ACCESS ISSUES IN FOREST GENETIC RESOURCES – EXPERIENCE IN SHARING AND EXCHANGE OF GERMPLASM IN AUSTRALIA AND THE SOUTH PACIFIC

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Introduction

The global movement of forest tree germplasm is vital to the development and maintenance of a healthy and productive forestry sector in many countries, especially those dependent on exotic tree species. This has long been recognized by forest administrators and researchers. Indeed, the progress of tree improvement programmes is closely related to the available level of genetic diversity for such programmes.

Many indigenous and exotic tree genera and species in Southeast Asia are economically or otherwise important in more than one country, and researchers may desire access to germplasm from neighbouring countries. Obvious examples include:

Indigenous species:

- Teak (*Tectona grandis*) is a major timber tree in every country where it occurs naturally (India, Myanmar and Thailand), as well as Indonesia where it is widely planted on Java.
- Neem (*Azadirachta indica*) is a multipurpose species in South and Southeast Asia.
- *Chukrasia* (including *Chukrasia tabularis* and *Chukrasia nimmonii* syn. *C. velutina*) is an important timber genus throughout South and Southeast Asia.
- Indochina rosewood (*Dalbergia cochinchinensis*) is a high-value timber species in Thailand, Cambodia, Lao PDR and Vietnam.
- Eaglewood (*Aquilaria* spp.) is an exceptionally high-value tree species in Malaysia, Indonesia, Thailand and Vietnam.

Exotic species:

- River red gum (*Eucalyptus camaldulensis*) is widely planted for timber, fuel and pulpwood in the drier zones of Asia.
- Mangium (*Acacia mangium*) has been planted on a large scale in parts of Indonesia, especially Sumatra and Kalimantan, and is also grown commercially for pulpwood and timber in Malaysia and India.

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For most of the 20th century, the international movement of tree seed was subject to minimal legal impediments and regulations, other than those related to quarantine. Today, however, there are increasing public and political pressures to regulate the movement of all kinds of germplasm. These may stem from the need to protect national assets and promote conservation, or from concerns about profiteering by unscrupulous bio-prospecting (e.g. for rubber and quinine). Historically, most tree seed has been supplied at a minimal cost, either free through donor-supported programmes or on a cost-recovery basis.

In the South Pacific, genetic materials, including tree crops, have been exchanged or transferred informally between islands since the region was first settled several thousand years ago. A well-known example is breadfruit (*Artocarpus altilis*), which has moved extensively during its domestication in the South Pacific, and has now been introduced throughout the tropical world (Ragone 1997). Because most tree germplasm exchange in the Pacific has taken place either at a customary level, or more recently between government agencies, it has not raised questions about the inappropriate exploitation of this material for commercial purposes (Whimp 1999).

A number of administrative and legal issues have arisen from increasing recognition of the importance of plant genetic resources for agriculture, forestry and medicine. These include access and benefit sharing, intellectual property rights and biotechnology[2]. In international fora, these issues have often been dealt with and discussed together, and may overlap, for example biotechnological advances in the development of plants, organs or cells cultured *in vitro*, including virus-free material. These may eliminate some of the quarantine problems associated with movement of vegetative material, and encourage wider movements of improved material.

The purpose of this paper is to review international developments and mechanisms relevant to the exchange of forest tree germplasm, and to provide examples of how such issues are being dealt with in Australia and the South Pacific. Australia is both a major user of exotic forest germplasm (e.g. *Pinus*) and a major source of forest genetic resources (e.g. *Acacia*, *Casuarina*, *Eucalyptus*, *Grevillea* and *Macadamia*), and so has a large stake in related access issues (Midgley & Boland 1998). We are also in a reasonable position to offer a bipartisan, though not disinterested, perspective on issues of access to forest genetic resources. We hope that this paper, by increasing awareness and knowledge of such issues, will contribute to and stimulate more discussion in the Asia-Pacific region.

Convention on Biological Diversity (CBD)

The CBD entered into force on 29 December 1993, 90 days after being ratified by 30 countries. The objectives of the Convention are the conservation of biodiversity, the sustainable use of genetic resources, and the fair and equitable sharing of benefits derived from this use. They also include appropriate access to genetic resources and transfer of relevant technologies, taking into account all rights over these resources and technologies, and appropriate funding.

The Convention reaffirmed the sovereign rights of countries over their natural resources, and noted that the authority to determine access to genetic resources rests with national

[2] Significant advances are being made with biotechnology of forest trees, in particular the understanding of gene actions, use of molecular markers, genetic engineering, cryopreservation and micropropagation (see Haines 1994).

governments and is subject to national laws. The provisions of the Convention encourage countries to facilitate access to genetic resources.

There is still much discussion within the Convention and in other fora about some of the principles of policy that it has established. A major concern of these discussions is to develop a common understanding on access to genetic resources, the principle of benefit sharing established by the Convention, biotechnology, intellectual property and technology transfer. These issues are complex and involve many different stakeholders.

A panel of technical experts and an open-ended intergovernmental group have been established under the Convention to help improve understanding of the principles of access and benefit sharing. The World Intellectual Property Organization has established an intergovernmental committee to focus on certain aspects of intellectual property, such as traditional knowledge, which affect access and benefit sharing.

Controversy surrounds the scope of the Convention with respect to holdings of biological material outside their natural environment. This issue is of interest to forestry researchers, because much of the research on forest species involves exchange of plant material collected before the Convention's entry into force. The Convention is gathering information on *ex situ* collections. The revised FAO International Undertaking on Plant Genetic Resources may offer guidance on these issues (see below).

By February 2001, 179 countries (out of the 189 members of the United Nations) and the European Union had ratified the Convention. Most of the countries of South and Southeast Asia have ratified the Convention, including Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka and Vietnam. Thailand has signed the Convention but not yet ratified it. Most the countries in the Oceania region have ratified the Convention, including Australia, Cook Islands, Federated States of Micronesia, Fiji, France (French Polynesia, New Caledonia and Wallis and Futuna), Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga and Vanuatu. The United States (which includes the Pacific territories of American Samoa and Guam) and Tuvalu have signed the Convention but not yet ratified it.

International Undertaking on Plant Genetic Resources (IU)

The IU was the first comprehensive international agreement to deal with plant genetic resources. It was adopted at the 1983 FAO Conference as an instrument to promote international cooperation in matters relating to access to plant genetic resources, including forest and tree genetic resources. The IU seeks to ensure that plant genetic resources of economic or social interest, particularly for agriculture, are explored, preserved, evaluated and made available for plant breeding and scientific purposes. The Undertaking is a non-binding intergovernmental agreement, adhered to by 113 countries and monitored by the FAO Commission on Genetic Resources for Food and Agriculture (CGRFA). The IU provided the basis on which international public domain collections of plant genetic resources were established for the benefit of all countries, and through which much capacity building and research and development on new plants and production systems has been undertaken. Much of the plant material is conserved in collections under the supervision of Future Harvest Centres (also know as Consultative Group on International Agricultural Research Centres).

The IU is currently being revised to make it, among other things, consistent with the CBD and to resolve issues of access to *ex situ* collections not acquired in accordance with the CBD. The current revision of the Undertaking, started in 1993, has been a complex process, occasionally hindered by differences between developed and developing countries. The history of inequity in the sharing of benefits derived from the exchange, use and development of plant genetic resources of relevance for food and agriculture, and associated mistrust, has slowed progress towards agreement on the revised Undertaking (Bragdon 2000).

Key outstanding issues include the scope of the new multilateral system, the terms of access to plant genetic resources for food and agriculture, and the fair and equitable sharing of benefits arising from the use of plant genetic resources for food and agriculture. Countries have agreed that the Undertaking should maintain a multilateral system of access and benefit sharing that meets the specific needs of agriculture. Expectations are high that the revision of the Undertaking will be completed in 2001[3]. The revised IU will be an important international instrument that reflects the significance of access and benefit sharing as the basis for continued and sustainable use of plant genetic resources for food and agriculture.

It is unlikely the revised Undertaking will include or cover directly plant genetic resources for forestry. It is likely that the coverage of the multilateral system will be limited to staple food crops and possibly forages. The coverage has not been settled but may be set out in a list. The only tree and tree-like species listed in a draft of such a list are citrus fruits, coconuts, oil palm, bananas and plantains. In addition to negotiations for the revision of the IU, a global plan of action has been agreed for the conservation and sustainable use of plant genetic resources for food and agriculture.

Although there is no equivalent in forestry to the Global Plan of Action on Plant Genetic Resources for Food and Agriculture, the Committee of Forestry has recommended that FAO convene regional forest genetic resource workshops. To date, six such workshops have been held and action plans developed (Palmberg-Lerche 2000; Hald *et al*. in these proceedings). In some cases such plans cover germplasm access issues, for example the Pacific Sub-regional Plan of Action for Conservation and Management of Forest Genetic Resources. The implementation of this plan was strongly endorsed by the Pacific Heads of Forestry in May 2000 (Anon 2000).

Intellectual Property, the World Trade Organization and the TRIPs Agreement

Intellectual property rights (IPR) may be given to creators to prevent others from using their inventions, designs or other creations for a specified time. The international significance of intellectual property grew with the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), concluded in 1994. This resulted in the establishment of an international organization to oversee trade issues (the World Trade Organization, or WTO) and the signing of a major agreement on intellectual property. The WTO deals with the rules of trade between nations, and the majority of the world's trading nations are involved in negotiating and ratifying WTO agreements. The goal of the WTO is to help producers of goods and services, exporters and importers conduct their business.

[3] [Editors' note: The revised text of the Undertaking was adopted by the FAO Conference under the International Treaty on Plant Genetic Resources for Food and Agriculture on 3 November 2001.]

The WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) is an attempt to harmonize national property rights regimes, and to bring them under common international rules. Under TRIPS, members of WTO must adopt IPR legislation covering:

- Patents (in the form specified by the Paris Convention);
- Copyright (in the form specified by the Berne Convention);
- Protection of plant varieties under either patent or *sui generis* systems such as the International Convention for the Protection of New Varieties of Plants (see below);
- Trademarks, geographic indications and designs, including integrated circuit layout designs; and
- Trade secrets (as required by the Paris Convention).

Nine countries in South and Southeast Asia (Bangladesh, Brunei Darussalam, India, Indonesia, Pakistan, Philippines, Singapore, Sri Lanka and Thailand) and three countries in the Pacific Islands region (Papua New Guinea, Fiji and Solomon Islands) are members of the WTO and are bound by the provisions of TRIPS. Developing countries that are making a transition to a market-based economy have until 2001 to comply. Least-developed countries have until 2006 to comply. The latter include the WTO members Bangladesh and Myanmar in Asia, and the Solomon Islands and Vanuatu in the Pacific. Four more least-developed countries in the Asia-Pacific region are in the process of accession to WTO, namely, Cambodia, Lao PDR, Nepal and Samoa.

Even countries with no IPR regimes are required to accept patent applications for pharmaceutical and agricultural chemical products from the beginning of the transition period, in order to preserve the novelty of the invention when patent laws are eventually put in place. The inadequacies of the TRIPS model for protecting interests in unmodified genetic resources, and the traditional knowledge of indigenous people, have been the subject of much debate (see Whimp 1999 for possible approaches to these problems).

Plant varietal rights

The TRIPS agreement requires WTO members to provide for the protection of plant varieties, either by patents or by an effective *sui generis* system (i.e. a system created specially for this purpose), or by a combination of the two. Work is underway in a number of fora to build the skills and capacity of developing countries to put in place intellectual property protection systems.

Systems of plant variety protection also exist under the International Union for the Protection of New Varieties of Plants (UPOV), which is based on the International Convention for the Protection of New Varieties of Plants. The majority of UPOV's 46 members are from developed countries, particularly Europe, but also include developing countries from the Americas and Africa. Members of the Union in the Asia-Pacific region are Australia, China, Japan and New Zealand. Many other countries in the region are developing laws to meet the requirements of UPOV.

UPOV systems of plant variety protection provide a means of promoting investment in plant variety development, as well as an opportunity to exercise limited rights in particular activities, i.e. production, reproduction, conditioning, sale, import, export and stocking. UPOV provides for uniform and clearly defined principles. To be eligible for protection, varieties must be distinct from existing, commonly known varieties. They must also be

uniform, stable and new in the sense that they have not been commercialized before certain reference dates. Authorization is not required from a rights holder to use a variety for research purposes, including the breeding of further varieties.

There is continuing debate within TRIPS of what constitutes an effective form of protection for the purpose of the plant patenting provisions. There is some confusion and linking to other issues not directly related to plant patenting. Issues sometimes raised include traditional knowledge, farmers' rights, and matters involving access and benefit sharing. Developing countries have been keen to promote their own plant breeding efforts, and to protect their diversity and the rights and interests of local communities responsible for promoting and maintaining diversity. A number of developing countries, therefore, including Bangladesh, India, Pakistan and Thailand in the Asia-Pacific region, are developing or have developed their own systems of protection to comply with the provisions of TRIPS or to meet their obligations under the CBD. These often give greater emphasis and protection to farmers' rights.

Some examples of knowledge and practices of indigenous and local communities

The experience of the Australian Tree Seed Centre (ATSC) with IPR issues in Australia concerns mainly the development of Australian acacias. The seeds of these species are traditional seasonal foods of Australian aborigines, as well as novel food crops in dry, tropical regions including Africa and India (House & Harwood 1992, Harwood *et al*. 1999). Species such as *Acacia colei* and *Acacia tumida* were introduced into several francophone countries in the Sahel by the Centre Technique Forestière Tropicale and its national partner organizations, following collections in Australia during the early 1970s (Cossalter 1986). These species were well adapted to local conditions, but were thought to have limited utility until the Société Internationale Missionnaire, a non-governmental organization working in Niger, and others became aware of their human food potential (Thomson *et al*. 1996).

The ATSC's general approach to the issue of indigenous intellectual property has been to engage and involve aboriginal land councils, corporations and communities in collecting seed and conducting field trials on community lands. Some of this work has been conducted under the Australian government's Contract Employment Programme for Aboriginals in Natural and Cultural Resource Management. Experimental, irrigated plantations of acacias have been established next to Aboriginal settlements to explore their potential for food production, as a means of controlling wind-blown irritants responsible for eye disease, and as an income-generating activity. Relevant scientific information on *Acacia*, including nutritional and toxicological studies of seed, has been published and disseminated to aboriginal communities.

Access to FGR in Australia

Australia has a complex pattern of ownership of forest and tree genetic resources involving federal (national), state and local governments, corporations, community-based groups and individuals. Each state is responsible for the policy, legal and administrative framework within which its living and non-living resources are managed. States hold property rights over native flora taken from land under public (government) ownership. However, the broader issue of resource ownership within each state remains unclear. Research seed collections of red cedar (*Toona ciliata*) from the species' natural range in eastern Australia demonstrate this complex pattern of ownership. ATSC teams assembled germplasm from trees within the jurisdiction of two states, and from land owned or managed by four government departments,

five local (municipal) governments, several aboriginal communities and more than 40 private landowners.

More recently, an inquiry into access to biological resources in Commonwealth areas commissioned by the Minister for the Environment made its report (Voumard 2000). A major recommendation of the inquiry is that new regulations should be introduced under the Environment Protection and Biodiversity Conservation Act to provide access permits and benefit-sharing contracts. These would require anyone seeking access to biological resources in Commonwealth areas to apply for an access permit from the Minister for the Environment and Heritage. Apart from the Antarctic territories, areas under Commonwealth control are fairly small but include some biologically and culturally significant sites. While the permit approval process is underway, the applicant will be required to negotiate a benefit-sharing contract with the holder or owner of the biological resource. This contract would cover commercial arrangements including up-front payments and royalties, and protection of indigenous knowledge.

The inquiry report recommends that the proposed draft contract be further developed and agreed as a national model by government, industry, indigenous organizations and other stakeholders. The state governments, which control nearly all of Australia's forested public lands, have expressed support for a nationally consistent policy on access, but progress towards this goal is likely to be slow. One outcome of the inquiry's recommendations may be to stifle interest in exploring biological resources on public lands, other than in potentially 'high-payoff' areas such as bio-prospecting for new pharmaceutical compounds.

Material Transfer Agreements (MTAs)

Australia is also a major exporter of tree germplasm. During 2000, the Australian Tree Seed Centre supplied about 3450 packets of tree seed to overseas clients (out of more than 6500 packets). The market for exports of native tree seed by private collectors and dealers is worth about US$6 million per year. Until recently, there was no formal mechanism for ensuring that Australia could gain access to information on the performance of these genetic resources once they had been planted, or to subsequent generations of germplasm.

After examining several options, CSIRO Forestry and Forest Products, through the Australian Tree Seed Centre (ATSC), adopted the concept of a Material Transfer Agreement that will accompany all consignments of Australian native tree seed (Midgley 1999) (Appendix 1). This agreement, or MTA, is a contract that governs the transfer of tangible research materials between two organizations, when the recipient intends to use them for internal research purposes, and when no research collaboration between scientists is planned. The MTA defines the rights of the provider and the recipient with respect to the materials and any derivatives.

The MTA covers access to seed for wood and non-pharmaceutical products only. It is expected that any use involving bio-prospecting for pharmaceuticals would entail further negotiation and a different agreement. It is further anticipated that the MTA will be modified in due course to accommodate emerging state policies and a nationally agreed policy on forest genetic resources consistent with a broader policy covering access to all biological resources. Some further points regarding the MTA include:

- The MTA is consistent with the spirit and content of the CBD. Most of the countries with which CSIRO regularly exchanges seed are signatories to the CBD and accept its guiding principles.

- The MTA is consistent with other similar instruments currently in use by the Future Harvest Centres.
- The MTA is based on the extensive experience of ATSC in sharing Australian forest genetic resources, and reflects the existing practice of seed recipients providing information on species' performance.
- The mutually agreed terms are reasonable and within the scope of existing practice.
- There is no provision for financial benefit sharing.
- There is no reference to actual ownership (within Australia), other than broadly to the national interest.

The MTA recognizes that Australia is both a user (mainly exotic pines) and a provider (eucalypts, acacias, casuarinas) of forest genetic resources, and can offer a bipartisan view on factors influencing the effective exchange of seed, cuttings, pollen and other forms of genetic material. Exotic tree species will continue to play a vital part in Australia's national plantation programmes, and international exchange of forest genetic resources is fundamental to breeding and sustained production.

In implementing the MTA, the Australian Tree Seed Centre has to bear in mind its obligations to the many and diverse owners of the germplasm it collects and distributes. It is expected that the ATSC will continue to collate and disseminate information and assist in any repatriation of germplasm on behalf of the owners of Australia's forest genetic resources. The resources to do this will need to be negotiated.

The main identified shortcomings of the MTA are:

- It is available only in English. Future MTAs may provide information in other languages to aid comprehension.
- It operates in a similar fashion to agreements used for computer software. By opening the packet and using the seed, the recipient agrees to the terms of the MTA. If the MTA is separated from the seed at some point in the distribution chain, for example by customs or quarantine officials, the end user may not be aware of the terms governing the use of the seed.
- Disputes arising from perceived or actual divergence from the MTA will be difficult to resolve should any problems arise in future.

We have only a short history of experience with our MTA. In 2000, 130 overseas consignments were accompanied by the MTA. These included 51 organizations and individuals in 14 Asian countries. By using the seed, all recipients have accepted the terms of the MTA and informal feedback has been encouraging. At this early stage, we have encountered no difficulties in using the MTA, but we have no evidence of additional voluntary feedback on seedlot performance.

SPRIG Code of Conduct

SPRIG is an AusAID-funded project which aims to help countries in the region to better conserve and develop their own, often shared, tree genetic resources. As in other tropical regions, Pacific Island nations are concerned about the equitable sharing of benefits from research and development of their forest germplasm. And, again as in other regions, the most contentious group of plant species in the South Pacific from an IPR perspective are those that have (or may have) pharmacological uses, such as kava (*Piper methysticum*), nonu (*Morinda citrifolia*) and manonu (*Tarenna sambucina*). There is also some reticence about sharing

germplasm of indigenous fruit and nut tree species, especially selected or improved varieties, that is thought locally to have commercial potential.

Regional attitudes in the Pacific to access to genetic resources are reflected in the SPRIG Code of Conduct for sharing tree germplasm (Appendix 2). The approach adopted towards this Code in the first phase of SPRIG was to discuss the issue openly at regional project coordinating committee meetings, and to seek appropriate advice. In general, the Heads of Forestry of Pacific Island nations recognized that sharing forest tree germplasm with others in the region was not particularly contentious, especially within the bounds of a collaborative project with obvious national benefits. They also observed that government officials in other ministries, less familiar with the history and mutual benefits of sharing of tree germplasm, may not share this view, and that some ground rules for exchanging tree germplasm were needed. A major problem faced by SPRIG was that most Pacific countries did not have appropriate post-CBD access regimes. Furthermore, most Heads of Forestry were reluctant to sign any legally binding post-CBD agreement without approval from a higher bureaucratic level. The prevailing belief was that a legal approach would undermine the goodwill created by the discussions and threaten the desired outcome.

As a way of addressing these issues, the SPRIG partners developed a Code of Conduct detailing the expected obligations of each partner in relation to seed exchange and subsequent development. Although the Code is non-binding, its moral force is expected to ensure respect for germplasm sovereign rights to species that become more valuable as a result of collaborative research work in SPRIG. The Code has facilitated the exchange of several hundred seedlots and individuals of potentially valuable species. All participating countries have both contributed and received germplasm (Table 1).

Table 1. *Examples of species for which germplasm was exchanged during Phase 1 of SPRIG*

Species	Source	Recipient
Endospermum medullosum (whitewood)	Vanuatu	Australia, Samoa
Flueggea flexuosa (mamafua)	Solomon Islands	Fiji, Samoa
Pterocarpus indicus (Pacific rosewood)	Vanuatu	Solomon Islands
Santalum album (sandalwood)	Australia	Tonga
Santalum austrocaledonicum (sandalwood)	Vanuatu	Australia
Santalum yasi (yasi, ahi, sandalwood)	Fiji	Tonga, Australia
Swietenia macrophylla (big-leaf mahogany)	Fiji	Vanuatu, Samoa
Terminalia richii (malili)	Samoa	Australia, Niue
Toona ciliata (red cedar)	Australia	Tonga, Fiji, Samoa

We experienced no difficulties with the Code of Conduct during Phase 1 of SPRIG. Early in second phase of SPRIG (2001–2006), the Code of Conduct will be extended from the current eight partners (see Appendix 1) to other members of the Pacific Community. The agreement allows for the testing of shared materials and, should elite material be discovered, it is anticipated that bilateral agreements with source countries will be developed.

IPGRI and APAFRI have recently proposed the idea of an Asia-Pacific Forest Genetic Resources Network (J. Koskela pers. comm.). If such a network is established, an important task will be to develop an appropriate agreement or Code of Conduct, consistent with national legislation and the CBD, that will allow Asian countries to continue exchanging forest tree germplasm.

Recognizing and rewarding indigenous tree domestication in the Pacific

Domestication of indigenous trees, and how to recognize and reward those involved, is a pertinent subject in the South Pacific for several reasons. First, some parts of the Pacific, especially Melanesia, have a long history of tree-based agriculture or arboriculture, and farmers have a long tradition of selecting and improving trees with edible components, particularly nut trees (Yen 1996). Second, the majority of land in Pacific island nations is under private or communal ownership, with only limited areas under public ownership. Accordingly, conservation of unique tree germplasm will most likely be undertaken in the private sector, as has been the case historically.

Under Phase 1 of SPRIG, seed of superior germplasm of multipurpose nut and fruit trees, for example *Canarium* and *Terminalia catappa*, was collected in Vanuatu (Evans 1999a, 1999b). This material has been used in local plantings for evaluation, gene conservation and seed production, and may also be used in future breeding work. A key issue to consider is how best to reward tree farmers for making such materials available. A first step may involve documentation, recognition and acknowledgement of suppliers, whether individuals or whole communities, of particular germplasm. Subsequently, superior cultivars may be named to reflect their origins. A key incentive may be to offer farmers or villagers priority access to the seed or other propagation materials from field plantings, and to later breeding programmes. Participants and suppliers in such programmes would benefit from a wider array of selected and improved material, and the reduced likelihood that any of their selections would be lost inadvertently.

These approaches would be effective for species used within communities at subsistence or semi-commercial levels. With regard to international exchange of any materials, especially for larger-scale commercial production, we emphasize that it will be the responsibility of national governments to develop appropriate access and benefit-sharing regimes, where appropriate including regimes for tree farmers' rights.

Lessons learned and conclusions

Some key observations and lessons concerning the sharing of tree germplasm in the Asia-Pacific region are as follows:

- The international exchange of forest genetic resources has been characterized by a considerable amount of goodwill. This provides an excellent basis for progress in developing access regimes. Tree germplasm is still being widely shared within the forestry research community and forest industry in Asia and the Pacific, despite growing concerns about 'losing' valuable tree germplasm to potential competitors, e.g. golden teak from Thailand.

- It is now generally recognized that tree improvement will be more efficient if breeders have access to the full geographic and genetic range of a species. Most commercially important tree species occur in more than one country, and efficient research and development of any species will entail exchange of germplasm (both unimproved and improved) and information between nations.

- A need exists for countries in the region to develop access regimes and mechanisms for sharing tree germplasm that are consistent with the CBD. This has proved to be a slow process and, in some cases, governments appear unsure of how to proceed. Many

are looking for guidance, including relevant model access regimes that they could adopt.

- There is currently no equivalent in forestry to the revised, agriculture-oriented International Undertaking on Plant Genetic Resources. The development of any multilateral access regime for forest genetic resources in the Asia-Pacific region will require wide consultation and concurrence both within and between countries. This will take many years to achieve. For the time being, a Code of Conduct, such as that developed by SPRIG, may be able to strengthen goodwill and allow continued exchange of forest tree germplasm. An early task of the proposed APAFRI/IPGRI regional network for forest genetic resources would be to develop a similar code to facilitate movement of tree germplasm between network members.

- Any Code of Conduct should be easily comprehensible to all parties. Codes are non-binding, but can frame expectations and build trust among partners.

- MTAs are a reasonably straightforward method of ensuring feedback or information on the performance of supplied germplasm. A number of working MTA models now exist, including that developed by ATSC, which may be adapted by donors and suppliers of tree germplasm.

- We advocate the development and wider application of non-binding mechanisms for tree germplasm exchange, such as Codes of Conduct and MTAs, until such time as more formal and binding access regimes can be instituted. We anticipate that these will be a useful precursor to legal measures.

Lastly, it is evident that those working on forest genetic resources must stay up-to-date with issues of access to genetic resources, including participation in national debates, and prepare themselves for greater levels of governmental control and legal procedures.

Acknowledgements

We would like to thank Dr Mikael Hirsch and Mr Tim Vercoe (CSIRO), and Dr Bill Aalbersberg (University of the South Pacific), for reviewing and commenting on a draft of this paper.

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Appendix 1. *Material Transfer Agreement (MTA) for tree germplasm supplied by the Australian Tree Seed Centre, CSIRO Forestry and Forest Products*

1. CSIRO's Australian Tree Seed Centre collects and maintains germplasm and information on Australia's flora for the benefit of Australians. The Centre conducts research, or assists others to conduct research, which adds to collective knowledge of the performance and utility of Australian forest genetic resources.
2. Australia has signed and ratified the Convention on Biological Diversity and pursuant to this Convention, the Australian Tree Seed Centre is committed to "*the fair and equitable sharing of benefits arising out of the utilization of genetic resources*" as well as facilitating access to genetic resources under Australian ownership on "*mutually agreed terms*".
3. Use of the germplasm in this consignment from CSIRO ("Material") is subject to this Material Transfer Agreement. The terms, obligations and acknowledgements of the Agreement itemized below apply once the Recipient removes the Material from its packaging.
4. The Recipient acknowledges that CSIRO provides the Material to the Recipient solely for the purposes of growing and testing for wood and non-pharmaceutical products.
5. It is mutually agreed that the Recipient will:
   a) Acknowledge the origin of the Material in all published and distributed information;
   b) allow CSIRO access to assessment data and information on the characterization procedures and performance of the Material;
   c) allow CSIRO access, for research purposes, to germplasm samples from plants grown from Material included in this consignment;
   d) take reasonable steps to ensure that these conditions are met in any subsequent deployment of the Material; and
   e) use the Material at its own risk.
6. Nothing in this Agreement affects existing proprietary intellectual property rights in respect of the Material.

Please direct any inquiries about this Agreement to:

Officer in Charge
Australian Tree Seed Centre
CSIRO Forestry and Forest Products
PO Box E4008, Kingston ACT 2604
AUSTRALIA

Appendix 2. *SPRIG Code of Conduct.*

CODE OF CODUCT FOR SHARING TREE GERMPLASM WITHIN THE SOUTH PACIFIC REGIONAL INITIATIVE ON FOREST GENETIC RESOURCES (SPRIG)

Preamble

The South Pacific Regional Initiative on Forest Genetic Resources (SPRIG) is an AusAID-funded regional project involving government forestry organizations in Australia, Fiji, Tonga, Vanuatu, Samoa and Solomon Islands. The three Australian members of the project are CSIRO Forestry and Forest Products, Queensland Forest Research Institute and FORTECH. The project commenced on 1 December 1996 with a duration of three years. Solomon Islands was included in SPRIG on 1 July 1998. SPRIG is a development assistance project seeking to benefit the lives and environment of Pacific Island peoples.

Part of the project will involve the collection and field testing of tree germplasm in the five SPRIG countries and Australia. The field testing will involve the reciprocal exchange of germplasm amongst all SPRIG partners.

Plant genetic resources in Pacific Island Countries are protected under the jurisdiction of each country. Plant genetic resources in Australia are commonly accepted to be under the jurisdiction of the state governments. This Code recognizes the overall objectives of the Convention of Biological Diversity (CBD) in regard to access and equitable benefit sharing but also recognizes that few countries in the region have implemented formal germplasm access regimes consistent with the CBD. For these reasons it is considered more appropriate to adopt a mutually agreed Code of Conduct based on goodwill to be followed by each project partner.

Under this Code of Conduct SPRIG partners agree that:-

A. Tree germplasm collected and supplied under SPRIG is for research and demonstration purposes only and remains the property of each contributing partner, and

B. The distribution of material to non-SPRIG parties and/or the commercial development of non-indigenous material within country by signatories to this agreement, will require additional negotiation with the SPRIG party who originally supplied the germplasm.

Species covered by this Code of Conduct

Species planned for collection and testing in Australia, Fiji, Tonga, Vanuatu, Samoa and Solomon Islands are shown in Appendixes [see below]. Tree species in the Appendixes were determined at the first meeting of the SPRIG Coordinating Committee meeting in Nadi, Fiji, 2–4 December 1996 and in consultation with officials from the Forestry Division of the Government of Solomon Islands. The agreement should be interpreted to cover all these species plus any other tree species collected during the course of the project.

Scope of the Code of Conduct

This Code of Conduct is to be agreed by the partners in SPRIG who are as follows-

a) CSIRO Forestry and Forest Products
b) Queensland Forest Research Institute (QFRI)
c) FORTECH
d) Forestry Department, Fiji
e) Forestry Division, Ministry of Agriculture and Forestry, Tonga
f) Department of Forests, Vanuatu
g) Forestry Division, Ministry of Agriculture, Forestry, Fisheries and Meteorology, Samoa
h) Forestry Division, Ministry of Forests, Environment and Conservation, Solomon Islands

Duration of Code of Conduct

This Code of Conduct will last for the life of the material collected and distributed.

Code of Conduct for Collectors

Collections of germplasm will follow the FAO (Food and Agriculture Organization of the United Nations) Code of Conduct for tree germplasm collectors.

Transfer of tree germplasm amongst SPRIG partners

Tree germplasm constitutes genetic materials such as seed, pollen, vegetative cuttings, herbarium material and DNA. Plant quarantine guidelines will be strictly followed for all countries. The CSIRO Australian Tree Seed Centre, which is a designated plant quarantine centre, will be a temporary storage facility for collected germplasm. Collected herbarium voucher specimens would normally be lodged in an in-country herbarium, if present, and duplicates sent to the regional herbarium, University of the South Pacific, in Suva, Fiji. This follows normal international protocols for safe storage of such material.

Signed:

Appendixes: Target tree species covered by Code of Conduct.

Australia	**Fiji**	**Samoa**
Santalum spp.	*Agathis macrophylla*	*Calophyllum neo-ebudicum*
Toona ciliata	*Barringtonia* spp.	*Casuarina equisetifolia*
	Cordia subcordata	*Eucalyptus tereticornis*
	Dacrydium spp.	*Flueggea flexuosa*
	Endospermum macrophyllum	*Intsia bijuga*
	Intsia bijuga	*Planchonella torricelensis*
	Pometia pinnata	*Pometia pinnata*
	Pterocarpus indicus	*Swietenia macrophylla*
	Santalum yasi	*Syzygium* spp.
	Swietenia macrophylla	*Tectona grandis*
	Terminalia spp.	*Terminalia calamansanay*
		Terminalia richii
		Toona ciliata

Solomon Islands	Tonga	Vanuatu
Burckella obovata	*Aglaia saltatorum*	*Agathis* spp.
Calophyllum peekelii	*Artocarpus* spp.	*Canarium* spp.
Cordia subcordata	*Atuna racemosa*	*Dysoxylum* spp.
Dillenia salomonensis	*Bischofia javanica*	*Elaeocarpus spirucus*
Diospyros hebecarpa	*Cordia subcordata*	*Endospermum medullosum*
Flueggea flexuosa	*Diospyros major*	*Garuga floribunda*
Gmelina moluccana	*Inocarpus fagifer*	*Intsia bijuga*
Intsia bijuga	*Pometia pinnata*	*Pterocarpus indicus*
Octomeles moluccana	*Santalum yasi*	*Santalum austrocaledonicum*
Palaquium spp.	*Spondias dulcis*	*Swietenia macrophylla*
Paraserianthes falcataria	*Syzygium malaccense*	*Syzygium* spp.
Pometia pinnata	*Syzygium neurocalyx*	*Terminalia* spp.
Pterocarpus indicus	*Toona ciliata*	
Vitex cofassus		