NATIONAL LAW ON ACCESS TO GENETIC RESOURCES AND BENEFIT-SHARING: IMPACT ON FOOD SECURITY AND TRADITIONAL KNOWLEDGE ASSOCIATED WITH GENETIC RESOURCES

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THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

FACULTY OF LAW
UNIVERSITY OF MALAYA
KUALA LUMPUR

2017

UNIVERSITY OF MALAYA

ORIGINAL LITERARY WORK DECLARATION

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Registration/Matric No: LHA130012

Name of Degree: Ph.D

Title of Project Paper/Research Report/Dissertation/Thesis ("this Work"):
"National Law on Access to Genetic Resources and Benefit-Sharing: Impact on Food Security and Traditional Knowledge Associated with Genetic Resources"

Field of Study: Biodiversity Law

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ABSTRACT

Food security for developing countries has been assured through the practice over millennia of farmers freely using and exchanging genetic resources for food and agriculture. Further, countries have been freely utilizing and exchanging such genetic resources. This establishes a high level of global inter-dependency for these resources. However, food security could well be threatened by international treaties such as the Convention on Biological Diversity and the Nagoya Protocol on Access and Benefit-sharing of Genetic Resources arising for their Utilization which provide for countries to enact national laws or policies to regulate access to these resources. For the regulatory system would come replete with the issuance of permits by bureaucratic multiple institutions; preceded by protracted negotiations for the sharing of benefits arising from the utilization of these resources. Through published articles, the thesis examines the dilemma resulting from the insistence by provider countries to regulate access to their resources and the potential adverse impact to food security of such regulatory measures. The challenge of balancing these seemingly competing interests is explored and solutions proffered. Traditional knowledge systems of indigenous and local communities almost always provide the lead for the uses of these resources. These are relied upon especially by pharmaceutical companies for the development of healing drugs. Yet a failure to recognize the value of this system in national access and benefit sharing laws could lead to its marginalization. Hence the vital need for their emancipation. The threats to the viability of these knowledge systems are identified and a case made for them to take their rightful place in the plurality of knowledge systems – both traditional and western. Ultimately these knowledge systems will provide the cures for new and emerging diseases; as well as help with resource management as well as meet the dangers posed by fresh calamities such as those portended by climate change.

ABSTRAK

Jaminan makanan negara-negara membangun telah dalam kurun-kurun yang lalu dijamin oleh amalan petani yang bebas mengguna dan bertukar sumber genetik makanan dan pertanian. Tambahan pula, negara-negara selama ini bebas mengguna dan bertukar sumber genetik tersebut. Ini menetapkan suatu tahap yang tinggi di peringkat antarabangsa dalam saling pergantungan bagi sumber-sumber ini. Walau bagaimanapun jaminan makanan mungkin boleh juga diancam oleh perjanjian antarabangsa seperti Konvensyen Kepelbagaian Biologi dan Protokol Nagoya dalam Akses dan Perkongsian Faedah daripada Penggunaan Sumber Genetik di mana perjanjian-perjanjian ini memerlukan negara-negara untuk menggubal undang-undang atau polisi nasional bagi mengawalselia akses kepada sumber-sumber tersebut. Dalam sistem kawalselia, akan datangnya penuh dengan pengeluaran permit oleh institusi pelbagai birokrasi; didahului oleh rundingan berlarutan untuk perkongsian faedah daripada penggunaan sumber-sumber ini. Melalui artikel yang diterbitkan, tesis ini mengkaji dilema yang disebabkan oleh desakan negara-negara pemberi untuk mengawal akses kepada sumber-sumber mereka dan kesan buruk yang mungkin atas jaminan makanan akibat daripada langkah-langkah kawalselia itu. Cabaran dalam mengimbangi kepentingan-kepentingan yang seolah-olah bersaing ini diterokai dan penyelesaian ditujukan. Sistem pengetahuan tradisional masyarakat orang asli dan tempatan hampir selalu memberi telunjuk bagi kegunaan sumber-sumber ini. Ini dipercayai terutama oleh syarikat-syarikat farmaseutikal bagi pembangunan ubat-ubatan penyembuhan. Namun kegagalan untuk mengiktiraf nilai sistem ini dalam undang-undang akses dan perkongsian faedah nasional boleh menyebabkan peminggirannya. Oleh itu pentingnya keperluan bagi pembebasan mereka. Ancaman kepada daya maju sistem-sistem pengetahuan ini telah dikenalpasti dan kes telah dibuat untuk mereka bagi mengambil tempat yang sah dalam kemajmukan sistem pengetahuan - kedua-dua tradisional dan barat. Akhirnya sistem- sistem

pengetahuan ini akan menyediakan penawar untuk penyakit-penyakit baru dan baru muncul; serta membantu dengan pengurusan sumber serta menghadapi bahaya yang dibawa bencana baru seperti yang ditandakan oleh perubahan iklim.

ACKNOWLEDGEMENT

I wish to express my heartfelt gratitude to the following:

My supervisor Dr Azmi Sharom for his useful observations and feedback – during a particularly trying time in his personal quest for academic freedom;

Alaleh Eghbali for her helpful administrative and related assistance in bringing the thesis to its proper format;

The rest of those in my personal life who encouraged me to add this achievement to my life.

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Sarawak (Malaysia), Biodiversity Centre Ordinance 1997 (Amended 2003, Regulations 1998, Revised 2004).

LIST OF TREATIES

Convention on Biological Diversity, opened for signature 5 June 1992, UNTS 30619 (entered into force 29 Dec. 1993). Malaysia ratified CBD in June 1994.

International Union for the Protection of New Varieties of Plants, adopted in 1961, revised in 1972, 1978 and 1991.

International Treaty on Plant Genetic Resources for Food and Agriculture, approved during the FAO Conference, 31st Session resolution 3/2001, (entered into force on 29 June 2004).

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), negotiated at the end of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) in 1994.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), opened for signature in 1973 (entered into force on 1 July 1975),

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity, adopted on 29 October 2010 (entered into force 12 October 2014).

United Nations Framework Convention on Climate Change (UNFCCC), opened for signature on 4 June 1992 (entered into force on 21 March 1994). Malaysia signed the treaty on 12 Mar 1999 and ratified it on 4 Sep 2002.

United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), adopted on 13 September 2007.

Vienna Convention on the Law of Treaties, opened for signature on 23 May 1969 (entered into force 27 January 1980). Malaysia joined CITES on 20 Oct 197.

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LIST OF SYMBOLS AND ABREVIATIONS

ABS	Access and benefit sharing
ASEAN	Association of South East Asian Nations
CBD	Convention on Biological Diversity
CGIAR	Consultative Group on International Agricultural Research
CIRAD	The French agricultural research and international cooperation organization working for the sustainable development of tropical and Mediterranean regions
COP	Conference of the Parties
COP/MOP	Conference of the Parties serving as the Meeting of the Parties
CPGR	Commission on Plant Genetic Resources
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
GR	Genetic Resources
GRFA	Genetic resources for food and agriculture
IBPGR	International Board for Plant Genetic Resources
ILCs	Indigenous and local communities
IPR	Intellectual Property Rights
ITPGRFA	International treaty on plant genetic resources for food and agriculture
MARDI	Malaysian Agricultural Research and Development Institution
MAT	Mutually agreed terms
MLS	Multilateral system
Nagoya Protocol/the Protocol	The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (ABS) to the Convention on Biological Diversity
PIC	Prior informed consent
PGRFA	Plant Genetic Resources for Food and Agriculture
R&D	Research & Development

REDD+	Reducing Emissions from Deforestation and Forest Degradation
SMTA	Standard Material Transfer Agreement
TK	Traditional Knowledge
UNEP	United Nations Environment Programme
TRIPs	WTO agreement on trade related intellectual property rights
TPPA	Trans-Pacific Partnership Agreement
UNCED	The United Nations Conference on Environment and Development
UNDRIP	United Nations Declaration of the Rights of Indigenous Peoples
UNFCCC	United Nations Framework Convention on Climate Change
UPOV	Union for the protection of new varieties of plants
WHO	World Health Organisation
WIPO	World Intellectual Property Organisation
WTO	World Trade Organisation

CHAPTER 1: INTRODUCTION

1.1 Description of the research problem and objectives of the thesis

The main theme of this thesis - through published articles - explores the impact of national access and benefit laws and policies on food security and the viability of the traditional knowledge systems of indigenous and local communities associated with genetic and biological resources. This assumed an importance after developing countries secured international recognition of their right to regulate access to their resources and traditional knowledge therewith after a prolonged debate in the context of the UN Food and Agriculture Organisation. Before then such resources were accessed for free essentially by Northern corporations and returned to the South as commodities. No benefits were shared with the provider, mainly developing, countries; or with indigenous and local communities which almost always provided the lead as to the use of these resources. This asymmetry was rectified by the 1992 Convention on Biological Diversity (CBD). Thereafter access required the prior consent of the provider country as well as the communities; and an agreement on the sharing of benefits arising from the utilisation of these resources – referred to as access and benefit sharing (ABS).

The ABS provisions were supplemented by a protocol concluded in 2010 – the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their Utilisation to the Convention on Biological Diversity.

The national ABS laws enacted pursuant to the CBD - and potentially the Nagoya Protocol - required a complex system of permits and protracted benefit sharing negotiations. This conflicts with the millennia-long practice of indigenous and local farming communities who freely exchange their genetic or biological resources for food and agriculture that has provided the world with its food basket. This break with the free use and exchange ethos has the potential to adversely impact food security. Additionally, the vacuous provisions of the CBD with regard to the knowledge of indigenous

communities associated with genetic resources portended the marginalisation of their traditional knowledge systems. The published papers examine the impact of ABS laws on food security as well as the traditional knowledge systems associated with genetic resources. The conclusion highlights the importance of upholding the critical value of allowing for the continuance of the practices of indigenous and farming communities; and the viability of the traditional knowledge systems of these communities. ABS laws must be compatible with, and as well advance, these values.

The thesis explores how this could be accomplished. The model of the International Treaty on Plant Genetic Resources for Food and Agriculture was analysed. It furthers a Multilateral System of free use and exchange of specified plant genetic resources for food and agriculture; and for recognition of the rights of farmers who breed genetic resources. The problems associated with implementing this System that plagues its implementation by member countries were explored in relation to Malaysia; replete with a solution based on its beneficent provisions favouring food security and Farmers' Rights.

Also analysed as a solution to the restrictive and bureaucratic ABS architecture were proposals to pool genetic resources and information relating thereto amongst producer or provider countries. An examination of the existing 'pooling' practices and arrangements amongst a large number of countries with regard to specific important food-related resources suggests the vital need to incorporate these in existing national ABS laws.

Finally, the thesis advances the need to ensure the viability of traditional knowledge systems which have fed, clothed and healed the world, and may yet provide solutions to the threats of climate change to food security. In this regard, it was proposed that Parties to the Nagoya Protocol could through decisions elevate the status and viability of the traditional knowledge system. Fostering the plurality of all knowledge systems – western and traditional - would invariably secure food security and the preservation of biodiversity.

1.2 Synopsis of the selected published works summarizing the key findings of each published article

ARTICLE 1:

'Food security and access and benefit sharing laws relating to genetic resources: promoting synergies in national and international governance' (2010). ***International Environmental Agreements: Politics, Law and Economics, 11*** **(2): 99 – 116.**

The article examines the impact of the national access and benefit sharing laws and other policy instruments on the free use and exchange of genetic resources (GR) for food and agriculture and hence on the maintenance of agricultural biodiversity upon which food security hinges so critically. It highlights the obstacles that stand in the way of developing countries facilitating access to their GR, and proposes a multilateral non-market orientated approach to overcome them.

Food security depends on the use, conservation and continuous improvement of genetic resources for food and agriculture (GRFA). This requires a free flow and exchange of these resources among breeders and farmers. The flow is between farmers and across countries. Consequently, there is a high degree of interdependence among countries and farming communities. These distinctive features differentiate GRFA from other genetic resources such as those used for the creation of pharmaceuticals.

Hence conditions of access, and to some extent any benefit sharing conditions attached to such access, should not impede this free flow and exchange. Else there is a grave danger that food security could well be adversely impacted.

In 1992 the formal international legal architecture governing access and benefit sharing (ABS) for genetic resources changed rather dramatically with the entry into force of the Convention on Biological Diversity (CBD). The CBD reversed the long-standing practice that allowed genetic resources to be accessed for free on the basis that they were the 'common heritage of mankind'. The CBD affirmed the sovereign right of countries to their natural resources. Henceforth access required a provider country's prior informed consent on conditions it determined. The sharing of benefits arising out of the user's

commercial or other utilization of the material accessed on a fair and equitable basis was made obligatory. Since then several countries have enacted national access and benefit sharing (ABS) laws.

To examine the impact of national ABS laws on practices critical to ensuring food security, the article analysed the laws, guidelines and policies of a select number of countries and regions from across various zones and stages of economies from both developing and developed countries. The main finding was that, by and large, ABS laws do not adequately take into account the distinctive features of GRFA in allowing for their free use and exchange, including accessions from other countries. In some cases, there was no consideration of even the prevailing facilitated exchange practices and modalities in key sectors in their own countries. Nor were there any specific provisions addressing food security concerns. Nor did the laws identify food security as an objective. This eclipsed the crucial role of GRFA in the decision-making process in ABS laws.

Very few laws differentiated between GRFA and other uses of genetic resources in their scope, subjecting all genetic resources to uniform access procedures and modalities without taking into account the distinctive features of GRFA and the adverse impact of regulatory laws on free exchange and use. Further, the activities covered within the scope of these national laws were usually defined very broadly such that access to GRFA – whether for research for commercial or non-commercial purposes – needed prior approval and elaborate procedures for access.

There was scant recognition that cumbersome access procedures can hamper access especially where there are a high number of accessions, as is often the case with GRFA. It was also not appreciated that differentiated multi-track procedures for research would be superfluous for GRFA as access leads almost invariably to commercial use. Further, differentiated procedures for access by nationals and non-nationals may impact adversely upon international exchanges of GRFA which is characterized by a high degree of

interdependence. The adverse impact of such procedures for the food and agricultural sector seems to have been missed in most laws. Requiring separate approvals from different authorizing bodies also adversely impacts access especially where, as was the finding in this article, agriculture ministries were excluded from this process.

Even access to GRFA for purposes of conservation for industrial and other applications was regulated. This ignores the fact that conservation is invariably an important first step for current and future development of GRFA as it maintains the pool of diverse capital of resources available for research and development and on which continuous crop and livestock improvement and productivity depends.

Of particular significance with regard to activities related to the conservation of genetic resources is the access by indigenous and local, including farming, communities. The laws provided for access exemptions for indigenous communities in respect of activities that are part of their traditional and customary practices. This would invariably restrict the exemption to exchanges of the GRFA between communities.

Jurisdiction was often fragmented in some laws, with the greatest challenge posed by the constitutional distribution of power relating to genetic resources (and more particularly, land) between the federal and state authorities, as is the case in countries with a federal-type constitutional system such as Malaysia. To take account of these jurisdictional complexities, procedures for access approvals were spread over multi-layered processes and multiple permit requirements from different authorities.

Further, the benefit sharing requirements imposed by the ABS laws between the provider and the user on the basis of mutually agreed terms necessitates complex and time-consuming negotiations. These may not be required for GRFA because parties invariably know what they want and the benefits to be shared. It was suggested that this sector might benefit from standardized benefit-sharing agreements given the high degree of accessions. Elaborate provisions requiring tracking and monitoring of the use of accessed

GRFA also present considerable difficulties and increase costs significantly. Minimal tracking and monitoring requirements of GRFA may be a value contribution to research and development.

There is hence an imperative to balance the sovereign right of nations to impose access terms with the free and unimpeded flow and exchange of genetic resources among nations and communities. Food security is too precious a global goal to be trumped by national sovereign rights over genetic resources. Hence national ABS laws should be framed to facilitate free exchange of GRFA. Having fought hard to regain sovereign rights over genetic resources to rectify a historical inequity, developing countries are unlikely to agree to this, unless there are clear and practical measures in place to ensure that their right is not undermined. One major obstacle is intellectual property rights laws governing genetic resources. These effectively close off access to the genetic resources that are owned by corporate interests. Unless the strictures impeding access to material protected by IPRs are relaxed, it is unrealistic to expect developing countries to relax access to their GR, including landraces and associated traditional knowledge. This calls for an opening up of the enclosures by both provider and the recipient – one to the material and the other to the improved varieties and the related technologies.

A multilateral approach that moves away from the market place might better provide for a resolution for these problems, modelled on the approach of the International Treaty for Plant Genetic Resources for Food and Agriculture (ITPGRFA) which envisages an institutional multilateral system that allows for facilitated access to plant genetic resources to all on the basis of an agreed standard material agreement. Further, the ITPGRFA, by attaching much greater importance to the non-commercial aspects of the benefits, suggests a framework for the resolution of apparently opposing approaches as well as stakeholders' interests; as well as suggesting how the different concerns may be integrated in one single framework.

Such an approach links the three objectives of the CBD as was indeed the *raison d'être* of the Convention and the intention of the parties. This approach also places the sovereign right accorded to countries by the Convention in the service of the

Convention's objectives. It also has the added quality of giving GRFA a social rather than a private property imprimatur. This non-market oriented multilateral approach could provide an equitable basis for developing countries to agree through the international regime to facilitated access to GRFA. Thus, may food security be assured.

ARTICLE 2:

***'Malaysia's Implementation of the Multilateral System of Access and Benefit-sharing*'. (2012). Kuala Lumpur & Rome: Biodiversity International and Malaysian Agricultural Research Development Institute.**

In the first article, it was concluded that a non-market oriented multilateral approach as envisaged by the International Treaty for Plant Genetic Resources for Food and Agriculture (ITPGRFA) could provide an equitable basis for developing countries to agree through the international regime to facilitated access to GRFA. This would assure food security.

This article explores the implementation challenges by countries that are parties to the treaty, using Malaysia as a case study.

Malaysia acceded to the ITPGRFA in May 2003. As a member of the treaty it is obliged to include in the multilateral system (MLS) those crops and forages specified in Annex 1 of the treaty that are in its management and control and in the public domain. These plant genetic resources for food and agriculture (PGRFA) are automatically included within the purview of the treaty; and must be made freely available to other parties to the treaty. To date Malaysia has yet to implement the treaty. Despite its commitment, Malaysia has been beset by several problems of implementation of the MLS. This article explores, through the prism of Malaysia as a key developing country Party – Malaysia - the reasons for this and identifies and discusses the problems of implementation. It suggests how these problems may be overcome.

A three-stage approach is suggested.

First, it establishes a process for ascertaining which of Malaysia's PGRFA are under government management and control. This is because it is unclear what constitutes such 'management' and 'control'. Determining this is complex because government activities in Malaysia take many forms. Often Institutions are established by statutes to manage resources and bestowed autonomous power to maximise efficiency. Are they then within the government's 'management' and 'control'?

The article concludes that these terms refer to a Party's government managing the resources, such as through conservation in a gene bank. Additionally, the government Party must have the ultimate power to decide how these resources are to be treated. The terms refer to both factual as well as legal conditions.

The factual requirement is met if the collection is in fact managed and controlled by the government. The article surveyed the major institutions in Malaysia holding collections of crops and forages, and examined whether they function as an extension of a government department. If so, the article argues that the PGRFA held by those organisations and listed in Annex 1 of the Treaty are automatically included in the Treaty's multilateral system – provided they meet the other criterion required by the treaty that is they must also be in the public domain. The article embarks on a critical analysis of the law and facts and concludes that the Malaysian Agricultural Research and Development Institution (MARDI) was in fact an extension of a government department. This was significant because MARDI holds the largest collection of PGRFA which are within the purview of the multilateral ABS system under the treaty. Hence its collections fall automatically into the system and may be freely accessed by other parties to the treaty. This clears the first uncertainty which has hindered implementation of the treaty.

Second, the article examines how best the MLS could be implemented in Malaysia, in particular whether through the prevailing legal architecture or the enactment of a new

law. As Malaysia has a dualist constitutional approach to the incorporation of treaties into national law, an international treaty does not automatically become part of Malaysian law; it must be explicitly incorporated by an Act of Parliament. However, a treaty may also be implemented through an existing law. In the latter case, there would not be a need to enact new legislation or even a new regulation under an existing law. All that would be required is for the relevant authority to acknowledge an obligation to place materials in the multilateral system and direct the holder of the material to implement the provisions of the treaty.

In yet another scenario, a judicial decision could incorporate an obligation under a treaty into national law. The article adumbrated examples of these from several common law jurisdictions which support the notion that a Government could proactively implement the terms of a treaty on the basis of provisions in existing laws. The advantage of this proactive approach is that it avoids the time-consuming and cumbersome process of law-making.

In practice, if there are provisions in an existing act, they constitute the basis upon which to implement a treaty through a simple directive issued to all bodies holding Annex-1 crops to implement the ITPGRFA's multilateral system of exchange.

The analysis concludes that there is power in the existing statute governing MARDI to make available the materials as required by the terms of the ITPGRFA. This clarifies the legal and factual position for the implementation of the multilateral system in Malaysia, at least as regards the largest *ex situ* collection of germplasm[1] (Schroeder, 2009, p. 14) held by MARDI, without the time-consuming process of enacting a new law, or even amending existing laws. While such initiatives are not necessary however, there may be

[1] [1]Germplasm is the genetic material of an organism which carries in it all inherited qualities, usually in one entity. The seed s of a plant would be called the plant's germplasm. Through its germplasm the plant itself can be recreated or its properties can be used, for instance in a drug.

situations in which amending existing statues would contribute to long-term legal certainty. The article offers draft text for such amendments.

The position as regards other collections such as those held by public universities is less clear. An examination of the statute setting up the University concluded that the university was under the management and control of the government. What was less clear was the status of an institute established by the university as part of its academic pursuit over which it has a large measure of autonomy. One such institute is the University of Malaya's *Rimba Ilmu* herbarium which hosts Malaysia's largest university collection, including the most comprehensive citrus and citroid collection – which is in Annex 1 of the treaty. One way would be for the government, if it so desired, to declare that collections held by a body of the university are: (i) under its management and control; or (ii) satisfy the criteria for their inclusion in the multilateral system. Additionally, it may be desirable to include a specific provision in a university's constitution empowering it to: supply information as to its collections to fulfil Malaysia's obligations under the ITPGRFA; and to transfer Annex-1 material to the treaty's parties upon request in accordance with the terms of the treaty. This would require an amendment of the statute governing universities. The article formulates a draft text for such an amendment.

Finally, the study examines the putative draft national law on access and benefit-sharing made pursuant to the Convention on Biological Diversity and explores how obligations under the ITPGRFA and the CBD could be implemented harmoniously. The article recommends that the national ABS law exclude the PGRFA in the multilateral system from its ambit, thereby creating legal and policy space for implementing the multilateral system.

ARTICLE 3:

'Developing a common pools strategy for genetic resources for food and agriculture: a case study of Malaysia', (2013), in Kamau, E.C., & Winter G. (eds.) ***Common pools of genetic resources: Equity and innovation in international biodiversity law*** **(pp.127 – 149), London & New York: Routledge.**

In the first two articles, we concluded that the distinctive features of plant genetic resources for food and agriculture required their separate treatment in a law or policy dealing with access to genetic resources to ensure food security. A non-market system for access to such resources was mooted modelled on the multilateral system of exchange under the International Treaty on Plant Genetic Resources (ITPGRFA). The challenges that a party to this treaty faces in implementing this treaty were identified and solutions to overcome them offered.

This article examines the strategy that Malaysia may pursue with regard to its PGRFA, in addition to fulfilling its obligations under the ITPGRFA, given that it participates actively in several collaborative regional and international initiatives that seek to share particular genetic resources. Such pooling of resources facilitates free use and exchange of resources upon which food security hinges. The article examines the need for, and the modalities of, establishing coherence between these initiatives. One possible model suggested for managing the high degree of interdependence of countries for access to PGRFA is the development of national, regional or international systems of exchange which ensure facilitated access to GRFA as well as the sharing of benefits with the nurturers of these resources: farmers, pastoralists, breeders, consumers and society as a whole (Tansey, 2008).

This issue has assumed considerable importance because Malaysia, like several other developing countries, is in the process of drafting a national ABS. The avenues provided by the national putative law are analysed. The article concludes that the law provides ample scope for the development of such pools to ensure food security.

In particular, the law provides for exclusions from the strict ABS permit and negotiated contracts requirements; as well as exclusions where there are existing regional and international ABS-type arrangements. This would preserve the integrity and continuance of the several formal collaborative regional and international arrangements for common pools in respect of the specified resources.

ARTICLE 4:

'Incorporating Traditional Knowledge in an International Regime on Access to Genetic Resources and Benefit Sharing: Problems and Prospects'. (2010). ***European Journal of International Law, 21*** **(2): 457–475.**

The earlier articles foreshadowed the time-honoured traditional role and efforts of indigenous and local farming communities in enriching local genetic resources which in turn enhances the national crop gene pools. The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) recognises the enormous contribution that indigenous and local communities (ILCs) of all regions of the world particularly those in the centres of origin and crop diversity, have and will continue to make for the conservation and development of plant genetic resources for food and agriculture (PGRFA); as well as the associated traditional knowledge (TK) systems that have spawned innovations upon which modern medicines have been developed. In short ILCs and their TK systems relating to genetic resources (GR) have fed, clothed and healed the world.

Hence a critical component of an ABS law for access to GR is the central role of traditional knowledge (TK) of indigenous and local communities (ILCs) associated with such resources. The CBD was mandated to develop an international ABS regime. Negotiations commenced in 2004 by an Ad Hoc Working Group. Among the provisions to be considered were those pertaining to Article 8(j) of the CBD which exhorts parties to respect, preserve and maintain their TK, innovations and practices that relate to the conservation and sustainable use of biodiversity.

In this context two specific elements were singled out for consideration:

- the recognition and protection of the rights of ILCs over their TK associated to GR; and
- measures to ensure compliance with the prior informed consent (PIC) of ILCs holding TK associated with GR, in accordance with Article 8(j).

The Working Group established a Group of Technical and Legal Experts to examine the issue of TK associated with GR. The Group met in Hyderabad in June 2009 and submitted a report. This article reflects on the key outcomes of this Experts Group as these would inform the negotiations for the TK component of the international regime.

The experts reached consensus that the need to secure the prior informed consent (PIC) of indigenous and local communities when their knowledge associated with genetic resources is accessed has become an integral and even legal imperative in any national or international ABS regime as demonstrated by a critical analysis of the provisions of the CBD, decisions of parties to the Convention, various international instruments, and the widespread practice of states reflecting its acceptance as customary international law.

Further the Experts recognised the integral role of TK in an ABS regime. TK nurtures biodiversity. Additionally, it identifies specific uses of the components of biodiversity. This provides the lead to the research of the potential properties of the resource – which then results in the creation of products of value in the food chain or as medicines.

Hence any commercial and other utilization of the TK should trigger benefit-sharing obligations of the user. It was preferable to link benefit-sharing, negotiated through mutually agreed terms, to the use of the genetic resources and associated TK rather than to access. This makes practical sense as at the time the application for access is made, the applicant may not be able to furnish information on whether commercial use is contemplated. The resource would remain to be collected which implies that an end product remains to be determined, and a final user (and there could be many) yet not

evident. The contribution of the TK at the stage when the end product results will be easier to establish, based on the nature of its commercial utilisation. Crucially, there would be an obligation to enter into a benefit-sharing contract once the R&D yields a product especially since the line between research for commercial and non-commercial purposes is often blurred. The nature of the benefits, including the quantum where monetary benefits were involved, would also depend upon whether the development is simple and linear or involves highly sophisticated technological processes; and the distance of the use of the TK component from the commercial market capitalization.

The Experts foresaw difficulties in determining ownership of the resource. The genetic makeup of a resource (which could include the associated TK information) is a new and complex juridical concept. Ultimately this will be resolved by reference to the legal status accorded by national law to the rights in relation to genetic resources and associated TK. In any event, most countries recognise that ILCs are entitled to benefit-sharing where their genetic resources and associated TK are accessed and provide for a distinct process for determining benefit-sharing. Industry players, too, recognise this entitlement; although some shun actual involvement in the negotiation of the benefit-sharing terms, preferring to leave this task to national governments or other intermediaries. The diverse provisions in national laws make clear that there is no link *per se* between the prior informed consent of ILCs and the right to determine benefit-sharing terms. The link is established by an affirmative provision in national law.

As commercial by-products are made from biological resources based directly on TK which invariably relates to the intrinsic qualities of the biological resource, and its genetic component, it was agreed that the scope of the international regime should include TK associated with biological resources and not only with genetic resources.

Secondly, the ownership status of the associated TK needs to be clarified. There is a clear requirement for states to protect the rights of ILCs relating to the objectives of the

Convention – including for the conservation and sustainable use of biodiversity. This requires the PIC of ILCs. This implies that ILCs have the right to refuse access in appropriate circumstances. National ABS laws that provide for the PIC of ILCs as a precondition for approving access seem to bestow on the associated TK of ILCs attributes akin to ownership rights over the TK. Some countries assert an overriding 'patrimonial' right to determine access to genetic resources. This seems to conflict with any mandatory PIC requirement of the ILCs. It also appears at odds with the commitment made by countries which have ratified the United Nations Declaration of the Rights of Indigenous Peoples (UNDRIP) to recognise the rights of indigenous peoples over their TK.

Other difficult issues relate to information of associated TK that resides *ex situ*, for example in databases, libraries, or gene banks. Should access to these attract the PIC and/or benefit-sharing requirements? There may be practical difficulties in implementing an obligation for access to such *ex situ* collection as the TK holder may not be identifiable; or there may be multiple holders which may be spread over several countries.

Further, TK associated with genetic resources that are in the public domain can be, and are, readily accessed. There seems to be a misconception that this allows its free use for commercialization. A consensus was reached that the public domain concept does no more than defeat a claim for lack of inventiveness or prior art in a claim for a patent. More particularly it does not mean that benefits should not be shared with the TK owner as is required by the CBD.

The associated TK may be spread across several communities within the country. Or the genetic resources may exist in one country and associated TK in another. Or the TK in relation to the resource may transcend boundaries. The particular difficulties that arise need to be resolved. The article proceeds to offer solutions. Such situations require regional strategies to ensure a participatory process among all TK holders to secure

benefits. This would also safeguard against users seeking out the weakest link to obtain access on terms which may prejudice the other communities. An analysis of the proposed ASEAN Draft ABS Framework Agreement suggests that the usefulness of a regional approach.

Further, clear procedures must be established for securing the PIC of ILCs to obviate legal uncertainty for both users and providers. There exist unique community-specific procedures, grounded in customary laws, practices, and community protocols. This diversity of local governance processes ought to be preserved in the international regime. In this context recourse to extant customary law regarding natural resource management and land and marine tenure may be adapted for this purpose. Additionally, the international regime could establish fundamental elements which should be adopted as the 'minimum' procedures for obtaining PIC from ILCs. This would ensure the legitimacy of the PIC process and decision-making from the perspective of the ILCs. The international regime could also draw upon the experience of several ILCs which have developed community protocols related to access to associated TK which build upon, and may even revitalize, customary laws and practices. Some communities have established an entire functioning management regime based on customary law. The recognition of community protocols and practices by national law would formally strengthen their legitimacy by obliging adherence, especially if accompanied by sanctions.

Monitoring and tracking of the resource and associated TK may be reinforced by requiring disclosure of compliance with the PIC requirement of ILCs and other access conditions at various checkpoints – such as offices for product registration or patents. The Expert Group highlighted the value of a certificate of compliance issued by the provider in this context. Nonetheless there could still be serious jurisdictional issues to enforce the obligations. More crucially, severe tracking difficulties could arise from the physical and informational nature of genetic resources and the dynamics of technologies which make

use of them at different stages of the research and development process. This could be particularly true in the case of genetic resources which are, in essence, coded information. The road map charted by the Expert Group provided the negotiators with a clear direction on this complex component of an international regime. Expert group reports have varying degrees of influence on the final outcome of negotiations. Often political choices decide the impact of such an input. Nonetheless, as the report of the Expert group – and this article – makes clear, there are practical solutions to overcoming the intricate issues posed by the interface between TK and an international ABS regime.

ARTICLE 5:
'Traditional knowledge systems, international law and national challenges: Marginalisation or emancipation?' in *The European Journal of International Law', 24*(4), 1205-1221.

As noted in all the preceding articles, traditional knowledge (TK) systems of indigenous and local communities have been of immense value over millennia. They have filled the breadbasket that has fed the world, provided medicines that have healed the world and provided for the sustainable management of resources, including biodiversity. They may yet hold the key to dealing with the risks posed by climate change. Yet today they are in danger of being marginalized. This article identifies the threats to the TK systems, the inadequacy of the international legal architecture to protect them and the faltering national attempts to the reassertion of their role. It identifies the varying interests and elements and assesses their influence in the marginalization as well as the resuscitation of traditional knowledge systems; and finally argues for the emancipation of these systems and their restoration to the plurality of knowledge systems to provide sustainable solutions to natural resource management.

Over the years, there have been serious threats to the very survival of this alternative knowledge system, stemming primarily from a denial of land rights and compounded by international intellectual property rights (IPRs) instruments, in particular, the TRIPs Agreement of the World Trade Organisation (WTO). The Agreement's patent criteria

denies recognition to indigenous innovations: the inter communal and intergenerational context as well the production for social exchange and for the common good is not countenanced by the Western-inspired IPR regime envisaged by TRIPs.

The CBD reversed this somewhat. It recognised TK as a vital constituent for the conservation and sustainable use of biodiversity. Benefit sharing with the providers of the genetic resources and associated TK became a key element to ensure this. Fair and equitable returns would incentivise provider countries and their ILCs to conserve and sustainably use the biodiversity. The CBD requires parties to provide in their national law for the grant of access to GR and, impliedly, to the associated TK conditioned upon mutually agreed terms negotiated with the provider country and the ILCs.

The key enquiry then is to assess whether national ABS regimes created by countries in the exercise of their sovereign right to regulate access to their genetic resources and associated TK under these international treaties would protect TK's pivotal role in the

CBD and its progeny the Nagoya ABS Protocol.

The language of the CBD supportive of TK is exhortatory ('promote', 'encourage') and its implementation is at the complete discretion of parties. The CBD requires the prior informed consent (PIC) of governments only. There is no specific provision that requires the PIC of ILCs when their resources or associated TK is accessed. Some decisions by the Conference of the Parties (COP) seemed to require such PIC.

It was finally the 2010 Nagoya ABS Protocol (Protocol), negotiated under the CBD that makes explicit that ILCs have an exclusive right to their TK and their PIC must be obtained for any access. This consent must be secured in accordance with the communities' customary laws, community protocols and procedures where they exist. Where they do not, parties are required to support efforts to develop them. The Protocol seems to extend to TK in the public domain; and makes benefit sharing mandatory. These provisions require national implementation.

However, in reality, even developing countries take widely differing approaches to the status of ILCs and their rights. These range from categorising the entire populace as comprising ILCs; or as treating ILCs as an integral part of the populace. In either case the PIC from an ILC as a distinct and identifiable entity would not be required. In short developing countries with significant ILC populations are divided as to the nature and extent of rights to accord to them in their ABS laws. This naturally bears serious adverse consequences for the recognition of the knowledge system of ILCs in domestic and, consequently international, jurisprudence.

Countries that ratify the Protocol will have to implement their ABS provisions related to the TK of ILCs. Central to this is the concept of PIC. It incorporates three elements: the communication of appropriate information, the absence of coercion or undue influence, and a degree of maturity and competence on the part of the community. Integral to this is full disclosure (including reasons for the activity, specific procedures the activity would entail, the potential risks involved and the full implications foreseeable); and, the right to stop the activity from proceeding and to be halted if already underway.

'Consent' enshrines several values grounded in the recognition of the autonomy of individuals or groups to make decisions based on freedom of choice. This advances fundamental human rights and the democratic decision-making ethos. It is emancipatory and democratic and promotes ethical and moral conduct which paves the way for realising an equitable and fair outcome. Consent in this context is not viewed as a goal in itself but the means to pursue more fundamental values. These may be realised if the state is prepared to rely on customary law as a policy resource upon which to construct working systems of sustainable development. This would invariably lead to the revitalization of TK systems.

Further, international initiatives point to the resuscitation of the traditional knowledge system as an accepted part of the plurality of existing knowledge systems that offer

conceptual and sustainable approaches to resource management and the multifarious ways of living sustainably. Prime among these is the adoption of the United Nations Declaration of the Rights of Indigenous Peoples (UNDRIP) by the General Assembly of the United Nations in September 2007, and the recently enacted Nagoya ABS Protocol.

The article analyses and highlights the fact that decisions of Parties to the CBD have consistently recognised that access to TK must be subject to the PIC of ILCs, as have the apex courts of several countries. Developments in other fora also suggest a reinforcement of this recognition. These include the World Intellectual Property Organisation (WIPO) and Reducing Emissions from Deforestation and Forest Degradation international framework (REDD-plus) under the UN Convention on Climate Change (UNFCCC).

Although a wide range of opposing views persist, the article concludes that there seems to be a discernible trend of states moving to accord to the TK system a status within their national law and policy framework on the basis that contemporary resource management arrangements are ineffective and there is a need to resurrect the wisdom of tried and tested indigenous knowledge as alternative development approaches and to incorporate TK into sustainable development, contemporary development strategies, and resource management arrangements.

ARTICLE 6:

'An Asian developing country's view on the implementation challenges of the Nagoya Protocol'. (2012). in Morgera, E., *et al,* (eds.). *The 2010 Nagoya Protocol on access and benefit sharing in perspective: implications for international law and implementation challenges* (pp. 247 – 268). Leiden, Boston: Martinus Nijhoff.

This article identifies the key implementation challenges arising from the Nagoya ABS Protocol from the viewpoint of Malaysia and other developing countries located in the Asian region, which participated in the negotiations of the Protocol as a group (the Like-Minded Asia Pacific countries). This article focuses in particular on challenges related to the scope of the Protocol, access and compliance, as well as several issues related to traditional knowledge (TK) - the specific challenges of obtaining the prior informed

consent of indigenous and local communities, as well as unresolved questions related to publicly available and diffuse TK and to TK accessed from various *ex situ* sources. It also examines specific challenges related to the implementation of the Protocol in federal systems. It concludes by mapping the way forward, both in terms of developing national legislation and adopting decisions under the Protocol; and offers potential solutions to key implementation challenges deriving from the final formulation of the Protocol from a developing country's perspective.

From the outset developing countries pushed for the term 'associated traditional knowledge' to be tagged to 'genetic resources', to underline their integral link; and that TK should be dealt with as a cross-cutting issue and addressed in all the provisions relating to access, benefit-sharing, compliance and capacity building. This important link is missing, except in relation to benefit-sharing and compliance with domestic law, in the case where such law on TK is established. The provision on access to TK associated with genetic resources is heavily qualified. In addition, the establishment of a global multilateral benefit-sharing mechanism to address benefit-sharing for transboundary TK, or for which it is not possible to grant or obtain PIC, is contingent upon parties first establishing the 'need' for such a mechanism. A situation where the same TK is shared by indigenous and local communities located in the territory of several parties merely requires some best-effort cooperative endeavours to 'implement the objectives of the Protocol'. Only two preambular paragraphs address explicitly the integral link between genetic resources and TK: one underlining the 'inseparable nature' for indigenous and local communities of associated TK to genetic resources and another affirming that nothing in the Protocol must be construed as diminishing or extinguishing the existing rights of indigenous and local communities. A provision embedded in a preamble has much less effect as compared to an operational provision.

The Protocol provision on access to TK is founded on the premise that indigenous and local communities have exclusive right to their TK. For this reason, the provision requires that their PIC must be obtained for any access, in accordance with communities' customary laws, community protocols and procedures where they exist. Where they do not, parties are required to support efforts to develop them.

Several difficult questions arise in relation to TK under the Protocol, however, which remain open. First, unlike the provision on benefit-sharing, the provision on access to TK is qualified: it must be 'in accordance with domestic legislation'. This is a critical implementation issue that needs consideration and clarification by parties through a decision of the Conference of the parties (COP). Further, parties to the Protocol need to establish a clear process for obtaining the PIC of indigenous and local communities with respect to their TK. This is a formidable task, both in defining the time when PIC is required and identifying the way in which it can be secured. A solution, particularly for developing countries, would be to prescribe the process through law or regulations. Several obstacles may be anticipated to the operationalisation of the processes.

Further, the article argues that the Protocol in its present form supports the notion that access to TK for a widely-known use of the resource would still attract the ABS requirements. The fact that no patent could be claimed for a use widely known in the public domain does not exempt the person utilising the resource from sharing the benefits with the particular indigenous and local community. During the negotiations, this conclusion was vehemently opposed by developed countries and industry.

In the case of diffused TK, where no community could be identified as the knowledge holder, developing countries proposed during the negotiations that the state should serve as custodian of its communities; the State would provide PIC, negotiate the benefits and hold these in trust for the communities; and apply the benefits for promoting, enhancing and protecting TK. Developed countries resisted these proposals, some arguing that CBD

Article 8(j) only authorised indigenous and local communities, and not States, to be holders of TK, and this precluded states from serving as custodians or trustees. The proposals by developing countries were not included in the Protocol.

As a result, it appears that TK that is publicly available and/or diffused can be accessed without PIC and MAT – a serious lacuna in the Protocol that promotes, rather than checks, biopiracy. The article proposes that developing countries should address this through their national ABS law as well as through a decision by parties to the Protocol.

Such clarifications to ensure the compliance by users of publicly available traditional knowledge associated to genetic resources could well result in additional ratifications to the Protocol, especially by provider developing countries. Parties developing ABS laws may also be justified in including provisions in their national law denying access to those countries not providing for such user measures, as is proposed in Malaysia's proposed draft ABS law.

It is also argued that the Protocol's reach extends to TK that is accessed indirectly, from publications or *ex situ* collections, such as the botanical gardens or national genebanks where its origin can be established. In short, its applicability is not limited to TK that is accessed from within the geographical jurisdiction of a provider country. Nor should there be such a limitation, as a matter of principle.

ARTICLE 7:

The Nagoya Protocol on Access and Benefit sharing of genetic resources: Analysis and implementation options for developing countries. **(2011). Research Papers 36, Geneva: The South Centre**.

This Paper analyses the key components of the Nagoya ABS Protocol and presents the options for implementation by developing countries through their national law. The Paper notes that the generalised provisions of the treaty, crafted to accommodate polarised positions of the countries, provide considerable flexibility to developing countries to shape the treaty through the Meeting of the Parties at the crucial implementation stage

after the Protocol enters into force. In this way, the Paper concludes that an international instrument could emerge that would be truly supportive of national ABS laws and policies to end biopiracy of genetic resources and associated TK; and restore fairness and equity in the exchange of genetic resources across the globe. For only on the basis of fair and equitable sharing of benefits with provider countries can there be a realisation of the other two objectives of the Convention on Biological Diversity - conservation and sustainable use.

[This Paper has been copiously cited by the IUCN official publication: Greiber T., *et al*, *An Explanatory Guide to the Nagoya Protocol on Access and Benefit-sharing*, (2012), Geneva and Bonn: IUCN. (See example at pages: 69, 70, 79, 80, 88, 112).]

1.3 Integration of the published works into a coherent framework

The synopses of the published papers suggest their thematic linkages. The overarching theme addressed by these publications is the impact of ABS regulatory laws and other measures on key areas of vital interest to developing countries. These laws and measures regulate access to a country's biological (including genetic resources) and to the traditional knowledge (TK) systems of indigenous and local communities (ILCs) as to the myriad uses of these resources. The objective is to ensure that any benefits arising from their commercial or other utilisation is shared with those who have provided these resources – be they countries or communities. The interests that have been identified are food security, the protection of the TK systems of ILCs and the preservation of biodiversity. Yet another collateral but equally important consideration is that the research activity in public research institutions is not hampered by ABS regulatory measures as it is primarily this activity that provides the necessary impetus ultimately leading to the creation of new and commercially viable products.

Concerns expressed by megadiverse-rich developing countries that their resources were being appropriated without the concomitant sharing of benefits arising from the

development by industry of commercially profitable products provided the impetus for the negotiation and creation of the Convention on Biological Diversity in 1992. In the more than two decades since, there has been no empirical research evaluating the impact of national ABS laws on food security and indigenous and local communities, the nurturers and preservers of biodiversity. The recently concluded (2010) Nagoya ABS Protocol did not completely address these concerns.

The publications read as a whole present a comprehensive and analytical evaluation of this impact. In essence they: i) create an understanding of what ABS laws must take into account to further these interests; and ii) how these laws may be shaped to ensure that they do not undermine these interests. Practical solutions are proffered based on existing international, regional and national measures.

Two broad categories of genetic resources are addressed. First are those genetic resources for food and agriculture (GRFA). These form the breadbasket of this world. It is essential that there must be unimpeded use and exchange of these resources by farmers and breeders; and among countries. Two distinctive features of these GRFA, namely, reliance on human management, and, the interdependence on these resources by countries and communities across the globe –has provided the impetus for farmers over millennia to freely access and exchange these food resources. This has contributed directly to an increase in the type and range of food supply to the world; as well as to imbue them with the necessary properties to withstand adverse climatic conditions and to improve them to suit changing demands for taste and nutritional needs. Countries that seek to regulate access to genetic resources – which entails seeking permits and the negotiation of benefit sharing agreements - must assess the impact of such requirements on the hitherto practice of free use and exchange; and its potential adverse effect on food security.

In this context, the first article - **'Food security and access and benefit sharing laws**

relating to genetic resources: promoting synergies in national and international governance'- presented the outcome of a study of ABS and related laws of several countries to ascertain whether they took into account the distinctive features of GRFA. The conclusion was that there was a paucity of any dedicated provisions that specifically took into account the distinctive features of GRFA. Consequently, apart from a general vacuous power in a meagre handful of laws to assess applications for access, or to refuse access, on the ground of food security, the issue of food security remains to be addressed in a meaningful way by these laws.

How may this problem be addressed? There are two prospects. One is that suggested by the multilateral system under the ITPGRFA (the treaty). This allows for the free use and exchange of listed key crops and forages identified essential for food security needs. The distinctive characteristic of these food crops and forages is that they have been developed over millennia by farmers on the basis of this free use and exchange. Any impediment to the flow of these genetic resources to farmers' fields would staunch the development of these food crops and affect food security. An ABS law replete with requirements for a permit to access materials and the negotiation of benefit sharing agreements could present such serious obstacles. The treaty seeks to provide ready and free access to these listed crops that are in the public domain and under the management and control of Parties on the basis of an agreed standard material transfer agreement. The resources must be accessed for development, breeding and training purposes. However, despite its entry into force in 2004, this well-subscribed treaty has yet to be fully implemented. The reasons for this and an analysis of the laws and policies that need to be revamped to overcome this problem of implementation are discussed in the second article, using Malaysia as a case study: **Malaysia's Implementation of the Multilateral System of Access and Benefit-sharing,**

The second approach to dealing with GRFA, in particular plant-based resources, is by a common pooling of the results of research and the free exchange of germplasm amongst countries across regions – especially those crops that are not listed within the purview of the treaty. Indeed, there already exist regional and international arrangements of pooling in respect of several crops. How these may be accommodated in an ABS national law is elaborated and clarified in the context of Malaysia's draft law. In this context, the ASEAN draft law on ABS provides a potential framework for dealing with the sharing of benefits where resources endemic to the region are shared among member countries. This common pooling facet and its adaptation to the Malaysian context is the focus of the third article: **'Developing a common pools strategy for genetic resources for food and agriculture: a case study of Malaysia', (2013).**

The second category of genetic resources are those accessed from the forest, based invariably on their uses as identified by the traditional knowledge (TK) of indigenous and local communities (ILCs). Modern medicine relies heavily on this TK system associated to biological and genetic resources to create drugs that heal the world. The TK is inter-generational in nature and developed in the social, cultural and linguistic context of traditional communities. While these resources and associated TK may not require the continuous exchange of materials made freely available, as in the case of PGRFA, two factors are of critical importance. First, it is the knowledge system that provides useful leads as to the myriad uses of the resources sought by industry. Second, ILCs preserve and nurture the biodiversity that yields these resources. Hence any ABS regime at the international and national level must ensure that this knowledge is not diminished; but protected, preserved and enhanced. This becomes especially important with the realisation that this knowledge system – encapsulating vast practical understanding of resource management – has not only contributed to the pharmacopeia that heals the world;

but could well provide solutions to new and emerging threats to the planet, such as climate change.

Additionally, there is the time-honoured traditional role and efforts of indigenous and local farming communities in enriching local genetic resources which in turn enhance the national crop gene pools. The International Treaty on Plant Genetic Resources for Food and Agriculture recognises the enormous contribution that indigenous and local communities of all regions of the world particularly those in the centres of origin and crop diversity, have and will continue to make for the conservation and development of plant genetic resources (PGRFA); hence its explicit reference to Farmers' Rights, exhorting countries to incorporate in their national law the protection and promotion of these rights including, significantly, the protection of traditional knowledge relevant to PGRFA.

The fourth article **'Incorporating traditional knowledge in an international regime on access to genetic resources and benefit sharing: problems and prospects'** – deals with the issues that have been debated with regard to the nature of TK and the rationale, as well as the modalities, for including TK associated with biological/genetic resources in an international as well as a national ABS legal regime. The article specifically captures the discussions, and outcomes, of the proceedings of a TK expert group established to provide input to the negotiations then in progress for the creation of an ABS treaty under the CBD. Some of the fundamental assumptions of this Expert Group have been incorporated in the Nagoya Protocol. These include:

- recognition of the interrelationship between genetic resources and TK. Their inseparable nature for ILCs, the importance of TK for the conservation of biological diversity, the sustainable use of is components and for the sustainable livelihoods of these communities;
- recognition of the diversity of circumstances in which TK associated with GR is held or owned by ILCs;

- acknowledgment of the right of ILCs to identify, within their communities, the rightful holders of their TK associated with GR;
- recognition of the unique circumstances where such TK is held in countries, reflecting a rich cultural heritage relevant for conservation and sustainable use of biodiversity; the TK may be oral, documented or in other forms;
- recognition of the wide range of rights accorded by the UNDRIP.

These assumptions appear in the preamble to the Protocol. It is well to recall that the Vienna Convention on the Law of Treaties accords preambles in a treaty the same legal status as the rest of its provisions: Article 31(2); more importantly they provide the context for interpretation of the terms of the treaty, which is especially important to resolve conflicting interpretations, or, serve as a basis for further elaboration in future decisions of Parties.

The fifth article **'Traditional knowledge systems, international law and national challenges: Marginalisation or emancipation?' (2013),** examines the existing international ABS legal architecture and the potential threats that may lead to its marginalisation; and suggests the imperative need to renew efforts to resuscitate the TK system as an accepted part of the plurality of existing knowledge systems- with implications for biodiversity preservation and enhancement. The factors that serve the emancipation of TK are analysed and clarified. The article ends on an optimistic note that there are clear signs pointing in the direction of TK taking its place alongside (or even pre-empting) the western knowledge system in dealing with threats to biodiversity and other environmental and climatic challenges.

Biological and genetic resources that do not fall within the purview of the MLS of the ITPGRFA or any common pooling arrangement to which countries are parties will fall to be determined by a national ABS law. The Nagoya Protocol enacted in October 2010 came into force in July 2014 with the ratification by the requisite 50 countries. It is

expected that eventually, most countries – including Malaysia – will accede to the Protocol. The Protocol sets out basic minimum obligations that Parties will have to adhere to in enacting their national ABS law. This raises special challenges in implementing the Nagoya ABS Protocol, especially for Asian developing countries. These form the basis of the sixth article **'An Asian developing country's view on the implementation challenges of the Nagoya Protocol', (2012).** This article identifies the key implementation challenges with a focus on challenges related to the scope of the Protocol, access and compliance, as well as several issues related to TK – in particular the specific challenges of obtaining the prior informed consent of indigenous and local communities, as well as unresolved questions relating to publicly available and diffuse TK and to TK accessed from various *ex situ* sources. It concludes by mapping the way forward, both in terms of developing national legislation and adopting decisions under the Protocol, offering potential solutions to key implementation challenges. The article also examines specific challenges relating to the implementation of the Protocol in federal systems, such as obtains in Malaysia - where states have exclusive jurisdiction over land matters, and by extension, biological and genetic resources. To resolve any jurisdictional conflict, a solution is offered based on the draft Malaysian ABS law: the state is given the exclusive right to regulate and manage access and benefit sharing applications with a residual right of the federal government to coordinate and provide assistance where there is a need to seek compliance in user countries. The law provides a template for all states to adopt or adhere to the final 7th article, **The Nagoya Protocol on access and benefit sharing of genetic resources: Analysis and implementation options for developing countries, (2011)** analyses the key components of the Nagoya Protocol and suggests that in the context of the bilateral agreement model between a bioprospector and the provider, there is still considerable flexibility to developing countries to shape the treaty such as to accommodate their interests through decisions made by parties at the crucial

implementation stage after the Protocol enters into force. The article provides clear options for countries to include in their national ABS law and points the way to ensuring the emergence of an international ABS architecture that would be truly supportive of national ABS laws and policies to end biopiracy of genetic resources and associated TK; and restore fairness and equity in the exchange of genetic resources across the globe.

1.4 Contribution to knowledge

Taken together the articles provide an analysis and way forward to advance through national and international ABS laws the key components that would secure food security as well as the continued viability of the traditional knowledge systems associated with genetic resources. And as well, restore fairness and equity in the global exchanges between providers and users of genetic resources and associated traditional knowledge. This is particularly timely as with the entry into force of the Nagoya Protocol, parties will now have to realign their existing national ABS laws and policies to accord with the treaty; or, as in the case of Malaysia, initiate the drafting of a new law in anticipation of acceding to the Protocol.

1.5 The Research Issues Investigated

The published works and this thesis investigate the impact of national laws and policies on access to genetic resources and benefits (ABS) arising from their utilisation on areas identified as being of vital interest to a developing country. These interests are identified as: food security and the traditional knowledge systems of indigenous and local communities associated with genetic resources. The focus is on the impact on developing countries in general with a particular reference, where appropriate, to Malaysia.

Food security

In the context of ABS, plant genetic resources for food and agriculture (PGRFA) have distinct features that place them apart from other genetic resources.[2] There are two important aspects that make for this difference. The first is the need for continuous and unimpeded access to the genetic material. The second is the interdependence of countries for each other's PGRFA.

Breeders, including traditional farmers, are continuously improving crops and introducing in them new traits such as drought or pest resistance (Moore, 2010). This has proceeded over millennia through a process of selection and breeding on the basis of the free access, use and exchange of PGRFA. Breeders and farmers, working collectively and continuously and managing these resources over generations, have enhanced crop productivity through the creation of resilient new varieties. Thus have they maintained the foundation of the world's food basket. This requires unimpeded access to a wide range of PGRFA – both as an immediate resource to allow for innovations through plant breeding to increase food production; and to prevent genetic erosion when diverse genetic material on farms are reduced to mono-cultured modern varieties.

Further, all countries and regions are often highly interdependent on each other's PGRFA - which are the foundation for modern agriculture. The interdependency ranges from 50% reaching in some cases to 100%. Significantly, no country was rated as being completely self-sufficient (Palacio, 1997).

It follows that there should be no. or minimal, impediments imposed for the practice of free use and exchange among farming communities. Else the foundation for modern agriculture and food security is threatened.

In the international law context, countries have acknowledged the sovereign right of countries to regulate access to their resources. The CBD requires that persons such as

[2] This has been recognised by the CBD: Decision II/15, COP2.

bioprospectors seeking access to their genetic resources – including PGRFA - secure the prior consent of the provider. Such consent would be conditional upon the negotiation of an agreement stipulating terms for the fair and equitable sharing of benefits arising from the commercial or other utilisation of the resources accessed. The recently negotiated Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable

Sharing of Benefits Arising from their Utilisation ('the Nagoya Protocol') built upon the ABS provisions of the CBD and added compliance provisions which were lacking in the CBD. Countries are to enact a national law to incorporate the terms of the CBD, and in future, the Nagoya Protocol, in their ABS laws. Some have already done so. Others, like Malaysia, are in the process of doing so. Both these treaties envisage a bilateral agreement between a bioprospector and the provider.

It is readily apparent that an ABS law with its system of securing permits and negotiating agreements may impact the free use and exchange of PGRFA so essential for ensuring food security. Hence the research explores these various facets of the nature of PGRFA and the impact of ABS laws of a large number of countries on the practices which have ensured the growth and maintenance of the food needs of the world.

Specifically, the following issues were investigated:

1. The nature of the resource as a determinant of the appropriate pattern of use and exchange relating to food security;
2. The structure of access and benefit sharing national, regional and international legal and other instruments and its impact on the free use and exchange of genetic resources for food and agriculture and the impact on food security;
3. ABS-related initiatives and activities relating to the use and exchange of GRFA to develop coherence to enhance food security.

The conclusion drawn was that there was scant regard for the value of PGRFA to the food security needs among the countries whose laws were reviewed. A solution to overcome

this is indicated by the multilateral system devised under the International Treaty for Plant Genetic Resources (ITPGRFA) concluded in tandem with the CBD. It addresses the specific distinct nature of PGRFA and the need for their free use and exchange amongst countries that subscribe to this treaty. The benefits are in the ability to secure these resources readily from provider countries at no cost. This free exchange is limited to crops listed under the treaty; these represent the most important food crops and forages. The crops must be under the management and control of the government and be in the public domain.

However, despite parties having become members of the treaty since a considerable time ago, it largely remains to be implemented. Taking Malaysia as a case study, the issues investigated in an article in respect of the PGRFA covered by the treaty, are:

1. What are the obstacles to the lack of implementation? In particular
    a. What is the status of the collections of PGRFA in Malaysia?
    b. Do they come within the purview of the treaty?
2. How may these obstacles be overcome?
3. What legal architecture or policy framework would facilitate its ready implementation?

Yet another solution may be to build on the several collaborative regional and international initiatives that seek to share particular genetic resources necessary for food security and poverty alleviation. Additionally, Malaysia as a member of the Association of South-East Asian Nations (ASEAN) is seeking to put in place a regional agreement on ABS of genetic resources. These efforts provide the rationale for investigating the following issues:

1. Whether these various and seemingly disparate arrangements in relation to ABS or PGRFA promote or hinder the free use and exchange of these resources?

2. How to develop coherence between these initiatives so as to provide for a common pool of resources for food and agriculture at the regional level?

Protection of traditional knowledge systems of indigenous and local communities

The distinctive characteristics for PGRFA and the requirements for free use and exchange and interdependence do not generally apply to non-PGRFA genetic material. Forest genetic resources, for example, may be accessed for research and development leading to the creation of products such as medicines, nutraceuticals or cosmetics by the pharmaceutical or other industries. In this context, the traditional knowledge of indigenous and local communities provides leads as to the use of the genetic resources. This role of TK systems in this regard makes it crucial that such knowledge systems remain viable. Additionally, TK systems have also added to innovations and practices that have enhanced the genepool of crops in agriculture. It is therefore essential to recognise the role of TK and ILCs in an ABS legal regime.

In this regard the following issues were investigated:

1. Patterns of use and exchange for non-GRFA and GRFA and their relationship to traditional knowledge systems and ABS laws and policies;
2. An appraisal of TK systems as incorporated in international and national ABS laws and policies.
3. Key provisions to ensure the viability of TK systems with regard to genetic resources. In this regard, all aspects of prior informed consent were analysed and their applicability to ABS clarified.
4. Advancing the role of TK systems in international and national ABS regimes and the prospect for their emancipation in the context of the international legal architecture.

Finally, there was an investigation of the issues arising from the ambiguity and inadequacy of the provisions in the recently enacted Nagoya ABS Protocol. The interest

of developing countries in advancing interpretations favourable to their interest, primarily as providers of genetic resources, was explored in depth. It was suggested that these interpretations could be incorporated in national ABS law; and these could be presented as options for adoption by the world community through decisions made under the Protocol.

1.6 The Objectives of the Study

The principal objectives of the study were:

a. To identify the key facets of an international ABS regime and national laws made pursuant thereto and their impact on food security, the traditional knowledge systems relating to genetic resources and ultimately the preservation of biodiversity.

b. To provide an analytical framework for understanding the obstacles so as to overcome the adverse impacts.

c. To develop regulatory options for overcoming these obstacles with the aim of preserving food security, the continued viability of TK systems and the preservation of biodiversity.

1.7 Advancement in Research Linked to the Published Works

The articles had a clear logic. They basically analysed ABS laws and policies and sought to see how they could impact on issues of fundamental concern to developing countries. There were three such issues, namely, the possibility that access requirements in an ABS law could undermine the free use and exchange of genetic resources practised over millennia by farmers and breeders. This could impact food security; secondly, the marginalisation of the traditional knowledge systems that have provided the world its food crops and provided the lead for medicines; and thirdly the fair and equitable sharing of benefits with the providers of genetic resources and TK associated with these resources.

The objective was to see how ABS laws could be shaped to ensure that the values embedded in these issues were not adversely impacted or undermined. Thus, the focus was on preserving food security, the continued viability of TK systems and the preservation of biodiversity.

These issues have not been examined before in any great depth. The published works thus provide an impetus for further research in these areas.

These published works have been well received and cited by others in the field. One of the articles earned the author the National Publications Award (for Journal section).

CHAPTER 2: LITERATURE REVIEW

1. The historical setting for the development of ABS regulatory architecture;
2. PGRFA under an ABS regulatory regime: special treatment
3. Developing an ABS regime that takes into account:
    a. Sovereign rights over GR; and
    b. Special treatment of certain PGRFA
4. Dealing with adverse impact on
    a. Food security;
    b. TK systems of ILCs.
5. The way forward.

2.1 Changing legal architecture

Kloppenburg in his seminal *First the Seed*, traces the evolution of the spread of plant genetic resources. Colonial empires took for free these resources from the fecund lands of their colonies for plantation cultivation in other colonial lands; the shifting of these resources by European powers to their hegemonic conquests likened to an imperial 'botanical chess game' (Kloppenburg, 2004; Mooney, 1983). Wherever European powers held hegemonic sway, research and collection for agricultural development was promoted through the establishment of networks of botanical gardens, the prime of which was, and remains, the Kew Gardens of London. This appropriation of plant genetic resources was no less a contributor to the 'capital' growth of the mother country (Marx, 1977) as was the 'haemorrhage of precious metals' such as gold and silver (Braudel, 1966, p. 464). These plant resources had enormous culinary, medicinal and industrial value. Soon plant and seed transfers assumed vast political and economic significance and were coveted. For example, the few hundred rubber seedlings spirited away from Brazil by Kew Garden botanists to Malaya in the colonial era and elsewhere, spawned the immensely lucrative rubber industry for Northern corporations for a long time. The development of new

breeding techniques, enabling the recombination of genotypes, increased the need for exotic germplasm and the search for genes or characters to improve extant crops.

The end of the Second World War created greater opportunities to feed the millions rendered destitute. The flow of plant genetic resources for food and agriculture (PGRFA) from developing to developed countries accelerated and was further institutionalised. Grain merchants such as Cargill flourished; and *ex situ* collection gene banks in the US amassed huge amounts of foreign indigenous materials, made possible by improved long-term storage techniques.

This spawned a network of these gene banks in the 1960s– such as the International Agricultural Research Centres (IARCs) (Cleaver, 1975, Oasa & Jennings, 1982), each charged with the improvement of specialised crops (Kloppenburg, 2004). Of their role, Kloppenburg says (at p. 161):

> *"The IACRs are not only a mechanism for encouraging capitalist development in the Third World countryside, they are also vehicles for the efficient extraction of plant genetic resources from the Third World and their transfer to the gene banks of Europe, North America and Japan."*

Kloppenburg notes the location of the Consultative Group for International Agricultural Research Centres (CGIAR) institutions[1] in the Vavilov[2] Centres of genetic Diversity, characterising these as 'modern successors' to the earlier 'botanical gardens that served as conduits for the transmission of plant genetic information from the colonies to the imperial powers'.

The materials from these gene banks were accessed for breeding purposes. The adoption of modern breeding techniques resulted in a high degree of uniformity and narrow genetic makeup. This created genetic vulnerability and erosion. This resulted in the loss of the original raw material and spelt danger as future pest and pathogen challenges could only

[1] The CGIAR is an ad-hoc global partnership comprising 15 IARCs and addresses agricultural research for development.
[2] A Vavilov Centre of Diversity is a region of the world first indicated by Dr. Nikolai Ivanovich Vavilov to be an original centre for the domestication of plants.

be met by recourse to the original material and the broadening of the crop genetic base (Pioneer Hi-Bred, 1983). The Food and Agricultural Organisation of the United Nations (FAO) responded to these challenges. Its member countries agreed in the 1960s for the establishment of a coordinated global programme of collection and conservation to guarantee the preservation of essential raw materials for plant improvement (Frankel, 1985, 1986a, 1986b). This role was tasked to the newly created International Board for Plant Genetic Resources (IBPGR) – a CGIAR institution housed in the FAO's Rome headquarters but detached from it for all intents and purposes (Kloppenburg, 2004). Global base collections of the germplasm, essentially from farmers' fields of developing countries, were deposited in centres, located primarily in countries of the North with most of the funds allocated to them. The rich germplasms of developing countries were thus housed in the gene banks of these developed countries (Kloppenburg, 2004), which further institutionalised the historically asymmetric flow from the South to the North; and marked a concomitant shift in power and control (Wilkes, 1983).

The ethos justifying this flow was that genetic resources were the 'common heritage of mankind' and freely available for plant breeders and others – not only from the country of origin but as well from these gene banks. This largely benefited those with the capacity to collect, and the scientific capacity to use, the materials – invariably the industrial countries of the North and their corporations. The colonial pattern of inequitable exchange was reinforced with the source material accessed for free by the North but returned to the South as a priced commodity.

This inequity spawned a debate in the context of the FAO; and led to the passing of a resolution in 1981, mandating the FAO to draft an international legal agreement that would provide a legal framework for controlling the flow of genetic resources (FAO, 1983). Developed countries succeeded in thwarting the proposed binding agreement into a compromise voluntary 'Undertaking'. The Third World's insistence that all germplasm

(including elite or commercial varieties) be made freely available under the principles that applied to their germplasm was flatly rejected by developed countries (FAO, 1983c); they refused as well the demand that the IBPGR be placed under FAO's purview. The compromise 'Undertaking' itself succeeded only upon a vote being taken (instead of the usual 'consensus' mechanism) at the insistence of developing countries, constituting the majority membership.

The Undertaking included within its purview 'special genetic stocks which included elite and current breeders' lines and mutants'; and it proposed an institutional restructuring of gene banks under the jurisdiction of the FAO. Developed countries with advanced seed industries, opposed this and the voluntary Undertaking was doomed to be still-born.

The Commission on Plant Genetic Resources (CPGR), created in 1985 to oversee implementation of the Undertaking, achieved little beyond acrimony between the developing and the developed world. Ironically, the latter accused the developing world of seeking to wrest control and undermine private enterprise and intellectual property breeders' rights (Schapaugh, 1985). Essentially then, the South's efforts to declare as 'public goods' the elite varieties developed by the North from the 'public goods' genetic resources accessed from the South - failed.

2.2 The CBD and end to common heritage

The debate did not end there. It was revived in the context of the negotiations under the United Nations Environment Programme (UNEP) that led finally to the adoption of the Convention on Biological Diversity (CBD) in 1992. The CBD altered the construct that had underpinned the contentious discussions in the FAO. Henceforth natural resources were no longer regarded as a 'public good' (Schroeder, 2009, p. 14); and acknowledged instead as the sovereign right of countries (CBD, 1992 Preamble, Art. 15.1), which had the right to set conditions for access (CBD, 1992, Art. 15.1) on the basis of mutually negotiated terms for the sharing benefits arising from the utilisation of the genetic

resources accessed (CBD, 1992, Art. 15.4 & 15.7). No longer tenable in the wider context of an international economic order that was seen as unjust and which led to significant human suffering, the 'common heritage of mankind' principle was jettisoned; and replaced with recognition of sovereign right of states over their natural resources. This anchors the exclusive right of provider countries to determine access to their resources on the equitable principle of 'justice in exchange' (Schroeder, 2009, p. 23).

The imperative for this was seen in the immense benefits derived by corporations from GR accessed from developing countries. Laird and Wynberg (2012) provide an estimate of US$ 50 billion earned annually by pharmaceutical and food companies relying on genetic resources for their R&D; combined industry and government expenditure in R&D in the pharmaceutical sector totalled US$ 68 billion in 2010. Important natural sources derived from terrestrial plants and microorganisms provide the basis for modern medicine, amounting to approximately 75% of the top 20 hospital drugs and 20% of the top 100 most widely prescribed drugs (Wright, 2010).[3]

The asymmetry between the developed countries (whose users access the GR) and 'provider' developing countries is expected to widen – with the North's technological capacity to conduct research and development on the genetic and the biochemical composition of genetic resources (derivatives), including through the application of modern biotechnology; aided by intellectual property rights over the products created (Oberthur & Rosendal, 2013). This would set the stage for the clamour by developing countries for the negotiation of an international regime under the CBD to ensure the flow of benefits to the provider countries (of which more later).

[3] Justice in exchange mainly establishes the fairness of transactions. This is in contrast to 'distributive justice' which deal s with access to scarce resources.

2.3 Crops and IPs

The inequity was set to exacerbate. Seed corporations widened their global reach to the potentially lucrative market in developing countries – essentially to the 'richer' farmers created by agro-industrial ambitions; and pushed to protect their 'investment' by requiring the grant of plant breeders' rights over their crops developed from the fields of farmers from developing countries. Aided by the TRIPS Agreement of the WTO – which obliges member countries to provide plant variety protection – they have successfully cajoled developing countries to become members of UPOV which grant patent-type rights to agri-breeders. The flexibility provided to countries to establish their own *sui generis* system – such as pursued by Malaysia and India - has been criticised by UPOV proponents. Recent TPPA trade negotiations seek to prevail upon these countries to revamp their laws to remove rights accorded to small farmers for the recognition of their innovations in the creation of plant varieties.[4] These developments widen even further the divide between providers and users of genetic resources.

2.4 The ABS equation

The CBD addresses the trans-jurisdictional facet of regulating transnational bioprospecting activity – where resources are acquired from one state and developed in another (Morgera, 2014). The CBD demonstrates the intervention of international law to restore justice and fairness so that gene resource-rich providers (essentially developing countries or indigenous communities located within their jurisdiction) are adequately rewarded by the users in technologically-advanced countries utilising the former's resources and their communities associated traditional knowledge to create value-added products (Cullet, 2009 & 372; Morgera, 2014). This forms the central core of the CBD - 'access and benefit sharing' (ABS). Conceptually, the benefits should incentivise the conservation of the resources; and the prospect of securing benefits would propel their

[4] Gurdial Singh Nijar, 'Safeguarding farmers' seeds', 31 August 2015, *The Sun Daily*, www.thesundaily.my/news/1538293.

sustainable use. ABS thus moves seamlessly in a cyclical whole to feed into, and help achieve, the objectives of the CBD – 'the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources' (CBD Article 1). Several commentators have criticised this assumption that ABS will quasi-automatically incentivise biodiversity conservation (Morgera et al, 2014; Wolff, 2013; Oberthur & Rosendal, 2013.

2.5 Bilateral system of exchange

The criticisms have been fuelled by the paucity of evidence of a positive interaction between benefit sharing and biodiversity conservation and the commodification of biodiversity (Reid, 2013). The underlying construct of the CBD countenances bilateral market-orientated arrangements between essentially private players (corporations or researchers) seeking access, and the providers (ILCs, institutions and sometime States). The mutually agreed terms upon which consent to the access is predicated would be reflected in a negotiated private law agreement. The state provides the regulatory framework for this to be accomplished expeditiously and fairly. Thus international law establishes an overarching multilateral framework for implementing domestic measures governing private contractual transactions and fostering international cooperation transcending the public-private divide (Oberthur & Rosendal, 2013; Morgeraet al, 2014). Such an economic market-based approach may be difficult to reconcile with the other concerns expressed by the CBD – the contribution to poverty eradication (COP 10 Decision X/6) and the conservation of biodiversity.

Further, several deficiencies in the CBD – exhortory and 'permissive' language replete with qualifiers for sharing benefits for access to traditional knowledge, an ambiguous reference to the role of intellectual property rights, the exclusion of *ex situ* collections and materials collected before the coming into force of the Convention in 1992 (that would exclude all the materials safely deposited in gene banks on the basis of the 'common

heritage') – coupled with the market-based framework has led commentators to state with considerable justification that the CBD is less about conservation as it is about establishing conditions for the commercialisation of GRFAs (Athanasiou, 1992).

2.6 The reality

Nonetheless fair and equitable benefit sharing arising from the commercial or other utilisation of the genetic resources and the transfer of technology utilising the resources (including by appropriate funding) in return for access to genetic resources, remains the *raison d'etre* of the CBD. However, what emerged after almost a decade of the CBD's entry into force was a far cry from its intended objectives. Crucially the critical benefit sharing objective remained largely unfulfilled, jeopardising biodiversity, the viability of the TK system and food security (Stoll, 2009).

Developing countries cried foul and finally managed to secure a mandate at the 2002 World Summit on Sustainable Development to launch negotiations for the establishment of an international regime with a focus on benefit sharing (Word Summit on Sustainable Development Resolution 2, 2002). After six years of intense and often rancorous negotiations (Nijar & Gan, 2012) primarily between 'user countries'- largely developed countries, and 'provider countries' - mainly developing countries, the Nagoya Protocol on Access to Genetic Resources and Sharing of Benefits arising from their Utilisation (Nagoya Protocol) was adopted in October 2010. The Nagoya Protocol added its imprimatur to the bilateral market formula - although it did mitigate several deficiencies of the CBD. Significantly, it excluded from its scope existing specialised international ABS instruments – primarily the ITPGRFA and the specific genetic resources covered by and for its purpose: Article 4.4. Although several key issues remain unresolved because the treaty was not negotiated in the usual manner through to the end (Nijar, 2011a; Buck and Hamilton, 2011), there are prospects for shaping the Protocol through national law and decisions at future COP meeting to overcome these (Nijar, 2012).

The bilateral market-approach, envisaging consent through permits and the negotiation of benefit sharing agreements, quite naturally creates obstacles to the free use and exchange of resources. If such free exchange is the *sine qua non* for the development of genetic resources for food and agriculture (GRFA), then it could adversely impact food security. This aspect is now addressed.

2.7 PGRFA

The Nagoya Protocol is *the* instrument dealing with ABS of genetic resources and associated TK. This much was made clear during the negotiations. Given the salutary role of the CBD and its ABS provisions, the Protocol explicates this in the opening sentence to article 4.4: *'This Protocol is the instrument for the implementation of the ABS provisions of the Convention'* (that is, the CBD). This is also implied in the provision dealing with the relationship of the Protocol with other international agreements and instruments. These must be 'supportive of and do not run counter to the objectives of the Convention and the Protocol' – a formula that is repeated in the provisions that allow for the development of other relevant international agreements (Article 4.2) and instruments (Article 4.3). Also, if the exercise of any rights under any existing agreement would cause serious damage or threat to biodiversity, then the Protocol supersedes that agreement: Article 4.1. Hence it is not entirely correct to suggest that the Protocol 'applies by default' (Morgera, 2014). The primacy of the

Protocol on ABS matters is clearly established.

As discussed, the Protocol preserves the applicability of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA): Article 4.4. The treaty was negotiated in response to a call by UNEP at a Conference in Nairobi in May 1992 which formally adopted the text of the CBD (Tymowski & Moore, 2005). The CBD excludes from its scope *ex situ* material collected before the entry into force of the CBD, including gene bank collections of the International Agricultural Research Centres of the

Consultative Group on International Agricultural Research (CGIAR) as well as many national collections (Glowka et al 1994). The Nairobi Conference recognised the need to seek solutions to these and other outstanding matters concerning PGR within the Global System for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture established by FAO. It called in particular for solutions to the issue of access to *ex* situ collections not acquired in accordance with the CBD and to the issue of Farmers' Rights. This call was reinforced in Agenda 21 (UN Doc. A/CONF.151/4), adopted by UNCED, which called for the strengthening of the FAO Global System on Plant Genetic Resources, and its adjustment in line with the outcome of the negotiations on the CBD as well as for the realisation of Farmers' Rights

(Tymowski & Moore, 2005). The invitation by the Nairobi meeting and UNCED was taken up by the FAO Conference in 1993. Its resolution 7/93 requested the Director-General of FAO for the adaptation of the International Undertaking on PGR (referred to earlier), in harmony with the CBD, the consideration of the issue of access on mutually agreed terms to PGR, including *ex situ* collections not addressed by the CBD, and the issue of Farmers' Rights (Tymowski & Moore, 2005). The ensuing seven years of difficult negotiations culminated in the adoption of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) in 2001. It entered into force in June 2004. Significantly, the benefit sharing provisions, tied to IPR issues, presented the main difficulty in the negotiations (Tymowski & Moore, 2005).

2.8 The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)

While dealing with the conservation and sustainable use of all PGRFA, the treaty's key focus was the creation of a multilateral system (MLS) of exchange of PGRFA of crops and forages listed in an annex – and chosen for their importance for food security and their interdependence (Tymowski & Moore 2005).[5] For these crops and forages access

[5] Some food crops that clearly meet the 'food security' criteria are missing, such as soybeans, ground nuts, sugar cane, cassava (some wild relatives), cereal fruits and tomato.

was to be freely provided among users of Parties. The crops included in the MLS were those that are in the member government's ownership and control and in the public domain. An important further condition limits the access solely for the purpose of utilisation and conservation for research, breeding and training for food and agriculture. The automatic access to the listed material included in the MLS is secured through a standard material transfer agreement (SMTA) which is automatically activated in respect of every transfer. The benefit is in the facilitated access itself. The most striking innovation in this regard is the term in the SMTA that requires the recipient of the GR to pay into an international fund an equitable share of the benefits where the product is commercialised and incorporates material accessed from the MLS. The payment is mandatory if restrictions are placed on the availability of the product for further research and breeding (such as through IPRs). Where there are no such restrictions payment is voluntary. Additionally, the benefits arising from the use of the PGRFA are to flow directly or indirectly to farmers in all countries who conserve and utilise PGRFA, especially those in developing countries and countries with economies in transition. Also for the first time in history the efforts and enormous contribution of farmers worldwide, including indigenous and local communities, to the development and conservation of crop diversity was recognised: article 9. Although weakly worded, its advice to Parties to take measures to protect and promote Farmers' Rights in their national laws, nonetheless provides farmers a firm basis to advance their rights (Intro to IT FAO, 2011). Its listed measures that may be taken are instructive: the protection of TK relevant to PGRFA; the right to participate in the sharing of benefits arising from the use of PGRFA; and the right to participate in decision-making related to PGRFA (IT FAO, 2011).

The Nagoya Protocol deals with its relationship to the ITPGRFA, although the treaty itself is not mentioned. Hence Article 4.4 speaks of an existing specialised instrument on ABS

that is consistent with the Protocol; its applicability to those who are parties to it; and its limitation to specific GR covered by and for the purpose of the instrument. Preamble 16 names the treaty and furnishes the rationale for this inclusion. The paragraph refers to the interdependency of all countries with regard to GRFA; and their special nature and importance for food security and for sustainable development of agriculture in the context of poverty alleviation and climate change. Yet another preamble refers to the development of the MLS of the treaty in harmony with the CBD. The article is wide enough to include other specialised instruments that may be developed, especially with regard to subject matter that does not come within the purview of the Protocol, such as marine genetic resources outside national jurisdiction; and other sectoral instruments that may be developed by the FAO in the future (Morgera et al, 2014). It has been highlighted that it may require some careful interpretation to harmonise the provisions in the Protocol governing ILCs with Farmers' Rights in the treaty (Chiarolla, Louafi & Schloen, 2013; Morgera et al, 2014).

The MLS projects the 'fundamental role' of the treaty in ensuring food security. The treaty provides a fresh and enlightened approach in international law to accommodate and capture the distinctive features of PGRFA so as to facilitate access to crop varieties and their components for agricultural research and breeding of new varieties. To these features we now turn.

2.9 Distinctive features of PGRFA

What differentiates crop GR from other components of biodiversity that necessitates a dedicated or special consideration in an ABS regime apart from their critical importance for food security? The two key features may be summarised as:

- Reliance on human management; and
- Countries' interdependence on agricultural crops.

Unlike other GR, agricultural crops are essentially a man-made form of cultural biodiversity. They require continuous human intervention. The genesis of the food that we eat today is the result of farmers domesticating wild plants and making them suitable for modern agriculture through a sustained and continuous process of selection and breeding over millennia. Improvement and experimentation are integral to maintain the crop diversity and ensure food security (Moore & Tymoski, 2005). Unfavourable natural traits – such as shattering of seed-heads prior to maturity – are deliberately eliminated and favourable ones introduced; and new threats posed by new diseases and environmental challenges tackled through adaptation. Continued and active management of these resources completes the contribution. To be able to accomplish these, farmers and plant breeders need access to a wide range of PGRFA as inputs or

"building blocks" to breed into a single variety. Any individual crop variety is thus the product of the breeding work of many generations of farmers and breeders, often stretching across many countries. As much as 60 different landraces originating from 20-30 countries may be used in developing a new crop variety. This makes tracking the origin of the plant difficult – that is establishing the parentage as well as its several distinctive properties or who contributed what to the new variety. All this requires unimpeded access to the GR.

The importance of such unimpeded access to broad genetic base of crops for agriculture and food security was underlined by the 1966 World Food Summit as set out in the preamble to its Declaration as well as the Plan of Action in the preamble to the Treaty.

This underlines the critical importance of PGRFA and the need for facilitative access (Engels & Frison, 1994).

First, as an immediate stock in terms of their beneficial characteristics – pest resistance, drought tolerance, plant architecture, taste or colour. For a variety of reasons, there is expectation that there will be an increased demand for access to a wide range of PGRFA

– especially from centres of origin of crop species in such cases as finding resistance to new diseases. This is illustrated by the recent case of cassava in Africa. **C**assava plays a central role in food security in Africa as it is the staple food in Africa. Two serious diseases threaten its use as food. At the initiative of the Pan-African Cassava Surveillance Network a disease-free cutting production facility is to be set upin Réunion, the only zone in Africa free from the two viruses. Recourse to material from this facility will, hopefully, prevent a possible food catastrophe, since cassava is playing an increasingly vital role in the subsistence of people in Africa. (CIRAD, 2014). Additionally, future pest and pathogen challenges may only be met by recourse to the traditional varieties (Pioneer Hi-Bred, 1983).

Second, as an insurance against unknown future needs. Crop vulnerability has been increased with the replacement of heterogeneous varieties by the high uniformity and narrow genetic makeup of commercial varieties implicit in modern day breeding. The specialisation and homogenisation of modern day farming systems may also cause their under-utilisation leading to the erosion of GRFA (Chiarolla, Louafi & Schloen, 2013; Lockie & Carpenter, 2009).

2.10 Interdependence

A distinctive characteristic of genetic material for agriculture is that the material may originate from one country but is usually developed in another. Free exchange exists not only among farmers but also more widely across the world's continents and regions (Moore & Tymowski, 2005). Potatoes from the Andes Mountains are now the staple crops in Europe and elsewhere. But the origins continue to provide the material for use as natural resistance where crops fail. Thus was the potato harvest, blighted by the Irish famine, rescued by securing the potatoes from their South American source (Moore & Tymowski, 2005); and the taro stocks retrieved from the source to save the Taro Leaf Blight in the South Pacific. Now the agricultural sector of almost all countries is heavily

interdependent on PGRFA from other parts of the world. A study presented to the FAO CGRFA concluded that for the major food crops, all regions were dependent on PGRFA from other regions to a high degree – for most nations up to 50%; with some countries (Indian Ocean countries) registering up to 100% (Palacios, 1997). Significantly, no country or region is entirely self-sufficient in PGR needed to sustain and improve major crops (Fowler, 1998). Some countries however continue to remain largely as suppliers while others are principally recipients of genetic materials. For example, the Mediterranean, Euro-Siberian, Australian and North American regions are over 90% dependent on 'imported' genetic materials (Kloppenburg, 2004). This should not mask the complexity of this interdependence for even the gene-rich countries are not uniformly gene-rich in food crops (Kloppenburg, 2004) as seen by the 87.7% dependency index of African countries on Latin American crops such as maize, cassavas and sweet potatoes) (Kloppenburg, 2004). Kloppenburg concludes that there is no such thing as plant genetic independence for either the regions of the South or the North (Kloppenburg, 2004).

Bartley (2009) and Koskela et al. (2010) have in separate studies identified additional distinctive features which would have implications for an ABS regime. The first is associated with the fact noted earlier that human endeavour has shaped the resources: either through modification of living conditions in ecosystems and agricultural production environments; or through long and complex processes of domestication and selective breeding. The latter usually involves continuous incremental genetic improvement over successive generations with a step added at each stage by different farmer actors. In this on-going process, a product is not the end point of the development but an intermediate step. This also leads to the second point identified by the authors: that these 'intermediate' products themselves can be used as genetic resources to reproduce as well as utilise for further R&D. This blurs the line between providers and recipients of the resources as the recipient can potentially also be a provider. This also blurs the line between GR and biological resources since many agricultural products reach the

marketplace in a form which allows their use both as a biological resource (example, for production) or as a GR (for reproduction and further development). Also, the purpose of the ultimate use cannot be determined at the time it is first accessed (Chiarolla, Louafi & Schloen, 2013).

2.11 Relationship with ABS laws

The CBD has consistently recognised the special nature of agricultural biodiversity, its distinctive features and problems needing distinctive solutions - as reflected, for example, by the decision of the parties at the 2nd Conference of the Parties (Decision II/15, COP2).

There is a gap in the literature in ascertaining whether these distinctive features were taken into account by parties in shaping their national ABS laws. Nor did the CBD provide guidance to parties on the modalities of addressing this facet. The Bonn Guidelines, formulated to assist countries to implement the CBD's ABS provisions, said no more than merely state that parties should enact laws that are 'supportive of human food security' (para 11.k) and included 'food and livelihood security benefits' under its proposed non-monetary benefits section.

A study was undertaken for the FAO by the author to ascertain whether countries enacting ABS laws in fulfilment of their obligations under the CBD took into account the distinctive features of GRFA and in particular their impact on food security.

The study examined the ABS laws of 32 countries and 3 regional laws and examined what was relevant for food and agriculture – namely the conditions under which GRFA can be accessed and under which the conditions for benefit-sharing operate. It concluded that these laws did not take into account the distinctive features of GRFA; conversely, several obstacles were observed which denied facilitation of the free use and exchange of such materials – such as cumbersome access procedures including multi-layered authorisation procedures and involvement of several authorities, multiple permits, individualised case-by-case (often protracted) benefit sharing negotiations, imposition of fees and lack of

timelines for access decisions (Nijar et al., 2011; Nijar, 2011b). Significantly, very few of the designated regulatory bodies administering national ABS laws involved the authorities responsible for food and agriculture, such as the ministries or agencies for agriculture. This was surprising given that GRFA will be the genetic resource most frequently accessed (Nijar et al., 2011; Nijar, 2011b).

The Protocol, as noted earlier, recognises in its preamble, the special nature of agricultural biodiversity and its distinctive features and problems needing distinctive solutions; this relates to PGRFA and food security. The preamble also states the interdependence of all countries with regard to GRFA as well as their special nature and importance for achieving food security; and the beneficent role of the MLS under the treaty in this regard. As earlier discussed, the Protocol's operational provision 'exempts' the resources covered by the treaty from any national ABS law. Indeed, it goes further than the CBD in obliging Parties to give special consideration in their national ABS law or regulatory requirements to '*the importance of genetic resources for food and agriculture and their special role for food security'*: article 8.c. Although formulated in rather weak language, it nonetheless creates the necessary regulatory space to apply differentiated ABS requirements to GRFA (Morgera, Tsioumani & Buck, 2014). This paves the way for striking a balance between fostering and preserving patterns of use, exchange and benefit sharing adapted for the food and agricultural sectors one the one hand and preventing facilitative specialised ABS measures from being abused by users to avoid their benefit sharing obligations, on the other hand (Chiarolli, Louafi & Schloen, 2013).

2.12 The MLS of the ITPGRFA

The MLS of the treaty seeks to advance the free use and exchange feature necessary for food security by departing from the CBD's concept of bilateral contracts. Instead, GRFA listed in an annex identified on the basis of their role in food security as well as being freely exchanged inter-dependently by the global community, may be accessed and

exchanged freely on the basis of pre-agreed terms set out in a standard material transfer agreement (SMTA). This eliminates ad hoc negotiations between providers and recipients and reduces transaction costs. The treaty requires that access be accorded expeditiously, eschews the need for tracking individual accessions and provides access either for free or for a minimal fee. Reporting obligations and the mandatory requirement to use the SMTA for subsequent transfers enable following the movement of the GRFAs through the chain of transfers at reduced costs for providers and recipients (Chiarolla, Louafi, & Schloen, 2013).

Benefits are shared on a multilateral basis in the MLS. Access to the specified materials, automatically included in the MLS, is deemed a major benefit in itself. Benefit-sharing is also implied through tools such as exchange of information, access to and transfer of technology, capacity building, and the sharing of monetary and other benefits from commercialisation. The non-monetary benefits may be even more important than profits to be made as the external effects - from product development and release involving the use of GRFA - may contribute to the creation of important public goods such as rural development and poverty alleviation, environmental protection, food security and cultural diversity (Schloen et al., 2011)

Above all, the treaty ensures the continued flow of PGRFA so essential to agriculture and food security by the establishment of the MLS granting facilitated access and benefit sharing for those resources that are most important for food security and on which countries are most dependent (Moore & Tymowski, 2005). For those crops that do not come within the purview of the MLS, the treaty exhorts the diversity of actors holding GRFA to include them in the MLS. It requests parties to encourage other holders of the listed PGRFA to include them within the MLS to achieve the fullest possible coverage: article 11.2; and to implement measures for this to be accomplished: article 11.3. A benefit-sharing Trust Fund forms ‘a core part of the MLS’ (Greiber, 2012) to receive and

utilise funds for the purposes of implementing the treaty: articles 13, 19.3.f and the SMTA.

National ABS law can exclude from its scope, materials covered by the treaty (GRFA) and used for the purposes of the treaty, that is, conservation for research, breeding and training. Materials that do not fall within these parameters – such as materials for R&D that leads to non-food/feed industrial product – will fall under the Protocol and national ABS laws; as will 'multiple-use' resources which can be used for both food and non-food purposes. Their importance to food security will determine their inclusion in the facilitated MLS and a waiver from the normal strictures of a national ABS law (Greiber, 2012).

2.13 Disengagement with the MLS

The ITPGRFA's membership comprises virtually all of the UN members. Yet there is less than enthusiastic support to implement it. Halewood et al place the blame on two design issues of the MLS (Halewood, Noriega, & Louafi, 2012, p. 8):

1. Insufficient policy reinforcement for the PGRFA commons; and
2. The mandatory financial benefit sharing provision.

As regards the first, there are actors who are unwilling to regard the PGRFA as public goods and instead see them as goods to be managed and exploited on the basis of reciprocity. Further, 'free-riders' take from the MLS without giving their PGRFA meaningfully in return. Both these actors undermine the common pools concept upon which the treaty is founded. Worse the free-riders exploit the goodwill of those who are prepared to share some of the world's most extensive collections of PGR with others.

The solution proffered by the authors is to 'reinforce the boundaries of the MLS and create, monitor and reinforce a reciprocity requirement' (Halewood, Noriega, & Louafi, 2012, p. 9).

The second design issue relates to the nature of the benefit sharing mechanism. It is a mix of a multilateral and a bilateral scheme and hence enjoys and suffers from the pros and cons of each such scheme (Halewood, Noriega, & Louafi, 2012). Benefit sharing is not the subject of negotiations between provider and user but based on pre-agreed terms incorporated in a SMTA. The MLS is the supplier and benefits are directed to it and not to the provider: individual, community or government. Both the PIC and the receipt of benefits are delinked from the provider of the GRFA. However, there is no similar de-linking for the sharing of the mandatory monetary benefits. These are triggered only when material accessed from the MLS is incorporated in actual new PGRFA products (Halewood, Noriega, & Louafi, 2012). And the payments are linked directly to the sale of those particular products – in the form of royalty payment of 1.1 per cent of gross sales minus 30 per cent to cover individual costs (Halewood et al 2007).[6] This latter aspect, reflecting a bilateral approach, entails a complex legal and administrative machinery to ensure that recipients share the monetary benefits; which include reporting of all transfers to the Governing Body, the creation and maintenance of a storehouse of encrypted data of those transfers and maintaining a legal representative of the third party beneficiary interests of the MLS to initiate the necessary legal proceedings for any breach.

Developing country providers of PGRFA look to the treaty's fund for capacity building and sustainable use-related activities. As the fund seems to have failed to deliver in this regard, so has the interest to participate in, and commit resources to, the MLS waned (Halewood et al, 2007).

2.14 Challenges of implementation of the MLS

Developing countries face several challenges of implementation in committing the listed PGRFA to the MLS as members of the treaty. Malaysia is a prime example of a developing country which was an active participant in the negotiations that led to the

[6] There is an alternative option for recipients under the SMTA.

adoption of the Treaty; it acceded to the Treaty in May 2003. Yet, it has been beset by several problems of implementation. It is important to identify these challenges and provide for overcoming them.

The first difficulty is in ascertaining which of its PGRFA are under "government management and control". Then they come within the treaty's provisions. The difficulty stems from the fact that the various major *ex situ* collection institutions are governed by different modalities. Some owe their existence to an Act of Parliament – replete with autonomous powers of administration and management which extend to the right to transfer materials in the collections. An example is the Malaysian Agricultural Research and Development Institute (MARDI) established under the MARDI Act. The first task then is to analyse whether, and the extent to which, the government nonetheless exercises ultimate control – for example through appointments, accountability of senior management, reporting requirements and funding sources (Nijar, 2011).

The second task is to ascertain how the obligations under the treaty may be implemented; treaties are not self-executing and need to be enacted into law or adopted

by other means under the 'dualist' constitutional concept. The easiest recourse is to bring it within the purview of an existing law. This avoids the protracted process involved in enacting a new law, or even amending an existing law.

This may also require that a national ABS laws exclude from its scope PGRFA governed by the multilateral system from its ambit. This creates legal and policy space for implementing the multilateral system. These cumulative steps would cover the whole field of regulating ABS without affecting the crucial role of PGRFA for food security (Nijar, 2011).

2.15 Common Pools Strategy: Regional, international and national initiatives

The treaty's MLS reflects a vision of PGRFA as a common by which resources are jointly used or managed by groups of varying sizes and interest. They are in effect not subject

exclusively to either state or private/market control but are instead managed through the collective actions of interested parties through cooperative mechanisms (Ostrom & Hess, 2007). Winter refers to 'common pools' as a means for a group of people to engage in the common use of resources, by cooperation in the preservation of the resources and in the conduct of cooperative research by both providers and users of GR and TK. This enhances the capacity of those in the group and a sharing of the resulting benefits – a formula for achieving equity among providers and users, R&D of GR and TK is enabled and incentives provided for the preservation of biodiversity (Winter, 2013).

Common pools have been in existence for a long time as seen in seed exchange systems, botanical and zoological garden networks, networks of microbial collections and biological databanks. There are now several collaborative regional and international initiatives that seek to share particular genetic resources for food and agriculture. These form the basis to further develop and enhance the common pool of resources for food and agriculture.

Malaysia, for example, is a member of international exchanges for commodities such as cocoa, pepper and palm-oil. These regional and international arrangements allow for free access to germplasm for research and development and the sharing of research results. In essence these arrangements allow for the preservation and the development of common pools in respect of the specified resources. The international arrangements that provide for exchange of germplasm and sharing of information, and subscribed to by developing countries in the Asian region, include those involving such varied food crops as sweet potato, maize, wheat, coconut, vegetables, pulses, cocoa, pepper, rice, cassava.

A national ABS law and policy could preserve these exchanges and the integrity and continuance of several formal collaborative regional and international arrangements with similar objectives. The law could exempt resources and pools that are the subject of these existing national, regional or international collaborative arrangements and that promote

exchange for research into crops of vital national interest either for conservation or multi-location variety trials from the strictures and requirements implicit in the 'property and market' bilateral concept that characterises the CBD and the Nagoya Protocol. The criteria for such exemption could include resources whose free use and exchange is necessary to engender their conservation and sustainable development that is considered:

- Vital to the country's food security needs;
- Necessary to promote use by traditional farmers;
- Important to alleviate poverty among communities; and
- Needed to address specific environmental and biological problems.

Exchange of the materials could be on the basis of the existing arrangements or by a standard material transfer agreement, modelled on the SMTA under the ITPGRFA.

2.16 Traditional Knowledge (TK)

2.16.1 Rewarding deprecating TK systems

At the centre of the 'seed wars' is the theory that only the input of scientists to the improved varieties counts. Discounted is the contribution over millennia of traditional farmers. These notions need to be dispelled from the outset.

First, TK is no less scientific. Indeed, science is constantly revealing new truths based on the practices demonstrated by traditional practices embodied in the customary law of indigenous communities (Orebech et al, 2005). And now solutions to the dangers posed to agriculture by climate change are presently being sought in the resilient ancient proven practices of indigenous peoples in overcoming deleterious climes. More contemporarily, in more sober reflective moments, proponents of industry acknowledge the debt to ancient society which has *'made the big accomplishment in soybean breeding and that we have merely fine-tuned the system to date'*: per Robert Leiffel, Program Leader of the National Research Program for Oil-seed Crops (Leiffel, 1981, p.36). Plant breeder Simmonds acknowledges that *'Probably, the total genetic change achieved by farmers over*

millennia was far greater than that achieved by the last hundred or two years of more systematic science-based efforts' (1979, p. 11). And even as we write, farmers throughout the world continue to perform this function as part of their daily chore. Hence, the plurality of the knowledge systems – both traditional and western science-based – needs to be acknowledged and vitalised.

Secondly, it is important to recognise TK system as viable and dynamic (Wynberg & Schroeder, 2009). The usurpation or biopiracy of TK is fostered by categorising such knowledge as static (Blackstone, 1983) or as embodying inflexible (and therefore discard-able) archaic notions. Indeed, this together with the developmental pursuit by countries radically altered the way commons were treated and explains somewhat the extinguishment of native customary lands in favour of logging companies and the like. This led, and continues to lead, to the destruction of the culture and linguistic diversity upon which the ethos of the preservation of biodiversity and traditional innovations hinge.

2.16.2 Valuation

The fact that the contribution of the use of the gene within a crop may be difficult to ascertain through accepted market-value processes, given also that a variety of genes from different sources may be incorporated into a single cultivar, does not justify the non-assignment of a value to material that has an obvious utility. Difficulty of assessing should not be mistaken for 'no way' of assessing. Indeed, various methodologies to assess the value of bio-resources through non-market strategies are being actively pursued, for example, by the National Biodiversity Authority of India (National Biodiversity Authority, 2013), the Malaysian Ministry of Natural Resources and Environment, and by the Centre of Excellence for Biodiversity Law under the Universiti Malaya Research Grant Project 'Securing Benefits for Access and Benefit Sharing of Genetic Resources'. In this context, the tools often employed to track patents by holders - such as 'genetic

finger printing' and 'unique identifiers' - can be adapted for tracking and monitoring the movement of genes and their value in the development chain.

Medical pharmacopeia has benefited in the creation of modern drugs through leads provide by indigenous communities. The contribution of TK to health systems is now indisputable. Three quarters of the plants that provide active ingredients for prescription drugs came to the attention of researchers because of their use in traditional medicine (Gray, 1990).

Finally, the suggestion that the original material remains intact for use by indigenous communities and donor countries as a basis for denying that the material has been appropriated, fails to recognise that the value of the germplasm lies in its genetic informational content. Collection of a small portion suffices to transfer the genetic utility contained in the bulk of the plant population. The use-value of the entire whole is thus passed on from the part. The benefits that accrue to the recipient in receipt of this information are real and substantial. If these are not shared, then there is clearly an inequitable asymmetry between the donor and the recipient of the genetic resource and the holder of the associated traditional knowledge.

All these factors emphasise the need for the revitalisation of the TK system as insurance for the protection and enhancement of biodiversity.

The threats need to be addressed. These include the closure of the commons of indigenous lands, and the definitional constructs reinforced by the TRIPs agreement of the WTO that accord rights over innovations only to industrial products - and not to those inter-generational and public good innovations of traditional societies (Nijar, 2012). The CBD and its progeny, the Nagoya Protocol, seems now on track to restoring TK as a critical component of an ABS law. It requires the prior informed consent of the TK holders where their genetic resources or associated TK are sought; and makes mandatory the sharing of benefits based on mutually agreed negotiated terms. These provisions in turn reinforce

the favourable development of extant overarching legal architecture, comprising COP decisions and the newly minted UN Declaration of the Rights of Indigenous Peoples.

CHAPTER 3: PUBLISHED PAPERS

Published paper 1:

Nijar, G. S. (2011). Food Security and Access and Benefit Sharing Laws Relating to Genetic Resources: Promoting Synergies in National and International Governance. *International Environmental Agreements – Politics, Law and Economics, 11*(2), 99-116.

Published paper 2:

Nijar, G. S. (2012). *Malaysia's Implementation of the Multilateral System of Access and Benefit Sharing*. Rome: Biodiversity International and MARDI.

Published paper 3:

Nijar, G. S. (2012). Developing a Common Pools Strategy for Genetic Resources for Food and Agriculture: A Case Study of Malaysia. In Winter, G., & Evanson, K., (Eds), *Common Pools of Genetic Resources: Equity and Innovation in International Biodiversity Law* (pp. 127-149). Oxford, UK: Earthscan/Routledge.

Published paper 4:

Nijar, G. S. (2010). Incorporating Traditional Knowledge in an International Regime on Access to Genetic Resources and Benefit Sharing: Problems and Prospects. *European Journal of International Law, 21*(2), 457-475.

Published paper 5:

Nijar, G. S. (2013). Traditional Knowledge Systems, International Law and National Challenges: Marginalisation or Emancipation? .*European Journal of International Law, 24* (4), 1205-1221.

Published paper 6:

Nijar. G. S. (2012) An Asian Developing Country View on the Implementation Challenges of the Nagoya Protocol. In Morgera, Buck & Tsioumani (Eds), The 2010 Nagoya Protocol on Access and Benefit Sharing in Perspective: Implications for International Law and Implementation Challenges (pp. 247-268). Leiden & Boston: Martinus Nijhoff Publishers.

Published paper 7:

Nijar, G. S. (2011). *Research Papers 36: The Nagoya Protocol on Access and Benefit Sharing of Genetic Resources*. Analysis and Implementation Options for Developing Countries. Geneva: South Centre.

CHAPTER 4: CONCLUSION

4.1 The cumulative effect of the papers

The collective pooling and management of genetic resources for food and agriculture, and especially those that are plant-related, has always formed a vital form of support for agricultural development, crop improvement and ultimately food security. Such pooling has become the object of regulation, especially through international laws controlling access to genetic resources and the sharing of benefits arising from their use. The published papers examine the impact of this international legal architecture on food security; as well as on the traditional knowledge systems which nurture and preserve biological diversity.

Farmers and their practices in germplasm conservation and innovation has been characterised by the free exchange of planting materials between them. From farmers' fields, crops and seeds moved beyond their natural areas. Later as a result of progress in genetics, the emergence of disease resistance in improved varieties and increased contact between scientists worldwide a systematic approach emerged to exchanging PGRFA initiated by the FAO and later the CGIAR which gathered existing and newly created agronomic research institutes around the world with a focus on *ex situ* conservation. This move from informally farmer-managed local pools to a global network generated global interest, international regulation and concern.[1]

The concern arose because the materials supplied by the biodiversity-rich countries, located mainly in the South, were exploited by technologically-advanced corporations mainly from the North. No real benefits accrued to farmers from developing countries from the commercialisation of the genetic resources thus accessed. The emergence of biotechnology by the North based on genetic resources added to the inequity; as did the globalisation of intellectual property rights under the TRIPs Agreement of the World

[1] Chapter 2.1

Trade Organisation. Developing countries were concerted in their quest to establish an international regulatory framework that would secure fair and equitable benefits arising from access to and the utilization of their biological and genetic resources, and associated traditional knowledge (TK). Their efforts paid off with the entrenchment of provisions in the Convention on Biological Diversity relating to access and benefit sharing of genetic resources (ABS);[2] followed some 8 years later by the 2010 Nagoya

ABS Protocol which further developed the key elements of CBD's ABS provisions. On hindsight, this was the easy part. The greater challenge, as many developing countries now realise, is operationalising these ABS provisions within a national regulatory legislative scheme.

The difficulty arises from the bilateral market-based scheme envisaged by these international instruments on which access is to be secured and benefits shared. Such a scheme impinges upon, and may even adversely impact food security, the protection of the traditional knowledge (TK) systems of indigenous and local communities (ILCs), and ultimately the preservation of biodiversity.

The published papers highlight these challenges, commencing with an identification of these matters, an analysis of alternative schemes in other international treaties as well as other existing regional and sectoral arrangements, and the prospects of adapting these in a national ABS regulatory framework that would advance rather than undermine the vital interests identified.

The published papers examine the ABS laws of several countries to ascertain whether they reflect these interests; evaluates the impact of the omission to do so, and discusses how a national regulatory ABS scheme and other sectoral arrangements could be devised,

[2] Chapter 2.2.

or relied upon, to advance these interests drawing lessons from existing international, regional and national measures.[3]

Two broad categories of genetic resources are addressed. First are those genetic resources for food and agriculture (GRFA). These form the breadbasket of this world. It is essential that there must be unimpeded use and exchange of these resources by farmers and breeders; and among countries. Two distinctive features of these GRFA, namely, reliance on human management, and, the interdependence on these resources by countries and communities across the globe – has provided the impetus for farmers over millennia to freely access and exchange these food resources. This has contributed directly to an increase in the type and range of food supply to the world; as well as to imbue these genetic resources with the necessary properties to withstand adverse climatic conditions and to improve them to suit changing demands for taste and nutritional needs. Countries that seek to regulate access to genetic resources – which entails seeking permits and the time-consuming negotiation of benefit sharing agreements - must assess the impact of such regulatory requirements on the practice of free use and exchange; and its potential adverse effect on food security.

A study of the ABS and related laws of several countries concludes that that there is a paucity of any dedicated provisions that specifically take into account the distinctive features of GRFA. Consequently, apart from a general vacuous power in a meagre handful of laws to assess applications for access, or to refuse access, on the ground of food security, the issue of food security remains to be addressed in a meaningful way by these laws.

Two possible pathways are examined to address the adverse impact of ABS laws on food security. One is that suggested by the multilateral system under the International Treaty

[3] Chapters 2 and 3.

on Plant Genetic Resources for Food and Agriculture - ITPGRFA.[4] This allows for the free use and exchange of listed key crops and forages identified essential for food security needs. The distinctive characteristic of these food crops and forages is that they have been developed over millennia by farmers on the basis of such practices of free use and exchange. Any impediment to the flow of these genetic resources to farmers' fields would staunch the development of these food crops and affect food security. An ABS law replete with requirements for a permit to access materials and the negotiation of benefit sharing agreements could present such serious obstacles. The treaty seeks to provide ready and free access to these listed crops that are in the public domain and under the management and control of Parties on the basis of an agreed standard material transfer agreement. The resources must be accessed for development, breeding and training purposes. However, despite its entry into force in 2004, and its value to food security in the context of an ABS regime, this well-subscribed treaty has yet to be fully implemented. The reasons for this and an analysis of the laws and policies that need to be revamped to overcome this problem of implementation are discussed, using Malaysia as a case study.[5] It is suggested that the major institution in the country holding collections of crops and forages is in reality an extension of a government department. As such the genetic resources, would be under government management and control – a critical criteria that then automatically includes those resources listed in Annex 1 of the treaty within the purview of the Treaty's multilateral system (if they are also in the public domain, as the Treaty further stipulates). The analysis concludes that the existing legal framework could be adapted to implement the treaty. This obviates the need to enact new laws or even amend existing ones. For completeness, and to provide for long term certainty, proposals are nonetheless made for new laws, or the amendment of existing laws. Finally, it is proposed that the putative Malaysian ABS law specifically exclude PGRFA in the multilateral system from its

[4] Chapter 2.8.

[5] Chapter 3.2.

ambit, thereby creating legal and policy space for implementing the multilateral system.[6] This would also accord with a parallel provision in the Nagoya Protocol.

The second approach to dealing with GRFA is to continue with the existing arrangements of common pooling of the results of research and the free exchange of germplasm amongst countries across regions with regard to specified crops.[7] How these may be accommodated in an ABS national law is elaborated and clarified in the context of Malaysia's draft ABS law. In this context, the ASEAN draft law on ABS provides a potential framework for dealing with the sharing of benefits where the same resources exist in member countries.[8]

The second category of genetic resources refers to those accessed from the forest, based invariably on their uses as identified by the traditional knowledge (TK) of indigenous and local communities (ILCs).[9] Modern medicine relies heavily on this TK system associated with biological and genetic resources to create drugs that heal the world. The TK is inter-generational in nature and developed in the social, cultural and linguistic context of traditional communities. While these resources and associated TK may not require the continuous free and ready exchange of materials, as in the case of PGRFA, two factors are of critical importance. First, it is the knowledge system that provides useful leads as to the myriad uses of the resources sought by industry. Second, ILCs preserve and nurture the biodiversity that yields these resources. Hence any ABS regime at the international and national level must ensure that this knowledge is not diminished; but protected, preserved and enhanced. This becomes especially important with the realisation that this knowledge system – encapsulating vast practical understanding of resource management – has not only contributed to the pharmacopeia that heals the world; but could well provide solutions to new and emerging threats to the planet, such as climate change.[10]

[6] Chapter 3.2.
[7] Chapter 3.3.
[8] Chapter 3.3.
[9] Chapter 3.5.
[10] Chapter 3.4.

Additionally, there is the time-honoured traditional role and efforts of indigenous and local farming communities in enriching local genetic resources which in turn enhance the national crop gene pools. The International Treaty on Plant Genetic Resources for Food and Agriculture recognises the enormous contribution that indigenous and local communities (ILCs) of all regions of the world particularly those in the centres of origin and crop diversity, have made, and will continue to make, for the conservation and development of plant genetic resources (PGRFA); hence its explicit reference to Farmers' Rights, exhorting countries to incorporate in their national law the protection and promotion of these rights including, significantly, the protection of traditional knowledge relevant to PGRFA.[11]

Another set of articles examines the nature of TK and the rationale, as well as the modalities, for including TK associated with biological and genetic resources in an international as well as a national ABS legal regime. Reference is made to the discussions, and outcomes, of the proceedings of a TK expert group established to provide input to the negotiations then in progress for the creation of an ABS treaty under the CBD. Some of the fundamental assumptions and findings of this expert group were finally incorporated in the resulting Nagoya Protocol. Of particular importance were the recognition of the interrelationship between genetic resources and TK and their inseparable nature for ILCs, the importance of TK for the conservation of biological diversity; and the sustainable use of the components and for the sustainable livelihoods of these communities; as well as a recognition of the diversity of circumstances in which TK associated with GR is held or owned by ILCs.[12] Several features of the existing international ABS legal architecture poses potential threats that may lead to the marginalisation of TK. These were identified and a strong argument made for the need to resuscitate the TK system as an integral component of the plurality of existing knowledge systems. The factors for the

[11] Chapter 3.4.
[12] Chapter 3.4.

emancipation of TK are analysed and clarified. It is concluded that there are clear signs pointing in the direction of TK taking its place alongside (or even pre-empting) the western knowledge system in dealing with threats to biodiversity and other environmental and contemporary challenges, such as climate change.[13]

Biological and genetic resources that do not fall within the purview of the MLS of the ITPGRFA or any common pooling arrangement to which countries are parties, will fall to be determined by a national ABS law. The Nagoya Protocol enacted in October 2010 came into force in July 2014 with the ratification by the requisite 50 countries. It is expected that eventually, most countries – including Malaysia – will accede to the Protocol. The Protocol sets out basic minimum obligations that Parties will have to adhere to in enacting their national law. This raises special challenges in implementing the Nagoya ABS Protocol, especially for Asian developing countries. The key implementation challenges are analysed as affect food security and threats to the continuance and preservation of traditional knowledge - in particular the unresolved questions relating to publicly available and diffuse traditional knowledge and to traditional knowledge accessed from various *ex situ* sources. It concludes by mapping the way forward, both in terms of developing national legislation and adopting COP/MOP decisions, offering potential solutions to these challenges.[14]

Also examined is the issue relating to the implementation of the Protocol in federal systems, such as obtains in Malaysia – where jurisdiction over land matters in distributed between the federal and state authority. In Malaysia, in common with other countries such as Australia, states have exclusive jurisdiction over land matters, and by extension, biological and genetic resources. To resolve any jurisdictional conflict, a solution is offered based on the draft Malaysian ABS law: the state is given the exclusive right to regulate and manage access and benefit sharing applications with a residual right of the

[13] Chapter 3.4.
[14] Chapter 3.6.

federal government to coordinate and provide assistance where there is a need to seek compliance in foreign user countries. The law provides a template for all states to adopt or adhere to.[15]

As shown in a final analysis, the key components of the Nagoya ABS Protocol suggest that, in the context of the bilateral agreement model between a bioprospector and the provider, there is still considerable flexibility for developing countries to shape the treaty such as to accommodate their interests through decisions made at the Meeting of the Parties at the crucial implementation stage after the Protocol enters into force. There are options for countries to include in their national ABS law to ensure the emergence of an international ABS architecture that would be truly supportive of national ABS laws and policies to end biopiracy of genetic resources and associated TK; and restore fairness and equity in the exchange of genetic resources across the globe.[16]

4.2 Significance of the findings

Taken together the published papers provide an analysis and way forward to advance, through national and international ABS laws and measures, the key components that would secure food security as well as the continued viability of the traditional knowledge systems associated with genetic resources. And as well, restore fairness and equity in the global exchanges between providers and users of genetic resources and associated traditional knowledge.

This is particularly timely as with the recent entry into force of the Nagoya Protocol, Parties will now have to realign their existing national ABS laws and policies to accord with the treaty; or, as in the case of Malaysia, initiate the drafting of a new law in anticipation of acceding to the Protocol.

[15] Chapter 3.6.
[16] Chapter 3.7.

4.3 Contribution to knowledge

There has been no empirical research evaluating the impact of national ABS laws on food security and indigenous and local communities as the nurturers and preservers of biodiversity. This despite the fact that more than two decades have elapsed since the CBD recognised a country's right over its natural resources and consequently the right to determine conditions of access.

Parties to the CBD and the Nagoya Protocol seem ill-equipped to put in place a regulatory ABS regime that would staunch the leakages of their genetic resources, optimise fair and equitable benefits for them as well as their providers without at the same time creating obstacles to the millennia-old free use and exchange practices of traditional farmers and breeders, local communities and indigenous peoples which could impact adversely on food security; and marginalise the viability of the traditional knowledge system.

The papers taken together provide a comprehensive analysis of the impediments and how these may be dealt with in the context of the international legal architecture encompassing several treaties as well as existing regional arrangements. This knowledge input hopefully will pave the way for the creation of a national legal ABS framework that secures for the country, its sectoral providers and ILCs fair and equitable benefits; while advancing the country's food security and a viable traditional knowledge system.

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