalist in Georgetown, Guyana.

Dr Henry Tschinkel
Interim Director-General
Iwokrama
c/o UNDP
41 Brickdam, P.O. Box 10960
Georgetown, Guyana
Tel: (592 2) 51504
Fax: (592 2) 59199

The Iwokrama program, the Commonwealth Expert Group said, would function under an independent board of trustees, chaired by an eminent, internationally respected person. The program would also be supported by donors and academic and professional institutions.

The Group's report made four main recommendations for Iwokrama:

- part of the site should be retained as a wilderness preserve;
- the remainder of the site should be managed on a sustainable basis to yield economic benefits to the people of Guyana;
- an international centre for research and training for the sustainable management of tropical rain forests should be set up; and
- a communications centre should be established to promote environmental literacy and public education about the linkages between rainforests and the quality of life on earth.

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[Vol. 23, No. 1 \(April 1995\)](#)

Patents on Life Forms: Bio-Piracy?

by Henry F. Heald

How can the rights of poor countries be protected amid legal battles over patent protection, intellectual property rights?

The stakes are high in the debate on intellectual property rights and patent protection for life forms. The rights of indigenous peoples and farmers in countries in the South, where most of the important food crops were developed, are under potential threat. Powerful companies in industrialized countries are busy patenting indigenous knowledge built up over generations by farmers in developing countries, a practice some people describe as "bio-piracy." Global policy is emerging almost inadvertently through the patent system, the activities of the biotech industry and court decisions. The issues involved are no longer strictly technical, but ones that have broad social implications.

A new book entitled [People, Plants and Patents: The impact of intellectual property on trade, plant diversity, and rural society](#), does not attempt to reach a consensus on these issues. Rather, it is an effort to "identify trends, concerns and opportunities on intellectual property issues relevant to plant breeding and plant genetic resources."

However, the authors, known as the "Crucible Group" (an international team representing a broad range of interest groups and Southern and Northern countries) do make some strong recommendations. They call upon the United Nations to convene an international conference on society and innovation, "bearing in mind that some people, countries and cultures have deep ethical concerns about biotechnology and the concept of life patenting."

Certainly, there was no agreement among the panelists at an IDRC Forum held last year in Ottawa to discuss the question, "The GATT agreement, biodiversity, and intellectual property: Who wins, who loses?" The discussion ranged from the inclusion of trade related international property rights (TRIPS) in the recent General Agreement on Tariffs and Trade, to the ethics of patenting life forms.

The patent system for dealing with plant and animal genetics is badly out of order, according to Pat Mooney, one of the forum panelists. Mooney is executive director of Rural Advancement Foundation International (RAFI) and a long-time critic of patent protection for biological material.

He believes the most serious fault with the current system is its inability to acknowledge and work with the indigenous knowledge base. "We need to pursue a system that directs the benefits to the innovators in the developing countries."

Geoff Hawtin, a British-Canadian plant breeder who heads the International Plant Genetic Resource Institute in Rome, argued that the TRIPS clause of GATT fails to protect the biodiversity of the developing countries. Companies have moved from patenting a specific gene in a plant to patenting genetic manipulation of a whole species. He argued that the patent system was never intended to be used for life

forms. Some patents have been granted that actually prevent farmers from planting their own seed, he noted.

Hawtin said there is little evidence that patent protection stimulates innovation in this field. Most of the great agricultural advances in the world came about without any patent protection. But with plant breeding being protected by the large agricultural companies, most of the research effort is being put into developing herbicide-resistant crops instead of biological controls.

On the other hand, Marta Gutierrez of the National Agricultural Technology Institute in Argentina argued that patents could be an acceptable way to access technology. She said agriculture in her country strives to operate in a fully competitive atmosphere and that the GATT framework on intellectual property could benefit the industry.

Argentina recognizes biodiversity as the assurance of the future of the agriculture industry, said Gutierrez. It will not deal with anyone who does not abide by the Convention on Biological Diversity.

Professor Anil Gupta of the Indian Institute of Management said intellectual property rights can be useful, but a system that better incorporates the needs of developing countries is required. Indigenous people, whose contribution to biological diversity has been extremely important, should benefit from the knowledge they have accumulated over generations.

Indigenous knowledge has not just been passed intact from generation to generation, it has also been modified at each step through the years. In Gupta's view, biodiversity is being lost in the developing world for a variety of reasons, including economic and environmental factors. Poor, illiterate farmers lack incentives to preserve the old ways. "If we have to preserve biodiversity by keeping people poor, that is a poor choice to make," he said.

Gupta's concern is that the developing countries do not have adequate institutions to manage intellectual property rights and cannot afford the high costs of processing patent applications or fighting challenges in court. Therefore, more patent laws could actually weaken the position of developing countries.

The TRIPS clause of GATT would work if companies were obliged to prove that they had taken genetic material from developing countries lawfully and contractually and that they were prepared to share the benefits equitably with all countries.

Gupta said the developing countries have been promised negotiations for access to new technology in return for the use of the biodiversity they have produced. But the system fails because the responsibility of the consumers has not been identified. Consumers refuse to pay any compensation to the producers of biodiversity.

Pat Mooney argued that the current patent system is too far gone to correct itself and called for a new convention to completely restructure intellectual property rights. He cited examples of large corporations applying for and receiving patents for biological material obtained from developing countries. Mooney described how US firms have patented naturally coloured cotton developed by farmers in Peru and other Latin American countries hundreds of years ago, and how a Texas company has patented a rice variety developed in the Philippines by the International Rice Research Institute. He suggested IRRI is afraid to challenge the patent because it depends on US funds.

To those who suggest that developing countries can ignore the GATT provisions, Mooney noted that legislation now before the US Congress would tie US aid to how quickly the recipient countries adopt the GATT/TRIP rules. He criticized a system that allows companies to patent blood cells of aboriginal people from the Solomon Islands or to patent thousands of DNA fragments from the human brain.

Pat Mooney and Geoff Hawtin are both members of the Crucible Group and thus are two of the authors of People, Plants, and Patents. The book offers no simple remedies, but tries to steer a course through the

maze of questions. On the most contentious issues, it offers three different viewpoints for argument, discussion and further research. It also presents a series of recommendations that, if followed, could help a government design a rational and workable national program.

Although People, Plants, and Patents leaves certain questions open to discussion, it is united on two fundamental points: people in the countries with a rich heritage of biodiversity should be allowed to benefit from that heritage; and intellectual property rights should encourage innovation that benefits everyone and promotes conservation of genetic diversity.

Available from IDRC Books:

[People, Plants, and Patents: The impact of intellectual property on trade, plant biodiversity and rural society](#) by the Crucible Group.

IDRC 1994, ca 100 pp.,

ISBN 0-88936-725-6, CA\$12.95 (Also available in French and Spanish.)

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[Vol. 23, No. 2 \(July 1995\)](#)

MONOCULTURES, MONOPOLIES AND THE MASCULINISATION OF KNOWLEDGE

by Dr. Vandana Shiva

Ways of thinking are not biologically determined; rather, they are culturally shaped. One such phenomenon in the cultural shaping of thought is the masculinisation of knowledge, a project started by the European men known as the fathers of modern science. In the words of Francis Bacon, the birth of modern science was also the masculine birth of time, a phrase betraying the view held by the founding fathers of modern science that their particular approaches to knowledge were essentially gendered and masculine.

As Brian Easlea has recalled in *Science and Sexual Oppression*, Francis Bacon appealed to the true sons of knowledge to find a way into nature's inner chambers by turning their united forces against the Nature of Things, to storm and occupy her castles and strongholds.

I will not dwell on how early modern science was seen as gendered by its fathers, but discuss how it is being freshly gendered in our times. A first step is to consider three unique aspects of modern science:

- its intrinsic reductionism and fragmentation;
- its separation of the knower and the knowledge; and
- its union with economic power. The first aspect reductionism has led to the destruction of diversity and the emergence of what I have called monocultures of the mind. The second and third aspects have led to the creation of monopoly in knowledge, the latest expression of which is intellectual property rights. In agriculture, both monocultures and monopolies provide vivid examples of the masculinisation of knowledge.

Monocultures: expressions of race, class, and gender

In the fields of Third World women farmers, the most conspicuous element is the diversity of crops. In India, we have named an agricultural biodiversity conservation program Navdanya, which means nine seeds. Navdanya is a system of polyculture as well as a microcosm representing the complexity of the cosmos.

In the rainfed areas, this system uses a cropping pattern called Baranaja, which literally means twelve seeds. The seeds of twelve different crops (often more than twelve, but never less) are mixed and then randomly sown in a field fertilized with manure. The relationships among different plants leads to symbiosis, which contributes to increased productivity of the crops.

Cultivating diversity can therefore be part of a farming strategy for high yields and high incomes. Diverse species in partnership and in symbiotic interaction create the self-organization capacity of living systems, a central feature of polycultures and agricultural ecosystems.

As part of these agricultural systems, human communities work in partnership with other species to maintain ecological processes and meet human needs. Diversity-based agriculture is decentralized, ecologically stable, and economically productive.

However, the monocultural mind sees polycultures as low yielding and inefficient. But the improvements of monocultures, as defined by corporations and western agricultural or forestry research, are often a loss for the Third World, especially for the poor. The productivity of monocultures is high only in a restricted context where the output forms a discrete part of the forest and farm biomass. For instance, high yield plantations cultivate one tree species among thousands in order to exploit the yield of just one part of the tree (e.g. the pulpwood). By comparison, overall productivity and sustainability is much higher in mixed systems of farming and forestry that produce diverse outputs.

But transnational corporations (TNCS), international research systems, and multilateral agencies largely run and controlled by white men find in monocultures an essential tool for control and accumulation of capital. Third World women, peasants and forest communities find in diversity both a source of abundance and freedom.

Intellectual property rights and knowledge monopolies

The free trade practiced by TNCS depends on protectionist and monopoly measures such as the patents on life forms emerging from intellectual property rights (IPRs), which rob farmers of their freedom to produce, modify and sell seeds. Herbalists, forest dwellers, fishing communities, and pastoralists who depend on biodiversity to survive, and whose resources and knowledge are freely used by the TNCS, will also be severely affected by IPRs in so-called free trade agreements.

Most discussions around the concept of trade-related intellectual property rights (TRIPS) in GATT assume that only the intellectual contributions of corporate-sponsored scientists require property protection and compensation. However, no attention has been paid to how IPRs will encourage the uncompensated free flow of resources and knowledge from South to North. Nor does anyone ask why the concept of IPRs in GATT defines as knowledge and innovation only that which can generate profits. Knowledge and innovation applied to social ends such as health care and sustainable agriculture is discounted as an intellectual contribution.

A more just framework for IPR would recognize that traditional farmers who have selected, improved and conserved biodiversity, or traditional healers who have used plant diversity for medicine, also have prior intellectual property rights that need protection. When this knowledge and biodiversity is exploited commercially, these contributors need to participate in determining whether such exploitation should occur and how it should be compensated.

The corporate demand for IPRs to biodiversity is based on the false assumption that it is their investments alone that lead to innovation, and which therefore need to be rewarded with monopoly control. Thus, the centuries of investment of time and creativity by Third World farmers in domesticating, breeding and conserving biodiversity is negated.

Farmers seeds are rendered valueless by a process that makes corporate seeds the basis of wealth creation. The indigenous varieties, or land races, evolved through natural and human selection, and produced and used by Third World farmers world-wide, are called primitive cultivars. But the varieties created in international research centres or transnational seed corporations are labeled advanced or elite. The tacit hierarchy in these categories becomes explicit in the process of conflict.

The issue of patent protection for modified life forms raises several political questions about ownership and control of genetic resources. One problem lies in the fact that the process of manipulating life forms does not start from scratch, but from existing life forms that belong to others perhaps in a system of customary law. Secondly, genetic engineering does not create new genes, it merely relocates genes that

already exist. In this process, complex organisms that have evolved over millenia in nature, and through the contributions of Third World peasants, tribal societies and healers are reduced to mere inputs for genetic engineering. This reductionism and fragmentation may suit commercial concerns but it violates the integrity of life as well as the common property rights of Third World people.

Countries like the United States are now using trade as a means of enforcing their system of patent laws and intellectual property rights on the sovereign nations of the Third World. The US accuses Third World countries of engaging in unfair trading practices if they fail to adopt us patent laws that permit monopoly rights over life forms.

In fact, it is the US that engages in unfair practices related to the use of Third World genetic resources. It has freely taken the biological diversity of the Third World to spin millions of dollars of profits, none of which have been shared with the original owners of the germplasm. A wild tomato variety (*Lycopersicon chomrolewski*) taken from Peru in 1962 has contributed US\$8 million a year to the American tomato processing industry by increasing the content of soluble solids. Yet none of these profits have been shared with Peruvian small farmers. IPRs have thus become an instrument of recolonization more than 500 years after Columbus. Third World people who struggled to escape colonization will not give up that freedom without resistance.

The Seed Satyagraha

The seed has rapidly become a symbol of this new struggle for freedom. The Seed Satyagraha is a fight for truth that attempts to tell the truth about free trade, using the non-violent, democratic methods of Gandhi.

A central element is to declare the common intellectual rights of Third World communities who have given the world the knowledge of the rich bounties of nature's diversity. We are creating alternatives by building community seed banks, strengthening farmers seed supply, searching for sustainable agriculture options suitable for different regions.

The seed has become for us a symbol of freedom in the age of monocultures, manipulation and monopoly. Gandhi's spinning wheel the Charkha became an important symbol of freedom, not because it was big and powerful, but because it was small and could come alive as a sign of resistance and creativity in the poorest of family huts. The seed too is small. It embodies diversity. In the seed, cultural diversity converges with biological diversity; ecological issues combine with social justice, peace and democracy.

For More Information Contact:

Dr. Vandana Shiva is director of the Research Foundation for Science, Technology and Natural Resource Policy, Dehradun, India and the author of many books, including *Staying Alive: Women, Ecology and Development* (Zed, 1989), *Monocultures of the Mind* (Zed, 1993) and (with M. Mies) *Ecofeminism* (Zed and Kali, 1993).

Dr. Vandana Shiva
A-60 Hauz Khas
New Delhi, India
Tel./fax: (91 11) 462-6699 or 685-6795; E-mail: twn@unv.ernet.in

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