行政院及所屬各機關出國報告

（出國類別:考察）

瓜地馬拉木材及傢俱產業協助計畫師資培訓

服務機關：行政院農業委員會林業試驗所

出國人職稱：研究員

姓　　名：唐讓雷

出國地區：瓜地馬拉

出國期間：92 年 8 月 9 日～92 年 8 月 15 日

報告日期：92 年 9 月 28 日

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報告名稱：瓜地馬拉木材及傢俱產業協助計畫師資培訓

主辦機關：行政院農業委員會林業試驗所

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關鍵詞： 樹木生長，林木速生，造林木利用

內容摘要：本次任務源起於國際發展合作基金會稍早提出之報告，報告涉及協助中美洲建立中小型企業之評估以及後續執行工作計畫，因此，擬出木材及傢俱產業技術協助綱領，以瓜地馬拉共和國種子師資培訓為重點，同時依該國相關人員要求擬定主題舉辦林業研討會。

目　　次

一、 前言:

為應國際發展合作基金會以及財團法人中華民國職業訓練研究發展中心之邀，而於民國 92 年 8 月 9 日至 92 年 8 月 15 日，以公假獲准赴友邦瓜地馬拉共和國，協助辦理瓜地馬拉之木材及傢俱產業技術協助計畫項目中之種子師資培訓及森林經營管理研討會，並擔任講師，主講介紹台灣林產工業發展之經驗，一般常見使用木質材料以及林產工業對林業資源之發展重要性等議題，同時參與討論該國提出之問題。

由我國駐瓜地馬拉共和國人員之安排，此次得以圓滿達成學術交流及涉外事務之任務，更進一步有機會接觸中美洲地區之林業從業人員，增廣見聞，收集資料，亦是難得之一次機會，與與會人員之問題與意見交換，可增加互相間之瞭解。

二、 行程：

日期	行程地點	工作內容
92 年 08 月 09 日	台北→瓜地馬拉	搭機赴目的地。
92 年 08 月 10 日	瓜地馬拉	拜會我國駐地相關人士。
92 年 08 月 11 日~ 92 年 08 月 13 日	瓜地馬拉	協助辦理研討會與會議之相關活動事宜等。
92 年 08 月 14 日~ 92 年 08 月 15 日	瓜地馬拉→台北	搭機返台行程。

三、 參加會議內容

與瓜地馬拉共和國合作之有關機構協商，而有如下表之議程，會議在瓜地馬拉之訓練中心舉行。

Seminar on Development and Administration of Forest Resources
Table of Events

Monday, August 11th

13:00 - 14:00	Registration of participants	
14:00 - 14:05	Welcome Words	Ledvia.Berganza - Manager del INTECAP
14:05 - 14:10	Offering words	Luis Ernesto Barrera Garavito - Manager del INAB
14:10 - 14:15	Words from H. E. The Ambassador of the Republic of China, Taiwan	Francisco Ou
14:15 - 14:25	Event' s Inaugural Words	Carlos Sett Oliva Minister of Agriculture
14:30-15:15	*Pannel Discussion on:* *1. SWOT of Guatemalan Forest and Wooden Furniture Industry and the Technical Assistance Program Provided by the R.O.C. Taiwan* *2. Guatemalan Forest Policy*	All Taiwanese Speakers Julio López National Forest Institute - INAB-
15:20 - 16:00	*Taiwanese Experience in Woods Management-Experience Sharing*	Dr. Tang, Jung-Lei Research Scientist, Taiwan Forestry Research Institute
16:05-16:25	Q & A	
16:25-16:45	Recess	
16:45-17:25	*Over developing in Timber Industry- What is at stake at Indonesian Forests?*	Lu, Chi-Kwan National Park Forest Administration Agency
17:25-17:45	Q & A	

Tuesday, August 12th

9:00 - 9:40	*An Operation Model of a Single Timber Industry*	Lu, Chi-Kwan Natural Resources Management
9:40 - 10:00	Q & A	
10:00 - 10:20	Recess	
10:20 - 11:00	*Frequently Used Wooden Materials*	Dr. Tang, Jung-Lei Research Scientist, Taiwan Forestry Research Institute
11:00 - 11:20	Q & A	
11:20 - 14:00	Recess	
14:00 - 14:40	*Development of Ecotourism based on the integration of forests and Mayan civilization*	Lu, Chi-Kwan Natural Resources Administration, MD
14:40 - 15:00	Q & A	
15:00 - 15:20	Recess	
15:20 - 16:00	*How the wooden furniture industry is supported by the forests*	Dr. Tang, Jung-Lei Research Scientist, Taiwan Forestry Research Institute
16:00 - 16:20	Q & A	

藉由協助辦理計畫之需要，亦特別拜會我國駐瓜地馬拉共和國大使及參事等，國際發展合作基金會駐中美洲顧問等，及瓜地馬拉共和國林業局長官及其林業專家、訓練中心主任與協助人員、工業商業部門官員及副部長等，討論協助瓜地馬拉計畫有關事項，繼續合作發展之方案。

四、參加會議心得：

本次任務源起於國際發展合作基金會稍早提出之報告，報告涉及協助中美洲建立中小型企業之評估以及後續執行工作計畫，因此，擬出木材及傢俱產業技術協助綱領，由瓜地馬拉共和國種子師資培訓為重點，同時依該國相關人員要求擬定主題舉辦林業研討會。

研討會在瓜地馬拉共和國首府之訓練中心演講廳舉行，由於先前之溝通得宜，該國之重視，與會人員積極，約二百餘人參與，發言踴躍，討論熱絡。

●總體而言，瓜地馬拉共和國之森林資源有下列優劣點：

（一）優點：

1. 森林資源豐富，約近500萬公頃林地。
2. 可見多種適合木材及傢俱用途之樹種。
3. 林地適合樹木生長，林木速生，有利造林。
4. 永續經營政策正確。
5. 北美地區與市場臨近。
6. 加勒比海地區屬北美關稅優惠區。

（二）劣點：

1. 缺少專業管理人才。
2. 缺少資金而政府之經營不力。
3. 前述因而衍生出計畫規模不夠，而加重成本效率問題。
4. 巴西等國與東南亞地區之競爭，影響其發展。
5. 國內惡質競爭，削弱共同發展。

●瓜地馬拉共和國之木材與傢俱工業，亦有下列之發展優劣點：

（一）優點：

1. 大部份為中，小及微型企業型態，而僵化之問題小，易於調適。

2. 瓜地馬拉具有豐富木材資源。

3. 一般企業經營者能認定特定產品，以求發展，走向專精化之觀念。

（二）劣點：

1. 材料資源之管理，分級利用觀念需建立。

2. 天然乾燥方法及處理問題多。

3. 加強結構設計與其相關之專業訓練。

4. 工廠內之管理及空間配置，理念及經驗需累積。

5. 有些許市場觀念之問題，成本及物料管理。

6. 需輔助增加產品展售機會及場所，同時收集市場資料。

7. 製造問題待解決，以及增值觀念。

8. 政府有關政策與方向之不定因素，需克服。

五、建議事項

國際關係之發展，互惠是一重要基礎，瓜地馬拉共和國重視林產工業之發展，對我國而言，同樣亦是一項有利機會，對此，建議如下：

1. 繼續專業人員交流機會，藉以獲取必需資料，為我國開拓中美洲林產品市場及林產資源開發之基礎。

2. 瓜地馬拉共和國林地廣闊，也有相當的人力資源，是具備有發展林產及傢俱工業之條件，人才之培養，素質之提高，係為首要，我國之駐外人員等，洞悉問題，採取適當之行動，執行種子師資培訓計畫等，甚為切題。然後續方案之擬定，有待各方深思熟慮，誠然，傢俱等林產工業發展是有其深源之影響，其間，涉及多種材料，週邊設備，木工等機械，市場測試融入等等，我國藉此計畫在此方面，自有其利基之掌握。

附錄：Outline on the related topics of presentation:

FOREST PRODUCTS INDUSTRY IN TAIWAN

by

(TAIWAN FORESTRY RESEARCH INSTITUTE)

The development on forest products in Taiwan may possibly be categorized into five stages for the last few decades. Earlier between 1954 and 1963, mostly small factories began learning to manufacture sawn lumber and hardwood plywood. Little or no knowledge was available then and the effort was made on improving manufacturing equipments and experience. The outline paragraphs are to list the emphasized features of each of the following four periods:

From 1964 to 1973

* Rapid development on hardwood plywood
* Manufacturing equipment modernization
* Quality improvement on human resources

From 1974 to 1983

* Oil crisis worldwide
* Export down and slow production in general
* Gradually shifting on furniture manufacturing, fancy plywood and wood composition board
* Focus on fast growing wood and wood working machines

From 1984 to 1989

* Fast growing on furniture and home furnishing manufacturing and trade
* Moving hardwood plywood manufacturing facilities toward southeast Asian locations
* Sharpening the skill on industrial management and personnel
* Research and development on production line efficiency

From 1990 to present

* Emphasis on wood materials of man-made forest, wood composites,

etc.

* Sustainable management on wood industry
* More concern on environmental impart
* More economical cooperation with surrounding territories
* Wood products importing to replace exporting gradually

Commonly Used Wood Materials
by
Taiwan Forestry Research Institute

Raw materials needed for Taiwan wood processing plants come mainly from abroad and from almost every corner of the world. This makes the identification of wood species difficult, often resulting in uncertainties as to the nature and identity of the received wood and its processing quality. When that happens, proper use of wood at right place is impossible and the wood resources would be mostly wasted. This articles focus on the introduction of some important commercial wood species for industrial uses from major regions of wood supply worldwide.

1. Indigenous species (Taiwan)

(1) *Chamaecyparis obtusa var. formosana* (Cupressaceae)

Formosan hinoki false-cypress, Taiwan yellow cypress.

(2) *Chamaecyparis formosensis* (Cupressaceae)
Formosan red false-cypress, Taiwan red cypress.

(3) *Libocedrus formosana* (Cupressaceae)
Taiwan incense cedar

(4) *Cunninghamia lanceolata var. konishii* (Taxodiaceae).

Formosan China-fir

(5) *Taiwania cryptomerioides* (Taxodiaceae).

Taiwania

(6) *Michelia compressa* (Magnoliaceae)
Formosan michelia

(7) *Cinnamomum camphora* (Lauraceae)
Camphor tree

(8) *Cinnamomum micranthum* (Lauraceae)

Stout camphor tree

(9) *Machilus kusanoi* (Lauraceae)

Large-leaved machilus

(10) *Machilus thunbergii* (Lauraceae)

Common machilus

(11) *Machilus zuihoensis* (Lauraceae)

Incense machilus

(12) *Sassafras randaiense* (Lauraceae)

Taiwan sassafras

(13) *Acacia confusa* (Leguminosae)

Taiwan acacia

(14) *Alnus formosana* (Betulaceae)

Formosan alder

(15) *Zelkova serrata* (Ulmaceae)

Taiwan zelkova

(16) *Bischofia javanica* (Euphorbiaceae)

Autumn maple tree

(17) *Schima superba* (Theaceae)

Chinese guger-tree

(18) *Fraxinus formosana* (Oleaceae)

Formosan ash

(19) *Melia azedarach* (Meliaceeae)

China-berry tree

(20) *Castanopsis uraiana* (Fagaceae)

Urai tanoak

2. South-east Asia area

(1) *Agathis spp.* (Araucariaceae)

Kauri

(2) *Afzelia xylocarpa* (leguminosae)

Makamong

(3) *Anisoptera spp.* (Dipterocarpaceae)

Mersawa

(4) *Cassia siamea* (Leguminosae)

Kilet

(5) *Celtis spp. (Ulmaceae)*

Celtis

(6) *Dalbergia spp. (Leguminosae)*

Rosewood

(7) *Diospyros spp. (Ebenaceae)*

Ebony

(8) *Dracontomelum spp. (Anacardiaceae)*

Dao

(9) *Durio spp. (Bombacaceae)*

Durian

(10) *Dyera costualta (Apocynacea)*

Jelutong

(11) *Endospermum malaccense* (Euphorbiaceae)

Sesendok

(12) *Eusideroxylon zwageri* (Lauraceae)

Belian

(13) *Fagraea spp.* (Potaliaceae)

Tembesu

(14) *Gonystylus spp.* (Gonystylaceae)

Ramin

(15) *Gluta spp.* (Anacardiaceae)

Rengas

(16) *Heritiera spp.* (Sterculiaceae)

Mengkulang

(17) *Hevea brasiiensis* (Euphorbiaceae)

Rubberwood

(18) *Homalium spp.* (Flacourtiaceae)

Malas

(19) *Intsia bijuga* (Leguminosae)

Merbau

(20) *Koompassia malaccensis* (Leguminosae)

Kempas

3. North America area

(1) *Acer rubrum* (Aceraceae)

Red maple、Soft maple

(2) *Acer saccharum* (Aceraceae)

Sugar maple、Hard maple

(3) *Alnus rubra* (Betulaceae)
Red alder
(4) *Betula alleghaniensis* (Betulaceae)
Yellow birch
(5) *Betula nigra* (Betulaceae)
River birch
(6) *Carpinus caroliniana* (Carpinaceae)
American hornbeam
(7) *Carya ovata* (Juglandaceae)
Shagbark hickory
(8) *Carya illinoensis* (Juglandaceae)
Pecan
(9) *Castanea dentate* (Fagaceae)
American chestnut
(10) *Catalpa speciosa* (Bignoniaceae)
Catalpa
(11) *Celtis spp.* (Ulmaceae)
Hackberry
(12) *Fagus grandifolia* (Fagaceae)
American beech
(13) *Fraxinus americana* (Oleaceae)
White ash
(14) *Fraxinus pennsylvanica* (Oleaceae)
Green ash
(15) *Gleditsia triacanthos* (Leguminosae)
Honeylocust
(16) *Gymnocladus dioicus* (Leguminosae)
Kentucky coffeetree
(17) *Juglans cinera* (Juglandaceae)
Betturnet
(18) *Juglans nigra* (Juglandaceae)
Black walnut
(19) *Libocedrus decurrens* (Cupressaceae)
Incense cedar
(20) *Liquidambar styraciflua* (Hamamelidaceae)
Sweet gum
(21) *Liriodendron tulipifera* (Magnoliaceae)
Yellow poplar

(22) *Picea engelmanii* (Pinaceae)
Engelmann spruce
(23) *Picea sitchensis* (Pinaceae)
Sitka spruce
(24) *Pinus contorta* (Pinaceae)
Lodgepole pine
(25) *Pinus Ponderosa* (Pinaceae)
Poderosa pine
(26) *Prunus serotina* (Rosaceae)
Black cherry
(27) *Quercus rubra* (Fagaceae)
Northern red oak
(28) *Quercus alba* (Fagaceae)
White oak
(29) *Ulmus americana* (Ulmaceae)
American elm
(30) *Umbellularia californica* (Lauraceae)
California-laurel

There are a number of wood composites that are commercially important being used with solid wood nowadays in a wood processing plant. Particleboards including medium density fiberboard(MDF), oriented strand board(OSB), and hardboard are quite common to be seen in making furniture, home furnishing, construction, etc. Plywood including blockboard has been, and still is, widely used, however. Laminated wood is another group of alternatives for using solid wood in a place where a demand for high stress is essential. These laminated products, i.e., laminated beam, parallel laminated strand lumber (PSL), Laminated veneer lumber (LVL), laminated veneer board (LVB) can be engineering designed to meet a specified requirement.
The addition of more polymeric materials in wood composites is becoming a trend currently in the area of research and development. Some success has been made and a few commercial products, classified as wood plastic composites (WPC), are being used outdoors, such as outdoor furniture, boardwalk materials, etc. in a resort area, due to their high durability to weathering. In fact, if we look back the component of wood, we may readily note that wood itself is composed of mainly polymers. In this connection, wood is considered as an element to a

composite and a host of wood based composition materials is yet to be development.

Important Relationship Between Wood Industry and Forest Management

by
Taiwan Forestry Research Institute

As a result of its large coverage, occupying one-third of the total land areas on earth, forest is a very important part of the global ecosystem. Forest, environment, and people (being neglected sometimes) have become an issue as to which one of the three is more important than the others lately. In fact, in considering the ecosystem, people, environment, and forest are inseparable and should be unbiased. The problem occurs because population growth results in the increase in wood material demand and demand for forest to protect the environment. It seemed to be contradictory to each other. In the meantime, however, it is considered to be an unprecedented challenge for both forest and forest industry managements. Are we facing a dilemma that we choice lowering living standard by using less wood or conserving less forest? The answer is unlikely yes as we strive for more efficient technologies. This includes the energy saving improvement in many aspects.

We must admit that in the past, industrial development did not care enough about being wasteful. The concept of cutting down waste, energy consumption, pollutants, etc. is becoming increasingly important. Wood needs less energy to produce, process, etc. as compared to a number of the other materials. It is a renewable and biological material and is evident that wood provides people with a healthier living condition. The use of wood would cut down the consumption on the other environmentally unfriendly materials. More importantly, the emphasis on proper use of wood would likely stimulate the forest management.

1. Background information on forest resource and forest industry worldwide:
   a. Boreal zone and temperate developed zone have large forest coverage areas,

b. Tropical zones are high on both forestland areas and population.
c. Industrialized area has also high forest coverage.

2. Forest product flow:
   a. Tropical zone produces a large quantity of wood and so does temperate,
   b. Tropical zone also produces a high proportion of firewood,
   c. Most softwood is produced in both temperate and boreal zones, while hardwood in tropical zone.
3. Much more forest product trade activity is in the temperate zone.

More discussion on sustainable development is underway worldwide, in which sustainable management on both forest resource and forest products industry is badly needed. The use of plantation wood is increasing in proportion so as to compromise the demand for environment conservation and economical development. Value-added concept on forest product is a task to pursuit in the near future for forest product industry. Furthermore, life cycle assessment (LCA) for a product becomes gradually popular a future perspective to be studied. An international standard is being discussed. This involves the assessment on the life cycle of a product as related to the environment. A lot of effects on forest product is expected, which, in turns, affects forest resource management.