



RAF COMMUNIQUE

RURAL ADVANCEMENT FOUNDATION INTERNATIONAL

January/February 1996

The Geopolitics of Biodiversity: A Biodiversity Balance Sheet

Issue: Conservation and utilisation of the world's biodiversity is the cornerstone for global food security and human well-being. Indigenous peoples' and farmers' intricate relationship with and knowledge of biodiversity is the lynchpin upon which our future is founded. The majority of this biodiversity and indigenous knowledge is found in countries of the South. RAFI has completed a survey and study of 34 major factors in biodiversity and know-how related to it. A summary of the results is presented in the "Biodiversity Balance Sheet" (p. 5). As the world approaches crucial decisions on germplasm access and management, a frank accounting of the geopolitics of "who has what", and "where does it come from" is needed.

Policy Implications: Properly managing the world's biodiversity requires forging mutually beneficial links between the informal geniuses of indigenous peoples and farmers and the formal scientific system. Facilitating these links must include providing adequate compensation for and appropriate access arrangements to germplasm. In 1996, a series of crucial meetings will take place that will move toward defining multilateral regimes for agricultural biodiversity management. Contentious genetic resources issues will be discussed at these meetings, including the future of the South's genetic resources held in the North's seed banks. With 75% of ex-situ resources and technology in the North, and 83% of in-situ resources and technology in the South, time has come for a reapportionment of the proceeds from biodiversity to the benefit of the South's farmers.

Stakes: Intergovernmental control over ex-situ holdings and just compensation mechanisms should be achieved in this year's round of meetings (Leipzig - June, Rome - November, and Buenos Aires - November). Failure to do so will allow the further entrenchment of a global corporate-driven system that does not value or compensate the South's role as resource and knowledge provider. By their very nature, current access and utilisation policies (or lack thereof) negate the involvement of indigenous people and farmers in germplasm management and the innovation process. To support crucial indigenous knowledge systems, countries facing pressure from the World Trade Organisation to adopt plant intellectual property systems should first legislate indigenous peoples' and farmers' rights and then consider policy options at the time of the 1999 GATT-TRIPs review.

Introduction

This issue of RAFI Communique presents RAFI's "Biodiversity Balance Sheet", an up-to-date look at the geopolitical state of biodiversity. The Balance Sheet is an analysis of who has what in biodiversity, and through factoring in the importance of indigenous knowledge and technologies, what countries are in the best position to benefit from diversity.

The report has particular emphasis on ex-situ resources. As the world approaches June's crucial

International Technical Conference on Plant Genetic Resources (Leipzig), and November's double feature of FAO's World Food Summit (Rome) and the Conference of the Parties to the Biodiversity Convention (Buenos Aires), the future control of ex-situ resources looms as a controversial and crucial issue. In order for the South to attain its "ecotechnology" potential, a hard line will have to be drawn at these conferences to place the ex-situ resources from the South under multilateral control, and funnel some of the benefits of this enormous diversity to the people and countries where it originated.

In Situ		Ex Situ	
<u>Resources</u>	<u>Technologies</u>	<u>Resources</u>	<u>Technologies</u>
Forest	Indigenous People	Seed Banks	Ecologists
Savannah	Indigenous Cultures	Gardens	Agronomists
Mammals	Farmers	Zoos	Tissue Culture Specialists
Birds	Livestock	BioMuse	Ag. R&D Funding
Fish	Crops	Plants	Biotechnology Companies
Reptiles		Garden Taxa	MicroPat Centers
Amphibians		Seed Accessions	Biotechnology Patents
Plants		Microbe Collections	
		Seed Bank Species	
		Zoo/Aquarium Species	
		Microbial (number)	
		Bacteria Collections	
		Fungi Collections	
		Plant Reference Collections	

Factors Compared

Readers may be familiar with the terms in-situ (outside of laboratories and seed banks) and ex-situ (stored in artificial collections) with respect to genetic resources. RAFI's study draws parallel distinctions for *technologies*, which are measured by infrastructure, funding, and number of persons practicing particular types of specialized work with biodiversity.

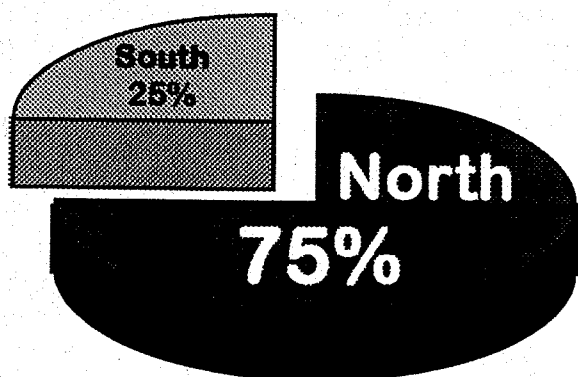
"Ex situ technologies" include specialists such as plant tissue culture scientists and agronomists, as well as non-human factors such as agricultural research and development funds and biotechnology patents. "In situ technologies" encompass often overlooked but crucial local factors, such as

indigenous cultures and farmers (see "The Value of Indigenous Knowledge" below). In situ technologies also include livestock breeds and diversity of crops grown - factors resulting from complex systems of experimentation and adaptation developed by farmers.

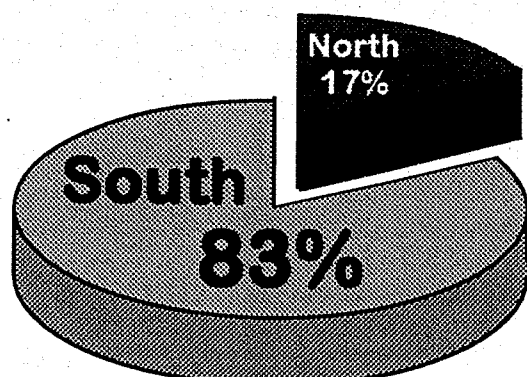
The In-Situ / Ex-Situ Balance

By the grossest possible gauge - grouping all the measured factors into two broad categories - in-situ and ex-situ - a stark division between North and South is clear. As might be expected, the South's control over in situ resources and technology is enormous. A full 83% of known diversity and in-situ knowledge is held in Africa, Asia, and Latin America. The North's small (17%) portion of in-

The "In Situ"/"Ex Situ" Balance: Aggregate of Resources and Technology



Ex Situ



In Situ

situ resources and technology, is contrasted by its dominant 75% share of ex-situ resources and technology.

How the North came to control 75% of ex-situ holdings is an important story with crucial ramifications for the future of agricultural research and food security. About 70% of all biomaterials in collections are held in industrialized countries; but the North's share of ex-situ resources is not largely the result of carefully cataloging its own natural resources.

Most of the North's material originated in the South. Because virtually all of this Southern germplasm was collected prior to the Biodiversity Convention coming into force, these materials are currently beyond the reach of the Convention, as currently interpreted. The North's "share" of the South's germplasm is thus currently the North's "property".

But even after considering the origin of the North's ex-situ collections, RAFI's survey underestimates the North's real control over ex-situ material. For example, the North has 74% of all of the world's zoos and aquariums, but it holds 93% of the species found in them. Perhaps the most important underestimation relates to crop gene banks. According to UN data obtained by RAFI, only 22% of all banks are in the North. However, 55% of all seed accessions and 62% of all crop species are in the North's collections.

Even then, the South's share of ex-situ resources is exaggerated since UN figures include the large gene banks of CGIAR (Consultative Group on International Agricultural Research) which are located in the South, but controlled by Northern boards and funders. If the CGIAR collections were deducted from the South's ex-situ holdings, its share of banked crop seed would plummet to about one-third of the global total.

The South's share of species diversity ranges from a low of 52% of known fish kinds to a high of 91% of reptile species. The relatively low share for fish is more likely an indication of the state of aquatic biology research than a true estimate of the percentage of the world's fish found in tropical waters. More significantly, the South has 87% of the global diversity of higher-order plant species and at least 83% of all forests (tropical and temperate).

Not by coincidence, 83% of recent bioprospecting projects documented by RAFI aim to take advantage of the South's terrestrial biodiversity. An additional 11% of bioprospecting projects are sampling diversity from international waters (most often those of the South), leaving only 6% of bioprospecting efforts exclusively focusing on the comparatively poor North.

Managing Agricultural Germplasm

With 86% of known higher plants, 99% of the world's indigenous people, and 96% of the world's farmers, the South's dominant role in agricultural germplasm and in-situ technology is beyond question. Indisputably, the future of world food security is dependent on these people and resources. While the South's infrastructure for high-tech agricultural research and development is severely limited, for standard agricultural technologies the South fares reasonably well. It has more than one third of agronomists and a fifth of plant tissue culture specialists.

The success of the South's conservation and use of resources and its growing technical capacity to develop and apply them hinges upon forging strong links between the formal scientific innovation system and the informal geniuses of indigenous people and farmers.

There are, nonetheless, threats to the South's strong standing in the management, development, and control of agricultural germplasm. These mainly relate to the future disposition of the over one half million seed accessions in gene banks at CGIAR research centres. A recent agreement between FAO and CGIAR places these largely Southern accessions under FAO auspices. This agreement is a first step in what must become a move to achieve full intergovernmental responsibility over 30-40% of the world's most important seed stocks.

The success of the South's conservation and use of resources and its growing technical capacity to develop and apply them hinges upon forging strong links between the formal scientific innovation system and the informal geniuses of indigenous people and farmers.

These stocks, developed and nurtured by Southern farmers for millennia, are currently worth at least U.S. \$5 billion annually to the North. In order for the South to develop its "ecotechnology" potential and forge research initiatives between formal and informal innovation systems, the South should insist that some value from the seed derived from these accessions (which are regularly replicated in Northern countries) be repatriated to the Southern indigenous and rural communities that created the basis for this wealth in the first place.

The critical forum for these negotiations will be the FAO's International Technical Conference on plant genetic resources to be held in Leipzig, Germany in June, 1996. At Leipzig, conferees will produce a key document for the future management of plant genetic resources. Building from the State of the World Report on plant genetic resources, the Global Plan of Action will be a solid step to provide the framework for an adequate access policy and compensation for the utilisation of plant genetic resources. The Leipzig plan will also likely provide an important framework for agreements on access for other biological materials, such as livestock and microbial germplasm.

At Leipzig, two crucial issues on ex-situ germplasm will stand out. Who controls samples of the South's germplasm held in the North? Who owns the myriad of accessions collected by CGIAR; but that CGIAR has allowed to be passed on to other Northern institutions for storage? In both cases, the answer should be that the imperative for making better links between the formal and informal sectors in the South requires that they be placed under firm multilateral control so that benefits may accrue to the germplasm's original providers.

The Leipzig Global Plan of Action should be introduced as a protocol to the Convention on Biological Diversity, a forum where indigenous peoples and farmers are increasingly asserting their rights and eloquently articulating their

The Americas	Asia/Pacific	Africa
Guatemala	Papua New Guinea	Cameroon
Colombia	Malaysia	Tanzania
Ecuador	Nepal	Gabon
Panama	Philippines	Liganda
Costa Rica	Indonesia	Congo
Peru	Vietnam	Ghana
Mexico	Solomon Islands	Nigeria
Venezuela	Thailand	Zaire
Brazil	Bhutan	Togo
Bolivia	India	Equatorial Guinea

desire to shape policy on access and management of plant genetic resources.

The Value of Indigenous Knowledge

In the myriad of uses for biodiversity, in-situ resources are linked inextricably to the knowledge systems of indigenous people and farming communities. Witness to this fact is the degree of Northern industry's dependence on indigenous knowledge, dependence of a degree that would astound casual observers.

Germplasm and plant knowledge produced by Southern systems continues to feed the Northern pharmaceutical and agricultural industries to the tune of billions of US dollars each year. Over 25% of the worldwide pharmaceutical market, estimated at US \$270 billion in 1996, depends on drugs derived from plants.

Specific cases of the transfer of such knowledge and germplasm are amply documented,¹ yet they are quietly but consistently labeled as "quaint" or "quackery". They are perhaps even more consistently under- or uncompensated.

The "Real" Hot Spots

Countries rich in in-situ resources and indigenous knowledge have a winning combination for the development of biodiversity (see chart above). But these "hot spot" countries aren't always the areas that conservationists habitually point out. Indeed, as biologists and ecologists race around the world counting plant and animal species numbers in the world's biodiversity "hot spots,"² one wonders if they have paused long enough to consider these places' intricate relationship with indigenous cultures, and the capacity of indigenous knowledge to sustain and develop them.



RAFI

The Biodiversity Balance Sheet

The GeoPolitical Structure of Biodiversity

PERCENTAGES

Resource	Desc.	Africa	Asia and Pacific	Latin Amer. Caribbean	Europe	North America	Other North	South	North	
		In Situ Resources						Total:	83	17
Forest	Area	25	10	49	2	14	1	83	17	
Savannah	"	36	16	33	1	4	9	86	14	
Mammals	Species	41	22	23	10	2	2	86	14	
Birds	"	44	19	25	9	2	2	87	13	
Fish	"	9	22	21	10	34	4	52	48	
Reptiles	"	19	37	35	6	0	3	91	9	
Amphibians	"	17	27	45	7	1	4	88	12	
Plants	"	23	26	38	8	3	3	87	13	
		In Situ Technology						Total:	84	16
Indigenous	People	7	78	14	0	1	0	99	1	
Indigenous	Languages	34	47	10	3	3	3	91	9	
Farmers	People	16	75	5	3	0	0	96	4	
Livestock	Breeds	16	29	5	43	5	3	49	51	
Crops	Kinds	23	44	16	11	2	2	84	16	
		Ex Situ Resources						Total:	29	71
Plant Ref.	Centres	4	17	11	39	26	4	32	68	
Seed Banks	"	18	32	26	0	13	9	78	22	
Gardens	"	6	15	9	42	19	9	30	70	
Zoos/Agua.	"	4	14	8	22	37	14	26	74	
Microbial	"	0	32	17	15	15	22	48	52	
BioMuse	"	5	7	10	52	21	5	22	78	
Plant Specimens	Numbers	4	16	8	27	37	8	28	72	
Seed Accessions	"	7	25	14	23	16	6	45	55	
Seed Bank Species	"	12	10	16	39	19	4	38	62	
Garden Taxa	"	1	10	3	68	10	7	14	86	
Zoo/Aqua Species	"	2	3	2	43	40	10	7	93	
Microbial Collect.	"	0	8	5	53	19	15	13	87	
Bacteria Collect.	"	0	9	6	54	15	16	15	85	
Fungi Collect.	"	0	8	4	52	22	15	12	88	
		Ex Situ Technology						Total:	17	83
Ecologists	Persons	3	12	2	36	42	5	17	83	
Agronomists	"	6	24	6	54	9	2	36	64	
Plant TC	"	1	15	6	31	4	42	22	78	
Ag R&D	Funds	7	16	7	45	20	6	30	70	
BioTech	Companies	0	1	0	17	73	10	1	99	
MicroPat	Centres	0	12	0	73	8	8	12	88	
Biotech	Patents	0	0	0	22	60	18	1	99	
		Totals								
In Situ		24	35	25	9	5	3	83	17	
Ex Situ		4	14	8	38	25	11	25	75	
Resource		13	13	19	31	17	8	45	55	
Technology		9	29	6	28	19	8	45	55	

Where are the real hot spots? RAFI's calculations are a country-level composite of four crucial factors:

- Number of indigenous peoples,
- Diversity of surviving indigenous cultures,
- Rates of plant endemism,
- Overall number of higher plant species.

These numbers were in turn compared against the physical area of each country, such that the resulting country composite figures were comparable.

While almost all countries, particularly in the South, have unique and valuable diversity on which they can draw, the chart here indicates the real "hot spots" based on RAFI's research. These countries are the places where cultural and biological diversity occur together - countries with the greatest potential to promote and develop valuable ecotechnologies.

Killing the Messenger? Cases from South America

Countries and NGOs may in some cases be willing to tip their hat to indigenous peoples as "custodians" of biodiversity; but in reality the nexus is much deeper. It is no coincidence that countries which are losing indigenous cultures are also losing their diversity.

Biological diversity alone is useful; but its value diminishes if indigenous knowledge is lost. Five hundred years of ruthless exploitation - and, in some cases, outright genocide - is wiping out much of the human genius in South America.

Brazil - home to much of the Amazon Basin - is a prime, but unfortunately not unique, example of

where policy is actively disconnecting indigenous people from biodiversity. On a purely biological balance sheet, Brazil is one of the richest countries in the world, the knowledge base of its surviving indigenous peoples is being eroded by short-sighted (and unjust) policy. As Brazil allows its indigenous people to be disenfranchised and perish, it is losing its potential to develop its biodiversity.

Elsewhere in South America, Peru has set about dismantling indigenous peoples' collective property rights, through a law ironically designed to promote development and foreign investment.⁴ Bolivia and Colombia, which have recently reacted relatively favourably to indigenous peoples' concerns for control of resources, appear somewhat less single-minded than their neighbors in pursuing an "auto-lobotomy" policy.

Conclusion

Many Southern countries are under pressure from the World Trade Organisation (WTO) to adopt intellectual property provisions for their biodiversity as part of their implementation of the GATT agreement. Before doing this, Southern governments should enact indigenous peoples' and farmers' rights, and then turn to their policy options as the 1999 review of GATT's intellectual property provisions nears.

¹Data for RAFI's "Biodiversity Balance Sheet" come from many sources. Principal published sources include: *Global Biodiversity Assessment*, UNEP (1995), *Ethnologue*, SIL (1992), and *World Resources 1994-95*, WRI (1994).

² See pp. 45-54 in *Conserving Indigenous Knowledge*, UNDP, 1994.

³ See, for example, the many works of Conservation International's "Rapid Assessment Team" projects.

⁴Garcia Hierro, Pedro. *Territorios Indigenas y la Nueva Legislación Agraria en el Perú*, Lima, IWGIA/Racimos de Ungurahui, 1995, pp. 94-95.



**Rural Advancement
Foundation International - USA**

**P. O. Box 655
Pittsboro, NC 27312**

PRINTED MATTER

FIRST CLASS