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Bioprospecting: A Mega Billion Prospect

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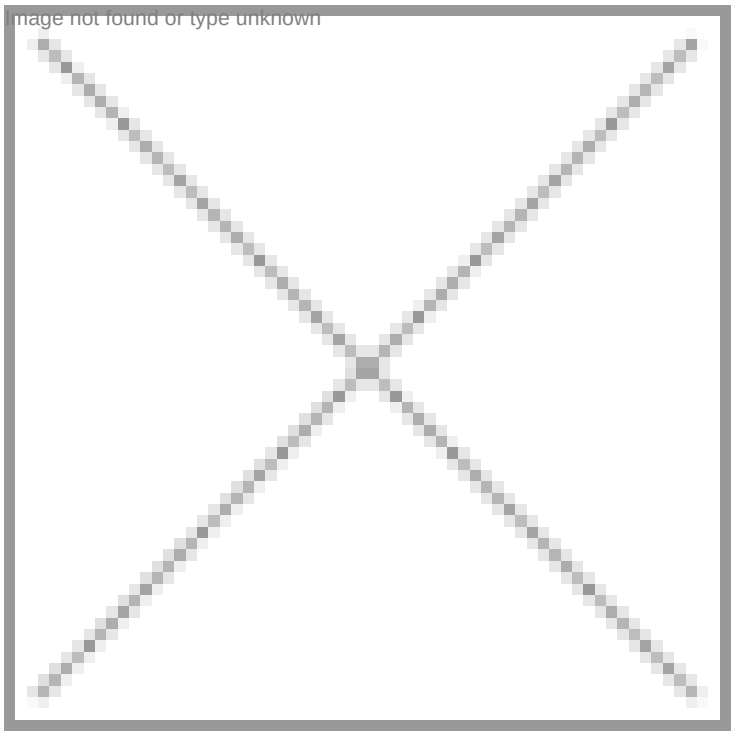
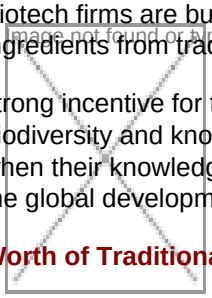


Biotech firms are building cross-border value chains on an unprecedented scale in a bid to discover and develop new active ingredients from traditional medicine. This has created



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strong incentive for the future of bioinformatics, bioprospecting as well as for the biopiracy. Communities and countries rich in biodiversity and knowledge of traditional medicine may gain, if they share the trade and investment benefits. This is possible when their knowledge is used with prior informed consent and they participate in the design of benefit streams that arise from the global developments of the healthcare industry.

Worth of Traditional Knowledge

By its very nature, traditional knowledge requires participation of holders of such knowledge or on their behalf before such knowledge can be priced as a marketable economic asset. This process can be accomplished in a number of ways but any path would involve several stages of resource and response development and the flows of costs and benefits can differ greatly depending on how rights in such knowledge are created, pari passu, with other existing intellectual property rights regimes. Further, moral rights, legal rights and property rights may overlap, but not necessarily.

Humans have always passed on knowledge about life, living, livelihoods, lifestyles, nutrition, healthcare and hygiene inter-generationally as part of kinship, cultural and social traditions of bequeathing lived experiences of our habitat. If the intended beneficiaries are located within a limited space or limited sentience of a community, no institutions beyond the family or clan or tribe or community network are necessary to ensure continuity in such traditions.

The sufficiency of substituting intermediating agencies such as learning institutions (schools, gurukuls or workshops) or administrative agencies deriving tax revenue or acting as religious functionaries (priests, shamans) to function as information conduits may also be reasonably presumed.

Bio-information can be used globally through partnerships, trade and other forms of cross-border transfer-pricing arrangements, if tacit knowledge held communally can be converted to articulated information under a system of flexible property rights. This could raise the value of traditional knowledge by enabling it to be priced to correspond to its true international market value. However, institutions that would yield dispersed benefits do not emerge easily and there is a profit to be made if local knowledge has a use and commercial value beyond its local context.

All forms of contemporary knowledge, whether tangible or intangible are amenable to coverage under IPR regimes unless someone prefers to hold them as trade secrets and succeeds in doing so. Non contemporary traditional knowledge to the extent that is tangible as in case of in situ plant varieties that occur in nature or codified informational resources regardless of whether the information is in print or digitalized databases can also be protected to the extent that organic resources can be brought within the protective scope of plant varieties protection under Convention on Biodiversity and information resources can be protected under the Copyright or other forms of IPR.

A Marketable Economic Asset

The worth of traditional knowledge may also be estimated from arrangements pharmaceutical firms have made in different places and the amounts they are willing to pay for exclusive rights of bioprospecting. In an agreement between Costa Rica and Merck, the latter obtained a monopoly right to bioprospecting in Costa Rica for an annual fee of $508,000 with a promise of 50 percent royalty share in any marketable product developed.

Another firm, Shaman Pharmaceuticals operates a parallel non-profit firm called "Healing Forestry Conservancy" through which it ploughs back at its own discretion, a unilaterally determined part of the value extracted from indigenous people and shamans in Asia, Africa and Latin America.

There is not much to choose between the risk of regulatory capture and private markets because either solution can exclude the holders of traditional knowledge from being parties to a negotiated contract.

The use of biological resources can also be linked to permits and know-how licenses for medicinal knowledge where bioprospecting is authorized through people's biodiversity registers as in Peru and India. In the case of the Arogyapachha (Trichopus Zeylanicus) used by the Kani community in India for its anti-fatigue effects, the plant came to the attention of a scientific expedition in 1987 and was found to activate the body's natural defenses by acting on the cellular immune system with hepato-protective, anti-peptic ulcer and cholorectic effects.

The drug "Jeevani" developed from this herb was patented by Kerala's Tropical Botanic Gardens Research Institute as contemporary knowledge and the Kani community rewarded with a 50 percent share in royalties through a trust fund together with remuneration for participation in its expanded cultivation and development. This brought considerable prosperity to the Kani community and raised their income by an average about Euros 200 (Rs 12,000) for every household. The demand for this product exceeds the supply capacity, which is constrained by bureaucratic hurdles over the cultivation rights of tribals on forestland.

May Apple (Podophyllus peltatum) used by native Americans for centuries as an ameliorate for skin warts, ulcers and cancerous growths is the source of Etoposide used for the treatment of cancerous growth with $500 million world market value. Vinca alkaloids originating from the traditional medicinal use of periwinkle have led to blockbuster drugs Vincristine and Vinblastine with estimated global sales of $300 million. Oil of evening primrose (Oenthera) used by indigenous populations in the Americas for skin problems is currently marketed for eczema and pre-menstrual problems with an estimated market of over $400 million. And, Australian smoke bush (Conospermum) given by aborigines to their old folk was found to contain Conocurvone, a substance that treats rheumatism and lumbago and destroys HIV virus in low concentrations with the predictable outcome that a private Victorian firm Amrad financed by an American institute now pays A$100 a year to the Western Australian government for the exclusive privilege to develop the discovery.

Prospectable Biological Resources

In many cases, while captive commercial cultivations exist, the plants can no longer be found in nature by the indigenous communities that historically found their properties and used them. This has also happened with Rauwolfia Serpentina, once common in the forests of India and Nepal as the source of reserpine, which is now on the endangered list. It is not known

what benefit, in any, was shared by the drug developers with the communities concerned in these cases.

Commercial bioprospecting of plant genetic resources is informed by traditional knowledge of indigenous peoples and value is created when tangible organic elements and intangible informational resources come together. A hit rate of 80 percent or more can be achieved in developing medical drugs where the screening of plants is limited to species used as medicine by indigenous communities (mainly angiosperms). The access to a country's plant genetic resources is governed by an evolving mosaic of national laws, international conventions, multilateral agreements concerning biodiversity and intellectual property rights and plurilateral codes of practice developed in the context of sui generis modalities created in the work of the Food and Agricultural Organization (FAO).

Biological resources are, inter alia, economic goods and include valuable traditional knowledge. Prospectable biological resources comprise two categories: organic resources and informational sources. The availability of organic resources depends on maintaining biodiversity of the biosphere in three important respects: genetic diversity within a species, species diversity within an ecosystem and ecosystem diversity within a habitat.

Biotechnology, genetic engineering techniques and the commodification of biological resources have increased the potential value of bioprospecting because scientific advances enable us to isolate, identify and synthesize life forms which can provide a rich source of new building blocks not only for medicines but also for dyes, colorants, perfumes, chemicals, pesticides, biosensors, bioelectronics and biochips.

Bioprospecting may be viewed as being only partly concerned with harvesting tangible organic material for genetic manipulation or for exploiting the information provided by the organic material. A second source of informational resources are compilations of information in the form of publications, databases, gene banks on the basis of which bioprospectors can learn about phenotypes (observable characteristics of life forms) and genotypes (genetic composition of life forms) and use or maintenance of organic resources.

A third source is ethno biological knowledge, an important channel for communicating experiences based on direct experience of natural systems because the chemical arsenals of plants represent more than 300 million years of evolution of ecologically active compounds and industries need information which could convert organic resources into a usable form in the market economy.

The main problem to be solved in the economics of bioprospecting is that while it is certain that certain kinds of knowledge produced through bioprospecting will eventually increase the productivity of resources used, the use of the resources can be classified neither as a cost nor as an investment without knowing whether the end-result is going to be some viable product or a saleable parcel of knowledge.

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