

Genetic resources and traditional knowledge: From Chennai to Bratislava*

The South and South East Asia region is rich in both biodiversity and human population. More than half of the global population as well as more than half of the world's poor live in this region. A great challenge facing the countries in this region is the conversion of their biological resources into economic wealth in an ecologically sustainable and socially equitable manner. The participants drawn from 14 countries in this region who met at the M. S. Swaminathan Research Foundation at Chennai from February 22 to 25, 1998, therefore welcome the opportunity that will be provided to review matters related to the sustainable and equitable use of biodiversity at the 4th Meeting of the Conference of Parties (COP-4) to the Convention on Biological Diversity scheduled to be held at Bratislava, Slovakia from 4 to 15 May, 1998.

The participants reviewed the situation in their respective countries in the area of biodiversity conservation and use before and after the coming into force of the Convention on Biological Diversity (CBD). They concluded that in the South and South Asian countries, the CBD has catalysed greater awareness, analysis and action in relation to all the following three major goals of CBD – Conservation, Sustainable use and Equitable sharing of benefits. While progress is being made with reference to the first two of the above three goals, initiatives relating to equitable sharing of benefits, taking into account the gender dimensions of equity, have been inadequate both in this region as well as globally. The participants therefore welcome the inclusion of 'Matters related to benefit sharing' as item 16 on the agenda for COP-4. They request Governments which will be participating in COP-4 to consider seriously the following suggestions relating to the implementation without delay of the provisions of CBD relating to access, benefit sharing, prior informed consent

and protection of traditional knowledge systems and rights (Articles 7–12, 14–18 of CBD).

Subsequent to the coming into force of the CBD, the World Trade Agreement and its provisions for Trade Related Intellectual Property Rights (TRIPS) have also come into force. Under the World Trade Agreement, 'Members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof'. With the strengthening and widening of the IPR regime, instances of attempts in industrialized countries to patent material based on traditional knowledge and genetic strains derived from this region are growing.

This has led the Consultative Group on International Agricultural Research (CGIAR) to call for a moratorium on IPR claims on seeds held in trust in the Gene Banks at its International Agricultural Research Centres such as the International Crops Research Institute for the Semi-arid Tropics (ICRISAT) located at Hyderabad in India and the International Rice Research Institute (IRRI) located at Los Banos in the Philippines. Various other material grown in countries of this region for centuries and whose medicinal and other properties have been known for ages, such as neem and turmeric, have been subjected in recent years to IPR claims in the industrialized countries. Even plant material of well-established geographical identity such as basmati rice grown in Pakistan and India, has been subjected to IPR claims. Therefore, the participants urge Governments participating in COP-4 to take urgent steps to harmonize the provisions of TRIPS with equitable benefit sharing and prior informed consent (PIC) provisions of CBD. What is urgently needed is a new global trade and transactions order which can be termed 'TRIPS PLUS', where 'plus' refers to equity and ethics in IPR claims. Since the same Governments are members of both the World Trade Organization and CBD, there is need for coordinated action in matters relating to biodiversity.

In this context, the Participants welcome the recent move of the World Intellectual Property Rights Organization (WIPO) to consider questions relating to according recognition to traditional knowledge systems and informal innovations. Traditional and formal knowledge systems represent a continuum and it will be unethical to recognize only the 'tip of the iceberg' in the innovation chain. Synergy between traditional knowledge and modern science is often essential for imparting the dimensions of ecological and social sustainability in technology development and dissemination.

Pending the enactment of suitable legislations to give effect to the provisions of CBD, we urge countries in this region to introduce immediately steps such as codes of conduct for both academic researchers and commercial entrepreneurs and companies, and information and material transfer agreements for the purpose of implementing the PIC and benefit sharing provisions of CBD. Know-how licences of the kind introduced in Peru will also be valuable to regulate the flow of information and resources. Knowledge and the resources to which the knowledge relates often go together.

Several significant voluntary initiatives have been developed by research institutions, botanic gardens and commercial companies in the areas of PIC and benefit sharing, such as development of institutional policies and codes of conduct on access and benefit sharing. Their experience provides valuable lessons for developing transparent and implementable procedures for ensuring equity and ethics in the use of traditional knowledge and genetic resources. Case studies on the experience of the Philippines and of the Andean Pact countries in enforcing legal measures for access and benefit sharing also provide important insights of value to other countries currently developing legislation relating to CBD. The experience gained so far in the Philippines stresses that access, PIC and benefit sharing legislation should be simple and practical. It should not be overloaded with too

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many objectives but should concentrate on the fundamentals of equity and ethics in access to resources and knowledge and in sharing benefits. The Philippines' experience also stresses that:

- ◆ legislation should be based on a sound understanding of the nature and extent of demand for genetic resources and should be linked to national needs.
- ◆ legislation should be prepared through wide stakeholder participation.

Political and socio-cultural conditions vary widely within and among nations in this region with reference to systems of ownership of areas endowed with great biological wealth. Hence biodiversity legislation should provide for institutional structures and processes which can deal with issues arising from diversity and pluralism in culture, traditions, local laws and local resources. Effective action on Article 8(j) of CBD dealing with indigenous knowledge systems and contributions to conservation has so far not taken place at least partly because of aggregation of diverse issues. The legislation should be based on an assessment of issues relating to benefit sharing such as the following: Who owns genetic resources? Who is authorized to take decisions on PIC? Who benefits and how? Has specific attention been given to the role and contribution of women in the conservation and management of biodiversity?

In this context it will be useful if IUCN could circulate a list of available materials such as books, manuals, reports, MTAs, ITAs, etc. in order to explain the range of options available, and work with others to draw on this experience to develop guidelines for preparing strategies and action plans for addressing access and benefit-sharing issues.

In spite of the variability inherent in cultural and political systems and in spite of the complexities involved, it is essential that immediate national and regional action is taken to implement the PIC and benefit-sharing provisions of CBD. An integrated package of legislative and non-legislative measures could be introduced, appropriate to the conditions of each country. While conservation and benefit-sharing measures have to be country-driven, there is scope and need for a Regional Biodiver-

isty Access and Benefit-sharing agreement among countries in this region. We welcome the call made by ASEAN for a common protocol on access and benefit-sharing among member-states. We request SAARC countries to develop a similar common protocol. We urge the Secretariats of ASEAN and SAARC to initiate steps to promote consultation and information exchange which can lead to reciprocity and concerted action in matters relating to access to genetic resources among countries both within and outside the region.

The active participation of the commercial sector is important for achieving the goals of CBD. In dialogues relating to CBD legislation, government, non-governmental and private sector should all be involved. Pending legislative steps, the private sector could incorporate in its operational procedures, guidelines for complying with the principles of PIC and benefit sharing, as is already being done by some pharmaceutical companies. Governments could also facilitate private sector involvement in the commercialization of biodiversity through know-how licences, MTAs and ITAs. Suitable codes of conduct could be developed and enforced by the companies themselves.

Steps to conserve and use biodiversity in a sustainable and equitable manner should include attention to microbial diversity. Both terrestrial and marine micro-flora and micro-fauna should be included among the genetic material where provisions relating PIC and benefit-sharing are applied. There is a need to strengthen national capability in the conservation, cataloguing and use of microbial biodiversity. Marine genetic resources also require special attention. Another urgent need is the intensification of efforts in training biosystematists. With a fast-growing expansion in the search for new genes for use in agriculture, industry and medicine, there is an increasing demand for biosystematists.

A network of resource persons/institutions in this region needs to be established to assist each country in the preparation of concrete legislative, administrative and other actions, including the development of national laws/policies, benefit sharing, PIC and access arrangements. IUCN could assist in the organization of a South and

South-east Asia Network of Resource Institutions/Persons for implementing the equity provisions of CBD, as part of its on-going Regional Biodiversity Programme.

The Leipzig Plan of Action adopted in 1996 at the Technical Consultation convened by FAO provides an excellent framework of the conservation and sustainable use of agro-biodiversity. *Ex situ* collections of germplasm are essential to prevent genetic erosion, particularly at the intra-specific level. National Biodiversity Strategies should give concurrent and integrated attention to *in situ*, *ex situ* and *in situ* on-farm conservation methods. PIC and benefit-sharing procedures relevant to each system of conservation need to be developed. Governments should enact a moratorium on IPR claims in relation to seeds held for public good in *ex situ* gene banks established prior to the coming into force of CBD. Also, the efforts of tribal and rural women and men in the field of *in situ* on-farm conservation of agro-biodiversity need recognition and reward. They are presently conserving valuable germplasm for public good at personal cost.

Industrialized countries should also enact legislation which supports the implementation of the PIC and benefit-sharing provisions of CBD. Unless both providers and users of biodiversity have mutually reinforcing legislation, action on CBD provisions will become one-sided. Industrialized countries should also implement the technology-sharing provisions of CBD and should help the providers of genetic resources in adding value to the primary material. Value-addition to genetic resources is essential for improving the economic status of the primary conservers. Benefit-sharing and value-addition will help to end the prevailing irony, where the conservers live in poverty in contrast to the prosperity of those who utilize their knowledge and material.

Chronicling of traditional practices and local biodiversity wealth will help to generate greater awareness of the importance of conserving biodiversity and using it sustainably and equitably. At the same time, such People's Biodiversity Registers will help to safeguard the IPR rights of local communities. Multimedia database development on the innovations, selections and genetic

resources conserved by tribal and rural families will help to get them benefits as and when national and global biodiversity funds are established. Such registers and databases will also help to chronicle dying wisdom in matters relating to the conservation and use of biodiversity. It will be appropriate to accord legal recognition to such local level Biodiversity Registers.

Governments, NGOs and other stakeholders should promote social marketing of the need for benefit-sharing and access regulations. Public awareness and concern will be necessary to stimulate political action. Mass media can play a critical role in generating public opinion for both conservation and sustainable and equitable use. Media Resource Centres should be established for providing media credible information. Media representatives should be associated with all stakeholder groups.

In the development of national laws relating to the provisions of CBD, it will be necessary to ensure widespread public and stakeholder participation. The process adopted in preparing the

legislation is as important as the product. The development of a national access and benefit-sharing strategy is an exciting adventure in stakeholder participation and partnership. By generating a sense of symbiotic partnership, undesirable practices like biopiracy can give way to an era of biopartnership based on procedures like co-patenting and credit and profit-sharing. South-South partnership is as important as North-South partnership for using biodiversity for public good, since the centres of diversity of most economic plants occur in the South.

The CBD marks a transition from an exploitative and inequitable relationship between the providers of biodiversity and its users to one of partnership between them based on the principles of equity and ethics. Since biodiversity constitutes the feedstock for the biotechnology industry and serves as the foundation of sustainable food, health and livelihood security, the paradigm shift introduced by CBD in the relationships among communities and nations is an extremely significant one from the

point of harmony both within human societies and between humankind and the rest of nature. We therefore urge all nations to implement the provisions of CBD relating to conservation, sustainable use and equitable sharing of benefits both in letter and spirit. The complexity associated with matters related to benefit-sharing should not become an excuse for inaction. A learning process will be involved before perfection can be achieved in legal provisions and implementation procedures. Hence we appeal to the forthcoming COP-4 and to the GEF General Assembly in New Delhi not to let these unique opportunities pass without developing consensus on basic principles and deciding to initiate concerted and cooperative action on methods of achieving the desired goals.

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Earth sciences go the fractal way*

The impact of fractals on the earth sciences was the subject of a recent workshop. The lectures delivered covered introductory aspects of fractals, percolation, and other related matters in full detail together with a wide range of their applications in earth sciences.

The general introduction done very extensively, highlighted not only the fascinating mathematical and physical aspects of the concept of fractals but also the aesthetic appeal it has. It pertains to objects that are 'self-similar' at various length scales and therefore exhibit the dilatatory symmetry. The best examples of fractals are indeed found in nature – in and around us – and there are perhaps simple reasons for it. The concept has been known for a long time

to mathematicians and physicists who have analysed it extensively and have also found numerous applications. Earth scientists and physiologists in the West have recognized the potential of its application to their fields and are already using the idea (of fractals) and all that goes along with it in their research. It is high time we caught up with the world in these areas of research. For this reason the Workshop was the much needed and crucial first step.

The first two days were devoted to preparing the background by understanding: (i) the basics of fractals and multifractals – various definitions and illustrations, different methods of estimation of fractal dimensions such as similarity-, capacity-, information-, and correlation-dimensions; (ii) chaos – the Lyapunov exponent, and strange attractors; (iii) self-organized criticality; (iv) stochastic differential equations; and (v) the percolation theory.

The latter 3 days were devoted to the applications of the above to geological, geomorphological, geohydrological, gravity, magnetic, seismic, rock mechanical, and climate studies. The underlying phenomena exhibit power law spectra. The ones discussed included frequency-size distribution of earthquakes, faults, rock formation, volcanic eruptions, mineral deposits, well logging, and electromagnetic as well as generalized inductions.

The famous Gutenberg-Richter frequency-magnitude relation

$$\ln N = a - bM$$

is a power law applicable to a range of magnitudes of earthquakes. Here N is the number of earthquakes of magnitude M and greater; a and b are constant. The constant b which is a measure of seismicity of a region is half the fractal dimension. A number of interesting aspects were explained and also

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