Issue 4 • Jan - Jun 2010
ISSN No. 1985-4951

INTROPica

INSTITUTE OF TROPICAL FORESTRY AND FOREST PRODUCTS

Centre of R&D in Tropical Biocomposite and Forest Canopy Management

SUSTAINABILITY OF FOREST MANAGEMENT

From The Director's Table

Assoc. Prof. Dr. Paridah Md Tahir

Bismillahhirrahmanirrahim..

May I take this opportunity to thank all the readers of INTROPica for keeping in touch with the latest activities at the Institute of Tropical Forestry and Forest Products (INTROP), Universiti Putra Malaysia. My heartiest gratitude to all the staff who have been very hardworking and committed in ensuring the success of all the activities that have been conducted throughout 2009, as well as, meeting the KPIs that INTROP is striving for. In the latest RU audit for 2009, the TNC (P&I) office has acknowledged our achievements in all components i.e., publications, research grants, graduate students, consultancies, to be outstanding. Indeed, we have done well.

The need to inform on activities in academic research laboratories is important. Thus INTROPica will be the mouth piece of INTROP, linking it to the rest of the nation and also the world. From 2010, this bulletin will be published biannually, featuring more scientific articles and research findings, as well as, other activities with Government Ministries and Agencies, private sectors and community. This first 2010 issue will focus on "Sustainable Forest Management", another research area covered under INTROP, which is also in line with the Institute's theme *"Green Innovations for Sustainable Future"*.

INTROP is not going to rest on its laurels for there is much more that need to be done and must be done to heighten the reputation of INTROP as one of the leaders In Tropical Forest Canopy Management and Biocomposite Technology. Some of the new strategies are to promote "innovations" amongst the staff and students, and to increase networking with private companies and international bodies through R&D programmes and post graduate studies. Please visit our website www.introp.upm.edu.my to find out more about our events and latest research updates. We would be happy to hear from you.

Message From The Editor

Prof. Mohd Basri Hamzah

Sustainable forest management has been the basis of Malaysian forest management ever since the advent of the Malayan Uniform System (MUS) in the 1950's. Forest, as a living and growing resource, is naturally sustainable as ensured by Provenance. However, under man's innovative management, its sustainability can be influenced to a certain extent through expediting regeneration and growth, prescribing species composition and directing forest stand development towards serving his economic needs as well as those of the environment. The regeneration process, which transforms seedlings to canopy giants, through an epic struggle in the light gap, is nature's paramount way to ensure sustainability in the Dipterocarp forest - the iconic forest formation in the Nusantara (see Box 1, page 9, for details). Modern forest management basically works within the regeneration process. The MUS operated on the 'Sustained Yield' Principle which ensured sustainability by not harvesting timber more than the forest's capacity to renew it, within a cutting cycle which coincided with the natural 60-year growth cycle of most Dipterocarps. Its successor, the Selective Management System (SMS), similarly ensures timber sustainability but within a sophisticated conservative management designed to minimise damage to stand and environment in the more fragile Hill Dipterocarp Forests (HDF) where nearly all the forest reserves are now located in the Peninsula. The system is bicyclic with two cutting cycles of 25-30 years within its growth cycle. The SMS, developed by the Forestry Department Peninsular Malaysia, is intimately based on the Sustainable Forest Management (SFM) principle. Environmental conservation is ensured through Reduced Impact Logging (RIL) and effective monitoring according to our own certification process, the Malaysian Criteria and Indicator (MC&I), formulated by the Malaysian Timber Certification Council (MTCC) based on global standards. To date all state forests are under certification which in itself is a measure of good forest management and practice. Among its peers, Malaysian forest management is well regarded given its long-entrenched sustainable tradition and capacity to move with changing times. Our forests are sustainable and are forever.

INTROP: Research Updates

UTILISATION OF FOUR-YEAR OLD RUBBERWOOD (*Hevea brasiliensis*) RRIM 2000 CLONE AND OIL PALM (*Elaeis guineensis Jacq.*) EMPTY FRUIT BUNCH IN MEDIUM DENSITY FIBREBOARD MANUFACTURE

BY
HARMAEN AHMAD SAFFIAN
December 2009

Chairman: Assoc. Prof. Dr. Jalaluddin Harun
Institute: Institute of Tropical Forestry and Forest Products

The introduction of new rubber tree RRIM 2000 series clone by Malaysia Rubber Board (MRB) has created new issues of the performance of this new rubberwood in the MDF manufacture. The rubber trees under RRIM 2000 series clone usually have high wood volume, clear and straight trunk and at same time produced high latex yield. One of the 2000 series is RRIM 2020 clone. This clone comprises rubber tree clone that have potential for the both high timber and latex production. This clone has relatively better growth performance with good growth form than rubber tree from Prang Besar (PB), RRIM 600 and 900 series and shorter rotation of 12 to 15 years.

Basic properties, fibre morphology and chemical analysis of the rubber tree RRIM 2020 clone were taken at different part of tree height (top, middle and bottom).

The study revealed that moisture content and density shown significant at P <0.05. PB260 clone is expected to have higher specific gravity (0.612), which is strongly influenced by the development of fibre with thicker cell wall and longer fibre length. The morphology properties of wood for all planting densities were comparable to those of commercial PB260. Amongst all planting density rubberwood planted at 2000 trees/ha gave to longest fibre length i.e 1.2 mm. The cell wall thickness reduced markedly as planting density increased from 500 to 1000 trees/ha. However, lower planting density shows thicker fibre diameter and lumen at the bottom part of tree.

In this study chemical analysis from young tree rubberwood showed the percentages of extractive free wood, hot water, holocellulose, alpha-cellulose, lignin and ash to be lower compared to mature rubberwood (PB260) above 25 years old. All 4-year old new rubberwood clones have higher holocellulose content than clone PB260. All the rubberwood RRIM 2020 is relatively more resistant towards acid compared to control (PB260). Similar all the young rubberwood are relatively more stable in alkali. There are no apparent different in buffer capacity of RRIM 2020 planted at different density

In this study MDF from PB260 are stronger and stiffer thus provides the better performance to produced MDF. The superior performance by the matured rubberwood (PB260) is expected since it has longer fibre length (1.3 mm) than that of young rubberwood which is 1.1 mm. Medium density fibreboard from planting density 500 trees/ha met the requirements set for Type 30 board in JIS A 5905/2003 specification while MDF from 1000 and 1500 trees/ha only showed Type 25. The higher mean value of the IB met minimum requirement of Type 30. Since wood from both PB260 and 500 trees/ha have relatively thicker cell wall (small lumen), more water can be absorbed to swell the wood.

Analyses of variances were conducted to determine the varieties in physical and mechanical properties and dimensional stability between ratio of admixture rubberwood and empty fruit bunches fibres blends. The interaction was at P < 0.05% confidence level. Homogenous MDF made from 100%RW shows higher value of MOR (30.72 MPa) compared to homogenous MDF made from 100%EFB fibre with 21.04 MPa. A board made from 100%RW showed higher strength because RW fibre length is longer (1.2 mm) and cell wall thickness is (0.24 um) compared to 100%EFB the fibre length is 0.89 mm, cell wall thickness is 0.11 um and fibre lumen is 0.22 um. MDF from 100%RW fibres was significantly better than board 100%EFB fibres.

MDF made from admixtures of oil palm frond and rubberwood fibre showed that the resulted board containing less than 50% substitution produced by EFB fibre exhibited good physical and mechanical properties. The 100%RW board gives higher IB (0.53 MPa) compared to that of 100%EFB (0.40 MPa).

As the amount of EFB the IB of the admixture board was decreased proportionally. Due to the shorter fibre length of EFB, there was larger surface area to be covered by resin. In this study, the range of thickness swelling range from 14.77% to 15.63%. The highest thickness swelling was obtained by 70%RW and 30%EFB board and the lowest value was from 50%RW and 50%EFB board. On the other hand, TS from 50%RW and 50%EFB showed that lower (14.03%) compared to others admixture board.

The lower water absorption obtained from 100%EFB which fibre EFB more prevent the absorption of water because which have content much extractives and oil.

Profile

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INTROP: Research Updates

PRODUCTION OF POLYURETHANE FROM LIQUEFIED KENAF (*Hibiscus cannabinus* L.) CORE FOR WOOD LAMINATING ADHESIVE

BY
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March 2009

Chairman: Assoc. Prof. Paridah Md. Tahir, PhD
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Kenaf is one of the several fibre crops that have been identified as potential source of natural long fibres. The only economical way to use this plant is to extract the long fibres from the bast and used it for fibre reinforced plastic composites to replace glass fibre which are known to be environmental unfriendly. Once the basts have been separated from the stem, the inner, soft and woody section – also known as kenaf core (KC) – can be used for other applications such as biochemicals, due to high amount of holocellulose content and low lignin content. Some of the chemicals that can be derived from KC include polyols, carboxymethyl cellulose, and cellulose esters.

This study was carried out to produce polyurethane (PU) adhesive from liquefied kenaf core (LKC) polyols by reacting it with toluene-2,4-diisocyanate (TDI). The liquefaction of KC powder was conducted in the presence of polyethylene glycol (PEG) 1000 and sulfuric acid as a catalyst. The optimum reaction condition (i.e., temperature and time) for producing polyol from KC was determined based on the percentage of reaction residues. Lower reaction residues indicate more KC powder being liquefied in the solvent system. The extent of liquefaction in various mixtures of PEG 1000 and glycerol was also analysed. It was found that the percent residue of KC decrease with an increase of liquefaction temperature up to 180°C and time of up to 90 minutes. When the liquefaction reaction was maintained for 120 minutes, the amount of residue, however, increased quite significantly. This increment can be associated with the formation of recondensation of the LKC components as by-product of the reaction. The percent residue of unliquefied KC was found to be relatively lower when the glycerol:PEG ratio was increased from 1:17 to 3:15 suggesting a more complete liquefaction of KC has taken place. At glycerol:PEG ratio of 5:13, however, the amount of residue was slightly increased suggesting recondensation of the lignin during liquefaction process. Hence, it is important to liquefy the KC before the recondensation point was reached.

The PU adhesive was successfully synthesized using polyols from LKC. The LKC polyurethane (LKCPU) adhesive has a molecular weight (MW) of 2,666, viscosity of 5,370 cps, and solids content of 86.9%. In gluing study, the shear strength of the bonded rubberwood with LKCPU adhesive shows an average of 2.9 MPa. No wood failure was observed on the sheared specimens, showing that the adhesive strength is

weaker than wood. The thick LKCPU mixture was relatively difficult to be spreaded onto the wood surface so much so reduced the penetration into the wood. Thus, coupled with the uneven pressure during clamping caused the adhesive to fail upon loading. The formation of air bubbles through liberation of carbon dioxide during curing process resulted in weak cohesive strength of the adhesive as can obviously seen on the sheared specimens. Nonetheless, based on the properties of the LKCPU produced in this work, it has great potential as wood laminating adhesive particularly for edge-gluing.

Profile

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INTROP: Essay

Forest Sustainability IN MALAYSIA

INTRODUCTION

Forest sustainability was not invented by man but forged by the Almighty over geological period in the immensely complex processes we now call the laws of nature. Barring tectonic shifts in the evolutionary process and irreversible catastrophic events in the history of the planet, the forest ecosystem at any one time has remained sustainable. The Nusantara region has for over 130 million years enjoyed a relatively stable tropical climate which enables uninterrupted evolution of the great Dipterocarp Forest Formation in all its glory and unmatched biological diversity. No other region on earth has experienced this long stretch of environmental stability, which has spawned the myriad assemblage of species bequeathing Malaysia as one of the twelve mega biodiversity centres on earth.

We will look into how the sustainability process work in nature and how modern man through his management tools strive to maintain and enhance forest sustainability to meet his management objectives in the context of Malaysian forestry. At the outset too the concept of resource sustainability and its crucial link with resource safety will firstly be addressed.

CONCEPT

In its essence forest resource sustainability simply means that what is taken out from the forest stand (say, Xm^3 volume of timber) must be replaceable. The process of ensuring this is what we call sustainable forest management (SFM for short). The concept can be further expended to include other forest products, beyond the usual timber, both tangible and intangible such as water and recreation. And environmental sustainability may be widened to embrace both physical and social dimensions. In a more wholistic definition the ITTO (International Tropical Timber Organization) defines SFM as: *The process of managing forest to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment.*

RESOURCE SECURITY

Forest resource security is conditional to and implicit in sustainability. If forests are easily encroached by man, as with illegal logging or conversion to subsistent farming, with inadequate or non-existent laws and regulations to curb such practices, the forest will eventually disappear and species becoming extinct.

Malaysian forests are fortunate to be very well protected with over twenty relevant documents to safeguard her resources, floral and faunal diversity, environment, the wellbeing of forest workers and forest-dependent local communities. For these we have the National Policy on Biological Diversity (1998), National Forest Policy (1978), National Forestry Act (1984), National Parks Act (1980), Environmental Quality Act

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(1974), Protection of Wildlife Act (1972), Aboriginal Peoples Act (1954) and Occupational Safety and Health Act (1994) to mention some of the more important ones.

FOREST SUSTAINABILITY PRACTICE IN MALAYSIA

Pre-modern forest exploitation

Forest sustainability is the essence of the ecosystem's long-term survival which evolved over geological epochs in a relatively stable climate and environment. The advent of man in the Nusantara imposed values on forest resources and the beginning of exploitation. However, pre-modern societies had negligible impact on the forest environment upon which they derived practically all the essentials for existence and culture. We can still find traces of this ancient influence, not unimportantly, in our pantun imageries, dance choreography, batik art, sculptures, enriched vocabulary, roots of wisdom, philosophy and spirituality, and shamanistic religion (still being practiced by indigenous tribes). The low-impact exploitation, from mostly sparse population density, probably did not dent the sustainable capacity of forest ecosystems. Forests appear not systematically managed during our medieval period of history. At least, there was no written record of conscious management left by the forefathers.

Modern forest management

Modern forest management in the country came with British occupation, at the dawn of the twentieth century, introduced originally from Indian practice with some tempering via Burmese experience. The generic regeneration system adopted was the tropicalised version of the temperate (European) shelterwood system where the overstorey timber is removed after regeneration is established in the understory, often through management. In the tropics, the seedlings and saplings were generally already naturally established and consequently these were termed 'advanced regeneration'. In the decades before the Second World War, forest management was basically in its infancy and exploitation was quite limited in scale with logging mainly low-impact and animal (buffalo) powered. The earliest recorded systematic management, the RIF (Regeneration Improvement Felling), did not explicitly adopt sustainability as a management concept but its focus on stand improvement after harvesting unconsciously points in the same direction.

The Malayan Uniform System (MUS)

The first real adoption of the sustainable principle was the implementation of the MUS shortly after the war in the fifties. Indeed, it was with the acceptance of the 'Sustained

Yield' principle underlying the MUS when sustainability was designatedly practiced in our forest management. As the name implies, timber yield under the MUS was ensured not to exceed the capacity of the forest to replace itself over a rotation period of 60 years; which means that if you remove X m3 of commercial timber at year one, then the logged residual stand is expected to replace the extracted volume within 60 years.

The concept was well and good for commercial three species but not for overall stand tree biodiversity. Non-commercial species, a much longer list, were eliminated down to 5cm diameter, through cutting and girdling, in post-felling treatment in order to drastically promote the commercial component. Great wastage characterizes the MUS in addition to great impact on the residual stand since more volume (hence more trees) were harvested.

The high-waste MUS which was hitherto practiced in the more accessible lowland Dipterocarp forest (LDF) became untenable when most of the forests gave way to massive land conversion of the great rural development programme of the 70's to uplift rural poverty. In consequence, the main production base shifted almost overnight to the hill Dipterocarp forests (HDF) where practically most of the country's FMUs are now located.

The Selective Management System (SMS)

The MUS, a monocyclic 60-year system was later replaced by the SMS a bicyclic system with a 25-30 year cutting cycle. The change greatly increases sustainability particularly in terms of biodiversity. Unlike the MUS, non-commercial species are not removed after logging thus maintaining a high degree of tree biodiversity. There is however an element of intended bias in the SMS when Dipterocarp species are promoted

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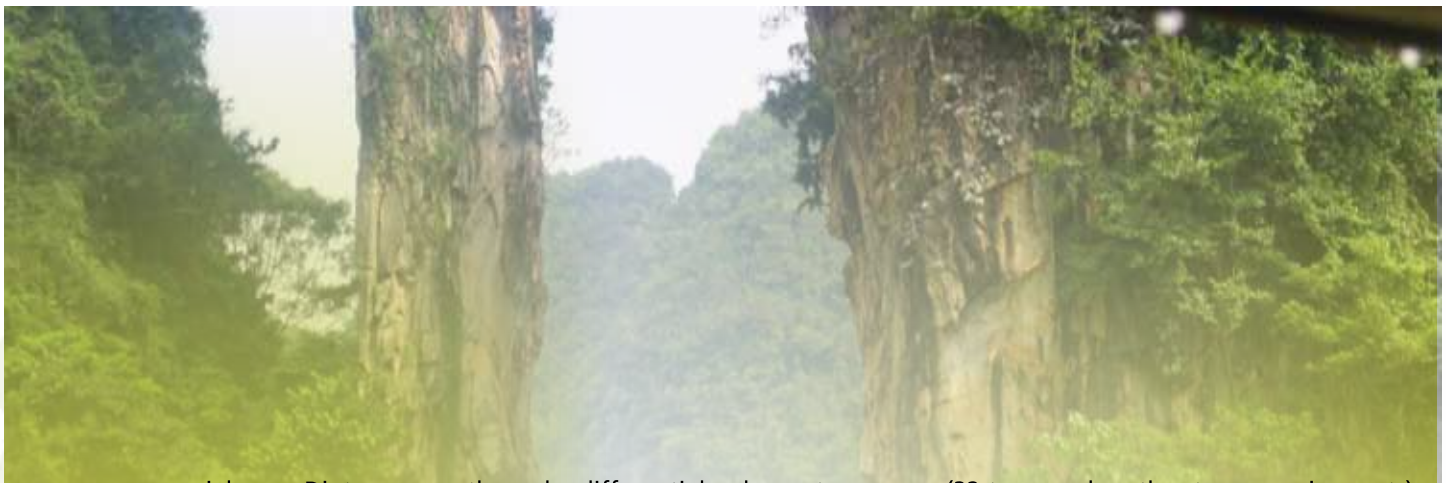

over commercial non-Dipterocarps through differential cutting girth limit that is designed to eventually shift the Dipterocarp/Non-Dipterocarp ratio, in quantitative terms and over several cutting cycles, in favour of the latter group. The species composition is however still maintained.

Most of the post-harvest treatments under SMS are designed to augment natural sustainability particularly in assisting and expediting the forest regeneration process which is the core of any management system. The pre-harvest inventory ensures that the volume extracted per unit area is sustainable through the system of tree marking to regulate felling. More importantly is the '32-tree' rule that ensures the regenerative capacity of the residual stand is not impeded. There must be at least 32 trees per hactre of commercial species above 30cm diameter, or its equivalent, for retention before the stand can be designated for harvesting. This capacity is further enhanced by the requirement of leaving four healthy commercial species per hectare, well-spaced and of bearing age, to serve as mother trees in the residual stand.

Just in case nature may default on this crucial role, the SMS resorts to artificial 'enrichment planting' of residual stands found deficient in regeneration following a post-harvest inventory. This literally means that the SMS carries a double insurance policy to ensure the forest stand is effectively regenerated following harvesting. To preserve species composition, only locally occurring species are planted. The costly treatment is increasingly not observed since the pre-harvest measures (32-trees and mother trees requirements) appear sufficient to ensure adequate regeneration.

Fact 1

Sustainable forestry practices can ease the pressure on our forests. The Collins Almanor forest in California contained 1.5 billion board feet of standing timber when harvesting began in 1941. Sixty years and 2 billion board feet later, this sustainably managed forest still holds 1.5 billion board feet of standing timber, and supports great blue heron rookeries, black bears, rubber boas and bald eagles.

Source: http//ecoearth.info/

Reduced Impact Logging (RIL)

It is when RIL was introduced and incorporated into the SMS that Malaysian forest management made a quantum leap in forest sustainability. As the name implies RIL are measures to minimize harvesting damages to the residual stand through observing a set of rules to maximize ecosystem integrity and expedite post-harvest recovery. Roading and road construction is kept minimal and its density closely controlled to reduce stand destruction, soil disturbance and erosion. A system of bridges, side drainage, culverts, silt traps and river buffers ensures surface erosion of exposed soil is minimized and silt loads reduced in river waters.

Directional felling of tagged trees is carefully controlled in order to minimize damage to residual stands. Wildlife supporting trees, for food source and shelter, including lianas, are preserved and excluded from felling and cutting. In all, RIL ensures that the regenerative capacity of the post-harvest stand, hence the health and sustainability of the forest ecosystem, including its floral and faunal diversity, are minimally affected by the harvesting process. And given this intended effect, the regenerative capacity of the residual stand is enhanced further when combined with post-harvest silvicultural treatments prescribed under the SMS.

Forest Certification, the MC&I

Malaysia is a leader in forest certification in the tropics and a pioneer, among very few countries, in having her own certification scheme, the MC&I (Malaysian Criteria and Indicators). Forest certification is the apex of forest sustainability and usually attempted to when forest management standards in the country have attained fairly high level which is of global recognition. International schemes, such as the FSC (Forest Stewards Council) are usually used as benchmarks in forest management just as the ISO is the internationally recognized standards for high quality management. The MC&I, evolved under the stewardship of the MTCC (the Malaysian Timber Certification Council, the responsible government agency) has incorporated the latest standards which are branded as the MC&I (2002) based on FSC principles. The scheme has been successfully applied to all FMUs (Forest Management Units) in the country.

Certification ensures the safety, health, integrity and sustainability of the exploited forests while simultaneously

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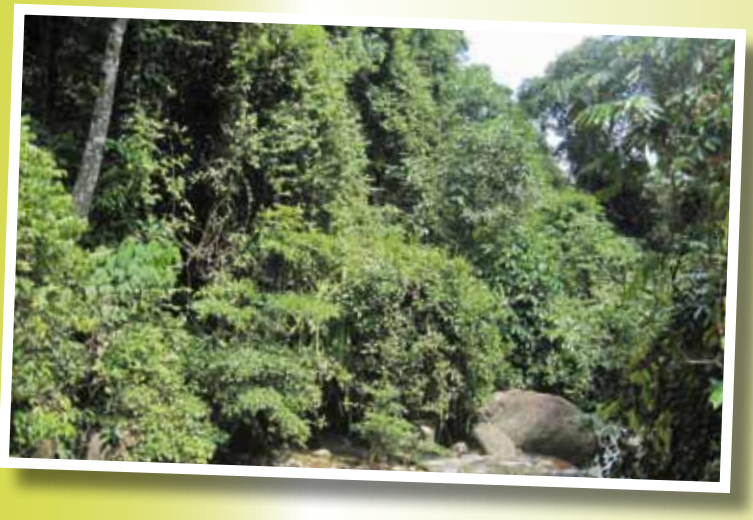
ensuring that the rights of local communities, dependent on and affected by forest activities, and also that of forest workers, are observed and not disadvantaged by forest operations. The approach is wholistic covering the physical environment together with its social and economic components. The main incentive is market penetration of selective markets, particularly in the west, which place high premiums on imported wood-based products originating from certified and hence sustainable production forests.



It is important to note that such volume manipulation between species groups is only practiced in the production forest designate for timber exploitation. The National Forestry Act, 1984 (Amendment 1993) ensures another ten (10) other function categories for permanent forest reserves are collectively devoted to conservation and protection. The Act also empowers state authorities to formulate rules and regulations for the multiple use of the FMUs including for conservation and protection of plant life, wildlife and water production and for objects of interest either geological, archeological, historical, ethnological, scientific, scenic or aesthetic.

High Conservation Value Forest (HCVF)

The MC&I (2002) gives prominence to HCVF as stated in Principle 9 which states that "Management activities in high conservation value forests shall maintain or enhance the attributes which define such forests. Decisions regarding high conservation value forests shall always be considered in the context of a precautionary approach.

Undoubtedly the concept is important and designed to preserve forest-based species, sites and even certain cultural practices from extinction, the antithesis of sustainability. We should however at the same time not be mesmerised by this new label and be overawed by its apparent novelty. Forest managers should recognise that the spirit of HCVF in Malaysian forest management exists as early as the MUS decade. Its Sustained Yield concept, and later the haloed Sustainable Forest Management (SFM) concept underlying the SMS, the RIL and the host of post-harvest treatments, plus the high resource security imbued in the voluminous forest and forest-related policy, laws and regulations are all essentially instruments to forge sustainability, the core of HCVF. We have in fact been practicing sustainability decades before a high sounding label was attached to it which indeed reminds me of the down-to-earth saying, kicap lama, botol baru (old sauce, new bottle).

HCVF is an important instrument in conservation and preservation, which inculcates the needed sense of urgency in a planetary environmental termoil seemingly on the verge of self-destruction; no dispute on this, period. This urgency is however more felt in developing economies addicted to resource squandering or in post-industrial ones, with hangover guilt complex of similar past sins. Fortunately, we are not in either category. Although we should be guided by HCVF in conserving our forest-based assets into the future, our forest managers should however remain mindful that, in the context of Malaysian forest management, and in its evolution, resource sustainability has always been at its core. HCVF should thus wisely be perceived in its proper perspective and never as novelty.

THE FUTURE

Forest resource security and sustainability should continue to be the guiding beacon of forest management in the future. The stakes and negative implication to our future economy, indeed our environmental safety and quality of life, are just too high if we do otherwise.

Let me illustrate this point; not many years ago, Selangor state earned about RM30 million from timber revenue but RM300 million in water consumption coming from forest water catchments. In Larut Matang, on the mangrove-protected coast of Perak, revenue from traditionally produced charcoal and mangrove poles for piling, is pittance compared with the hundreds of million ringgit earned from the coastal fishing industry. These golden eggs as it were, will vaporise overnight, if you kill the goose, the forest ecosystem that produce them.

In the same vein, it also makes sense to preserve and sustain forest biodiversity. Beyond its heritage value, which we should rightly be proud of, biotechnology, no doubt with active

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contribution from UPM scientists, will unlock a multibillion ringgit industry from its vast inventory of chemicals and drugs still trapped in the forest ecosystem, nurtured and readied as it were in a 130 million-year evolution. Such immense largesse from Providence is indeed humbling and our kesyukuran (thankfulness) here is in order.

Despite the high visibility of timber production, future forest vales will mainly derive from non-timber, often intangible and elusive. It is difficult to tag a value to forest-inspired quality of life, sense of wellness and happiness. The cultural traits and identity inherited from our forest-conditioned forefathers are in fact priceless. Economists are beginning to put values to the benign and protective role of forests such as flood mitigation, soil conservation and fertility, slope stability, coastline protection, carbon sequestration and climate stabilisation. Our law and policy makers should appreciate such largesse given by Providence. On this operating scale forest revenue from timber production can be considered insignificant and immeasurably asymmetrical to the immense but hidden value accruing through landscape security and protection.

Box 1: The Forest Regeneration Process

Every piece of forest has a capacity to renew itself if disturbed or damaged, quite analogous to the human skin's ability to heal its wound. The normal of disturbance occurring under natural condition is the uprooting of a forest giant, a long-lived dominant in the uppermost storey, thus creating a forest gap and incurring some damage to neighbouring trees and vegetation. The surrounding soil is seldom disturbed aside from the uprooting.

Far from an anticlimax, the demise of the giant is actually the beginning of a very important process in the dynamics of the forest, its regeneration which ensures its ultimate and long-term survival. The crown opening immediately and drastically changes the microclimate at the floor of the gap creating a condition conducive to the growth of regeneration (seedlings and saplings) already present under the shadows of the fallen giant. This feature of 'regeneration-in-waiting' is typical of the Dipterocarp formation. Without the opening, and particularly the attendant increase of light intensity on the forest floor, the regeneration will eventually perish to be replenished during the next seeding period, the iconic and unpredictable large-scale 'mast flowering' of the Dipterocarps, which occurs anytime within a two to ten-year cycle. The forest gap regeneration is the normative process of forest renewal in the Dipterocarp formation. The growing space thus created is slowly 'filled up' by growing and competing seedlings in a classic 'survival of the fittest' dynamics over a 60-year succession period until eventually the surviving and emerging successor replaces the long-gone fallen giant. The forest stand at its developmental peak, the climax stage, is literally a mosaic of regeneration gaps at various stages of succession, but mostly in the maturing stage, in an ecological condition that can be described as a dynamic equilibrium.

In catastrophic natural events, such as in mass windthrows under typhoon-scale storms, or massive landslips on mountain or hill slopes, or forceful flooding and mudflows in upper riverine valleys, the destruction can be total wholesale tree felling with considerable vegetation and soil disturbance. The healing process will entail a long-drawn succession period exceeding a century before the climax stage is restored. In extreme cases, the succession gets deflected for a much longer period with long dominance of secondary vegetation we call the belukar, but the succession process will eventually restore the climax stand and overall sustainability of the forest.

The Devine Providence we call nature has evolved the sustainable capacity of the forest through its healing processes of regeneration and succession to deal with disturbances at all scales, from the commonly recurring crown gap openings to the rare catastrophic events.

The end of a forest giant is mainly due to windblow, the immediate cause, which usually occurs following a long-drawn deterioration process of structural weakening due to fungal decay or termite infestation of its foundation, i.e. its root and basal stem. Healthy trees seldom topple over unless under unusually forceful wind storm.

Profile

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Quiz 1

What type of supermarket bag is more ecofriendly, paper or plastic?

a) Paper
b) Plastic
c) Either is fine
d) None of the above

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INTROP: Biocomposite Corner

INVIGORATING BIOCOMPOSITE SECTOR THROUGH USING OIL PALM AND KENAF BIOMASS TO ELEVIATE THE TIMBER SUPPLY CRISIS IN MALAYSIA

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The biocomposite industry in Malaysia has shown tremendous transformation since its introduction early 1990's. With the issue of depleting timber supply, the biocomposite sector seems to be the preferred alternative solution to eleviate the timber shortage issue. Since biocomposite industry requires not only timber as its raw material, other commodities such as Oil Palm and Kenaf have also been considered as alternatives for reliable raw material sources. On this note, it is important to encourage the biocomposite industry to use both crops as the main raw materials. The issues of shortage of timber supply could thus be significantly minimized while contributing to the national wealth.

Oil Palm residue as new fibre sources

The Malaysian oil palm industry produces 11.9 million tones of oil along with a staggering amount of oil palm biomass of about 90 million tones. From that volume, 40 million tones are in the form of oil palm fronds (OPF), empty fruit bunches (EFB) and oil palm trunk (OPT) while the remaining 50 million tonnes were from palm oil mill effluent (POME), stems, shells and roots (Anis et al. 2003). Over 90% of EFB can be converted into fibre material compared with 25% and 50% respectively from OPT and OPF (Thole and Hora, 2003). The abundantly available EFB has opened a wider potential of fibre source for the biocomposite industry in Malaysia. This was clearly indicated by Kamaruddin et al. (1997), that the supply of oil palm residues, including trunk, fronds and EFB were expected to increase exponentially until the year 2020. EFB offers the best potential for raw materials by in lieu of its low production cost and availability. This would be more than sufficient in sustaining the supply of wood-based industry. Although the EFB fibre is considered inferior in quality to that of trunk and frond, pre treatment could enhance its properties to the required standards. Many studies have been done to investigate potential use of oil palm biomass as material for manufacturing of biocomposites products. A number of biocomposite products have shown bright prospects to be commercially produced using oil palm biomass such as plywood, medium density fibreboard (MDF), particleboard and fibre-reinforced plastic composites (FRPC). As mentioned by Anis et al., (2007), if all the available biomass is fully exploited, the oil palm industry has the potential to develop into RM20 billion a year.

Kenaf as new alternative crop for fibre source

One of the setbacks in forest management practice in Malaysia is the long rotation period. For instance, Sarawak is managing the forests following a selection system under the "sustained yield" concept that requires harvesting on rotational basis of 25-year cycles. Based on the types of forest, the cutting cycle varies, e.g., for Dipterocarp Forest, it is 30-55 years, for Peat Swamp Forest, it is 40-60 years, and for Mangrove Forest, the cycle is 20-30 years. In contrast, kenaf can be harvested between four or five months after planting. It can grow 3 to 5 times faster than poplar, and up to 3 times faster than reed and bamboo. Kenaf production yields are favorable when compared to wood. An average of 17.8 tonne per hectare (ha) per annum (a) can be achieved with kenaf, compared to 2.2 tonne/ha/a for tree fibre. Over the period 1997 – 2001, the global average for yield of kenaf is about 1.2 tonnes dry fibre/ha. Average yields obtained by different countries are: Indonesia 1.4tonne/ha, Thailand 1.6tonne/ha and India 1.7tonne/ha. The potential yield of kenaf as obtained in experimental fields with improved cultivars, is 3-5 tonnes dry fibre/ha. Seed yields of 1-1.5tonne/ha can be obtained from late-sown kenaf plots. The experimental plots at the National Kenaf and Tabacco Noard (NKTB) have shown that to be economical, the yield of kenaf stem (moisture content 15-20%) should reach 15-20tonne/ha. Due to the limited wood resources available, kenaf plants have the potential to make a significant contribution to the supply of raw material for

INTROP: Biocomposite Corner

biocomposite sectors in Malaysia.

Efforts on promoting Oil Palm and Kenaf as major fibre sources for biocomposite and wood-based industries in Malaysia

The utilization of oil palm biomass as fibre sources for industry need no further introduction since continuous effort has been made for more than 20 years. The Malaysian Palm Oil Board (MPOB) is the lead agency appointed by the government to support the well being of the oil palm industry in Malaysia. In contrast kenaf is a newly introduced crop in the national agenda under the Ninth Malaysian Plan which commenced in 2006. The National Kenaf and Tobacco Board (formerly known as National Tobacco Board) was appointed as lead agency. Together with MARDI and UPM, among the pioneer agencies with experience in Kenaf R&D, the implementation of Kenaf agenda is designed to be integrated effort involving related agencies from the government and industry sectors. The development of kenaf industry in the county will focus on the primary objective to promote it as an economically attractive new industrial crop for farmers, particularly smallholders. Being a fast growing crop, kenaf has great potential as Malaysia's future industrial crop which can help in uplifting rural income. Recognizing the potential, the Government allocated RM2 million for kenaf research under the Seventh Malaysia Plan (1996-2000) and another RM3.2 million for the same purpose under the Eight Malaysia Plan (2001-2005). The effort was intensified in the Ninth Malaysian Plan (2006-2010) as reflected by another RM20 million being approved for top-down kenaf R&D in upstream (planting and agronomy), downstream (processing and product development) and marketing activities. Since the year 2000, the Malaysian Government has allocated RM48.8 million (USD15.25 million) to accelerate kenaf-based activities, both in upstream and downstream sectors. In the initial stage, 450ha of land had been planted with kenaf, yielding 10-15 tonnes fibre/ha (two crops a year) in a joint project between Matsushita Electric Works and Mieco Chipboard in Kuantan for the production of kenaf oriented boards for flooring. Currently, the NKTB has allocated 1,250ha of land to be planted with kenaf.

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Profile

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INTROP: Highlight

ECOTOURISM: DIMENSION OF SUSTAINABILITY

DR. ZAITON SAMDIN

Ecotourism often involves small-scale tourism oriented to natural areas, wildlife, and traditional culture. In general, ecotourism contributes to rural economies in addition to maintaining land in its natural state. There are many definitions of ecotourism. It is typically defined as travel to destinations where the flora, fauna and cultural heritage are the primary attractions. It is, however, defined in various ways by different groups of people with different agendas. At its simplest, ecotourism can be described as interpretative tourism, where conservation, understanding and appreciation of the environment and cultures visited is sought.

Ecotourism is a subset of nature-based tourism (Beaumont, 2001). The Ecotourism Association of Australia (1992) defined ecotourism as 'ecologically sustainable tourism that fosters environmental and cultural understanding, appreciation and conservation'. The International Union for the Conservation of Nature and Natural Resources (IUCN) has provided the definition of ecotourism and this definition has adopted by many countries which is stated as:

environmentally responsible travel and visitation to relatively undisturbed natural areas, in order to enjoy and appreciate nature (and any accompanying cultural features – both past and present) that promotes conservation, has low visitor impact and provides the beneficially active socio-economic involvement of local populations. (Ceballos-Lascurain [1996]).

Wearing and Neil (1999) identified four fundamental elements in defining ecotourism. The first element was the notion of movement or travel from one location to another. In other words, as ecotourism's emphasis is on experiencing natural areas, travel should be restricted to protected and undisturbed natural areas. Filion et al. (1994) have defined ecotourism as a form of tourism which allows tourists to enjoy and appreciate nature. In order to sustain ecotourism, its relationship to natural resources must be identified. Ecotourism is closely related to the resources on which it ultimately depends.

The next element is nature-based. Commonwealth Department of Tourism (1994:17) defines ecotourism as 'nature-based tourism that involves education and interpretation of the natural environment and is managed to be ecologically sustainable'. According to this definition, one of the components of ecotourism is that it is nature-based, besides being environmentally-educative and sustainably-managed. The third element is conservation. Blangy and Wood (1993:32) have defined ecotourism as 'Responsible travel to natural areas that conserves the environment and sustains the well-being of local people'. Under the terms of this definition, ecotourism will encourage ecotourism by bringing an appropriate return to the local community and encouraging the conservation of resources in the long term. The final element is the educative role. Wight (1994) notes that the educational principle in ecotourism should involve all parties, including local communities, governmental and non-governmental organisations, industries and tourists.

Ecotourism is closely related to the concept of sustainable tourism; has the potential to provide a sustainable approach to development in such destinations as national parks and protected areas. Inskeep (1991) added that ecotourism balances economic benefits and a reduction in environmental stress factors, and so fits in with the conditions for sustainable tourism. Most researchers have identified one of the criteria of ecotourism as sustainability. Fennell (1999:43) asserted:

Ecotourism is a sustainable form of natural resource-based tourism that focuses primarily on experiencing and learning about nature, and which is ethically managed to be low-impact, non-consumptive, and locally oriented (control, benefits, and scale). It typically occurs in natural areas, and

Fact 2

Recycling two glass bottles saves enough energy to boil water for five cups of tea.

source: http://www.stepin.org/index.php?id=eb_learning

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should contribute to the conservation or preservation of such areas.

Sustainability has become a catch-phrase and the use of the word has attracted various groups and individuals. Sustainability comes from the verb 'sustain,' which means to hold up, to bear, to support, to provide for, to maintain, to sanction, to keep going, to keep up, to prolong, to support the life of. Mowforth and Munt (1998:22) stated that sustainability is 'a word that is defined, interpreted and imagined differently between individuals, organisations and social groups'. They added that essentially, sustainability is related with two basic concepts: concern for the environment and natural resources. Harris and Leiper (1995: xix) further asserted sustainability as 'the existence of ecological and social conditions necessary to support human life at a certain level of well-being through future generations'.

According to Butler (1998) ecotourism, when linked to sustainable development, can be interpreted as relating to economic sustainability, ecological sustainability, the long-term viability of tourism, and accepting tourism as part of an overall strategy for sustainable development and biodiversity conservation in protected areas. Blamey (2001) finds that two principles of sustainability are commonly highlighted in ecotourism: namely support for local economies and support of conservation. Several authors, such as Dowling (1998) and the Ecotourism Association of Australia (1992) emphasise the sustainable component in the definition of ecotourism. To achieve ecotourism and sustainable development at the same time, there is a need for an effective development plan for natural ecosystems, cultural resources and protected areas. Proper management, conservation and resource maintenance is a vital element in the viability and long-term sustainability of ecotourism.

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Profile

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INTROP: Highlight

FOREST CONSERVATION FOR CLIMATE CHANGES: FROM LEGISLATION TO CLEAN DEVELOPMENT MECHANISM (CDM) POTENTIAL OF FOREST PLANTATIONS IN MALAYSIA

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ABSTRACT

It is generally believed that deforestation will drive climate change. Malaysia has also suffered from the reduction of its forest reserve in previous years. Various legislations were promulgated over the years by the government to strengthen the management and utilization of forests. The Kyoto Protocol provides for the involvement of developing countries, including Malaysia, in an atmospheric greenhouse gas reduction regime under its Clean Development Mechanism (CDM). This mechanism allows Malaysia to host projects aimed at reducing greenhouse gas emissions through forestry activities. Forest plantation projects are now undertaken by local companies with incentives and supports given by Malaysia government.

Keywords: Climate, change, forest, conversation, legislation, carbon sequestration

INTRODUCTION

LLately, the issues of global warming become one of the major concerns worldwide. Although it has entered the public awareness during the extraordinarily hot summer of 1988 but the best possible solution to be implemented is still undergoing extensive scientific discussion, experimental work and political debate. Global warming is a keyword that represents an increase in the average temperature of the earth's atmosphere. If no action is taken the greenhouse effect could lead to a rise in average global temperatures of between 1.5-4.5 oC as early as the year 2030. Such increases will make the world warmer than it has been for more than 100,000 years.

Figure 1: Forestland distribution in Malaysia

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Table 1: Degraded Area due to Shifting Cultivation (in Million Hectare)

	1960	1985	1993
Sarawak	2.25	3.3	n.a
Sabah	n.a	n.a	1.07
Kelantan	n.a	n.a	0.05

Table 2: Forested land in Peninsular Malaysia (% of the total land area)

	1966	1970-72	1981-82	2004
% forest area	73	61	49	19.54

Fact 3

According to the Environmental Protection Agency, compact fluorescent light (CFL) use 2/3 less energy than standard incandescent balbs and last 10 times longer It's your call

source:http://environment.nationalgeographic.com

It is generally believed that deforestation will drive climate change. Forest soils are moist, but without protection from sun-blocking tree cover they quickly dry out. Trees also help perpetuate the water cycle by returning water vapor back into the atmosphere. Without trees to fill these roles, many former forest lands can quickly become barren deserts. Removing trees deprives the forest of portions of its canopy, which blocks the sun's rays during the day and holds in heat at night. This disruption leads to more extreme temperatures swings that can be harmful to plants and animals. Trees also play a critical role in absorbing the greenhouse gases that fuel global warming. Fewer forests means larger amounts of greenhouse gases entering the atmosphere—and increased speed and severity of global warming.

A project had been carried out to investigate and survey the status of the tropical forest and deforestation due to development and agricultural activities in Malaysia. Potential of CDM on forest plantation will also being discussed. These works carried out by the members from Universiti Putra Malaysia and Forest Research Institution Malaysia (FRIM). Figure 1 shows the distribution of forest lands in Malaysia. 19.54 million ha. or 59.5% of land are covered by the tropical forest (not taking into the plantation forest such oil palm estate). Seventy four percent or 14.45 million ha of these land are permanent reserved forest (PRF) and 16% are state lands or alienated land (Figure 2). Deforestation occurred when the productive PRF and state land forests are harvested and also via shifting cultivation (Table 1). The harvesting was conducted during the conversion of forest area into agriculture and industry. For example, in the period of 1986 – 1994, 144,406 ha were degazetted (equivalent to the size of Malacca state). The annual allowable cuts from PRF in Malaysia are 42,000 ha., 60,000 ha. and 170,000 ha. for Peninsular, Sabah and Sarawak, respectively. At present, however, only about 30% of these logging areas are treated (which included replanting). The decline of forest area is really worrying. As compared to year 1966, the forest area has been reduced from 73% to 19.54% (Table 2).

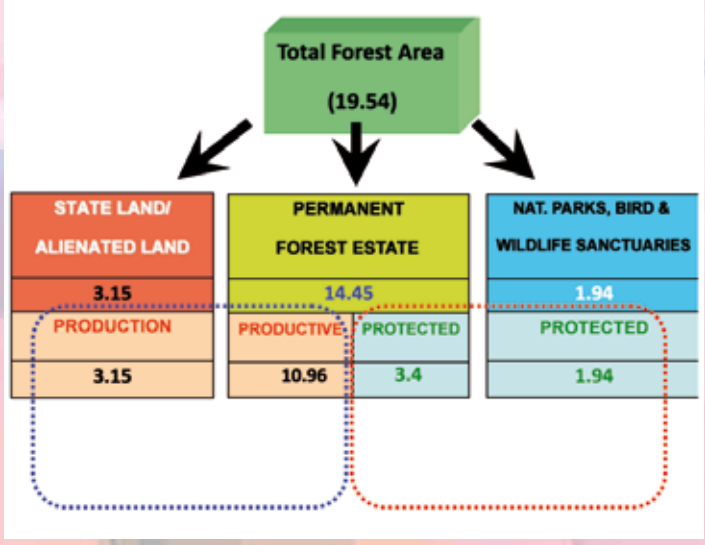

Figure 2: Forestland use in Malaysia, 2002 (Peninsular Malaysia Forestry Department, 2005).

Policies and Legislations of Forest Conservation

Various legislations were promulgated over the years by Malaysian government to strengthen the Department of Forestry, Malaysia, as well the management and utilization of forests. Thus a strong institutional framework has been established the responsibilities over forests between the State Governments (under which forest jurisdiction lies) and the Federal Government which is responsible for national policy of the country. In this regard the National Forestry Council (NFC) was established in December 1971, comprising the Chief Ministers of the thirteen states and chaired by the Deputy Prime Minister. The NFC provides a vital forum for the formulation of forestry policies which are coordinated and consistent with the national goals of sustainable forest management.

In line with the country's aspirations, a National Forestry Policy was promulgated and approved by the NFC in 1977. This policy paved the way for greater uniformity in the implementation of strategies for the achievement of forest

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conservation, management and development in the country. The policy represents an important legislation, which is unequivocal in maintaining that forest management must fulfill environmental and conservational needs besides meeting rational economic production goals. The balance that must be achieved among these objectives is thus spelt out in distinct terms in the policy through the multi-pronged strategies embodied therein. Thus under the policy strategic and sufficient areas are allocated not just for production but for protection as well as social and educational needs. In tandem with this policy enactments and rules were formulated and enforced at the various state and district levels to give bite to the national stance.

To further enhancing the protection of forest land, the Environmental Quality Act 1974 was amended to include the need for Environmental Impact Assessment (EIA) with affect from 1987 for activities that involve forest land use. Thus EIA is required for activities which involve logging and land development schemes converting an area of 500 hectares or more of forest land into different land use, industrial, housing, agricultural and aquaculture projects, accompanied by clearing of mangrove swamp forest covering 50 hectares or more as well as logging or conversion of forest land to other land use within catchment areas or reservoirs.

CDM and Forest Plantation

The Kyoto Protocol (1997) has established several mechanisms to achieve their goal of reducing green-house-gas (GHG) emissions in a cost-effective manner. Among the mechanisms, Clean Development Mechanism (CDM) aims at promoting co-operative measures between the Annex 1 parties and non-Annex 1 parties. The CDM idea is to facilitate co-operative projects between developed and developing countries for reduction of GHG emissions, with the opportunity for additional financial and technological investments in GHG reduction projects. There are assortments of carbon offset projects, many of which are in the renewable energy sector, such as those using wind, small hydro and biomass energy technology. However, forestry projects are particularly appealing for a variety of reasons, not the least of which is that they are often the most cost effective. Such projects vary widely from those that plant new trees to sequester carbon to those that provide better forest management in order to reduce emissions by preventing events like forest fires that release carbon into the atmosphere. From a local development perspective carbon deals can add value to forests and forestlands and result in new income for rural populations. The Kyoto Protocol introduces the concept of using forests and forest management to enhance sequestration of CO2 to compensate for emissions from the utilization of fossil fuels. Forestry activities can be utilized for Off setting carbon emissions during the first commitment period starting from 2008 through 2012.

The Market surveys have been conducted to assess the opportunities for implementing CDM projects in Malaysia. These studies show that there is great potential for mitigating GHG emissions through CDM projects due to the high rates of energy and transport growth in this country. As a developing country, Malaysia is not subject to any commitments towards reducing GHG emissions under Kyoto Protocol. However, through participation in the CDM under the Kyoto Protocol, Malaysia could, however, benefit from investments in the GHG emission reduction projects, which will also contribute towards the overall improvement of the environment and to some extent bring additional economic benefits. Malaysia ratified the Kyoto Protocol on 4 September 2002. The preparation for establishing a national strategy on CDM will have to take into account both the country's short and long-term position with regard to climate change mitigation measures.

Studies on tropical forests indicate that a significant amount of biomass and vegetation become lumber, slash, charcoal and ash through forest harvesting and forest clearance. However, the proportion differs for closed and open forests. If tropical forest land is converted to pasture or permanent agriculture, then the amount of carbon stored in secondary vegetation is equivalent to the carbon content of the biomass of crops planted, or the grass grown on the pasture. If a secondary forest is allowed to grow, then carbon will accumulate and maximum biomass density is attained after a relatively short time (Pearce et al 1997). When changes in land use occur resulting in tropical forests being changed into a different land use, the carbon sequestered is lost as shown in Table 3.

The negative figures represent emission of carbon; for instance, conversion from closed primary forest to shifting agriculture results in a net loss of 204 tC/ha. Change of land use from closed primary forest to permanent agriculture results in the major loss of carbon (220tC/ha). Carbon released by deforestation of secondary and primary tropical forest is estimated to be 100 - 200 tonnes per hectare. Typical sequestration potential available in the tropics by afforestaion / reforestation is estimated to be between 3.2 - 10.0 tC ha yr-1. Assuming a global land availability of 700 million ha for reforestation and afforestation activities, an estimated 42-59 billion tC could be sequestered by afforestation / reforestation in the next fifty years including 7 billion tC from agro-forestry.

Forest Plantation in Malaysia

Forestry in Malaysia is now at cross-roads. It is becoming apparent that the natural forests may not be able to yield forest adequate quantity of quality timber in the future (Apannah and Weinland, 1993). To become self reliant, the only resort is to initiate plantations. Growing plantations sink more carbon than standing old forests.

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Table 3: Changes in Carbon with land use Changes (tC/ha)

	Original C	Shifting agriculture	Permanent agriculture	Pasture
Organic C		79	63	63
Closed primary forest	283	-204	-220	-220
Closed secondary forest	194	-106	-152	-122
Open forest	115	-36	-52	-52

In Malaysia, forest plantations can be considered to have begun with Taban (Palaquium spp) tree plantation that started in Malaysia (Appannah and Weinland, 1993). In the pre-humid climate of Malaysia, tree growth is faster. Growth rates of 20 cu.m/ha/year are common and some hybrid species of Eucalyptus have been known to grow in excess of 50 cu.m/ha/year. These rates can further be increased through the use of proper selection, breeding and the use of modern biotechnology. It is worth mentioning that the most important plantation species used all over the tropics, such as Eucalyptus spp, Pinus spp, Tectona grandis, and Acacia spp, owe much of their success to easy availability of planting stock. Therefore self-sufficiency of planting stock is a prerequisite for successful plantation development.

A successful experience in replanting and restoring the natural forest has been reported by The Innoprsie -Face Foundation of the Netherlands (INFAPRO) project, a project covering 25,000 ha in the Danum valley, Sabah, successfully rehabilitated 9,500 ha of logged forest land using the foundation carbon offsetting fund (Salleh et al, 2001). Carbon sequestration rates here range from 5 to 10 tC per hectare with an approximate cost of $5 per ton. Carbon benefits can be achieved through an improved forest management as much as 15 tC/ha after one year, 51 tC after 5 years, 65 tC/ha after 10 years, 83 tC/ha after 20 years and 92 tC/ha after 35 years.

To further encourage the companies to undertake forest plantation projects, incentives are given by Malaysia government under the Promotion of Investment Act, 1986:- (i) Pioneer Status with a tax exemption of 100% of the statutory income for 10 years, or (ii) Investment Tax Allowance (ITA) of 100% on the qualifying capital expenditure incurred within five years, which can be offset against 100% of the statutory income for each year of assessment.

CONCLUSIONS

Deforestation is a main factor that has contributed to the global warming. Tropical forests became the prime source of carbon emission from the terrestrial ecosystem due to extensive deforestation for land conversion into agriculture, shifting cultivation and forest fires. Due to the characteristics of tropical forest ecosystems of faster growing trees and plants, and greater biodiversity, they offer tremendous opportunities for cleaning the global atmosphere through carbon sequestration. While tropical deforestation will continue, it will be much reduced if greater value is accorded to tropical forests, beyond the value of the trees only. Joint carbon sequestration projects offe¬r tremendous opportunities to support such efforts. Valuing biodiversity, aesthetics and water production are some new initiatives that are currently being investigated.

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Profile

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INTROP: Postgraduate Committee

PICNIC AT SG. CONGKAK

A BBQ program was held by Persatuan Siswazah INTROP (PSI) (INTROP Post Graduate Association) on 31st January 2010 at Sungai Congkak, Ulu Langat, Selangor. Sixteen students happily participated in this leisure program including swimming in the shallow cool river on full stomach. The BBQ was a riot of fish, chicken, squid, prawn, shellfish and not to forget the rice dish and yummy drinks sponsored by Nadia and Balkis. There was also trekking upstream and wallowing in the river for hours. The setting was a beautiful rainforest with the sound of water flowing and completely soothing away the stress of a post-graduate's life. The program really achieved its main objective for having fun, good food and at the same time to get to know each well as a family in INTROP.

BOWLING

The Persatuan Siswazah INTROP (PSI) (INTROP Post Graduate Association) organized a bowling event at The Mines Shopping Fair Bowling Centre for its members. The event was held on 14th March 2010 (Sunday). The purpose of the event was to create a close relationship between members. Total members of 15 were present and all members gathered at the Bowling Centre at 3pm. They were divided into groups of five. Each group was entitled for two games. Members were presented with door gift as token of appreciation. The event ends at 5.30pm.

Quiz 2

True or false? During one long trip, you conserve more fuel by driving fast and getting to your destination sooner than you do by going the speed limit.

See page 32

INTROP: At A Glance

ICKAF 2009 participants taking snap shots to record their moments.

Opening ceremony officiated by Tan Sri Bernard Dompok (center).

Participants were ready for their Conference.

INTERNATIONAL CONFERENCE ON KENAF AND ALLIED FIBRE 2009 (ICKAF 2009):

1 st – 3 rd December 2009

A lot of discussion was held prior to the very first international conference conducted by INTROP, UPM. INTROP give provenance of the benefits of bio-fibres in recent technology by jointly organizing the International Conference on Kenaf and Allied Fibre 2009 (ICKAF 2009). The Conference brought together many stakeholders from around the world for exchange of new findings and ideas on bio-fibres and contributing towards a better future.

The 1st to 3rd December 2009 marked the most anticipated event in 2009 for INTROP. ICKAF 2009 was held at the Legend Hotel, Kuala Lumpur and officiated by the newly appointed minister, for the Ministry of Plantation Industries and Commodities, Malaysia, Tan Sri Bernard Giluk Dompok.

The Conference was also co-organised together with the Malaysian Timber Industries Board (MTIB), National Tobacco Board (NTB), and International Jute Study Group (IJSG), Bangladesh, and other collaborators. It attracted industries and researchers from different countries including India, Bangladesh, Poland, Australia, Iran, Nigeria, Singapore, and United State of America. The Conference succeeded in formulating an international framework to support awareness in the multiple benefits in using bio-fibres such as kenaf, jute, ramie, flex, and oil palm.

Thumbs up to all participants and individuals who contributed directly or indirectly into making the International Conference a reality. There was something for all to cheer as INTROP's Director, Assoc. Prof. Dr. Paridah Md Tahir officiated the closing ceremony after handing over prizes to the winners for best poster presentation.

All keynotes speaker sit together with the participants present.

Participants having their own discussions and exchange of ideas while waiting for oral presentations.

The Minister was briefed at ICKAF 2009 booth along with other participants.

INTROP: Activities

XIII WORLD FORESTRY CONGRESS (WFC)

XIII World Forestry Congress (WFC) was held on 18 to 23 October in Buenos Aires with record number of 5,200 participants attending the opening on Sunday, 18 October, 2009. The total participants swelled to 7,000 coming from 160 nations. The XIII WFC was opened by Julián Dominguez, the newly appointed Argentine Minister of Agriculture.

There were seven main themes and 60 thematic parallel technical sessions; seven poster sessions; and numerous side events in the World Forestry Congress. These themes were divided into sub-themes that include most of the issues related to forests and the products and services they provide. The seven themes were ; Forests and Biodiversity, Producing for Development, Forests in the Service of People, Caring for Our Forests, Development Opportunities, Organizing Forest Development and People and Forests in Harmony. Many notable luminaries such as Jane Goodall and Balgis Osman-Elasha, a Nobel Peace Prize laurate gave stimulating presentations. Climate change, carbon storage potential and Reduced Emissions from Deforestation and Forest Degradation (REDD) were the main interest judging by the number of papers presented and the number of participants attending the sessions related to these topics.

Assoc. Prof. Dr. Ahmad Ainuddin Nuruddin

One of the exhibits in the exhibition hall in XIII WFC.

Participants in one of the Planery sessions in XIII WFC.

Photo with UPM alumni from Laos.

Banner of the XIII World Forestry Congress.

Closing dinner in XIII WFC.

Profile

Name : **Assoc. Prof. Dr. Ahmad Ainuddin Nuruddin**

Position : **Deputy Director**

Lab : **Laboratory of Techno Economic (TECPOL)**

Fact 4

Cats always go to the person who likes them least because there is no eye contact made with them. It makes them feel less threathened and renders the person more approachable.

source: http://www.petandwildlife.com/wildlife-facts/animal-quick-facts-and-oddities...did-you-know.html

INTROP: Activities

PUBLIC TALK BY PROF. RYSZARD KOZLOWSKI: Bridging The Gap In Biocomposite Technology Between Malaysia And Developed Country

Date : 4th – 7th December 2009
Venue : Malaysian Timber Industry Board (MTIB)

Knowing this guy is such an opportunity that you will never want to miss. Despite having vast knowledge and experience he proved to be a down to earth and kind person. Prof. Ryszard Kozlowski is a world renowned scientist based in Poland who carried out innovatory research in various fields including lignocellulosic fibrous raw materials, wool and silk, processing of bast fibres and environmental protection. Currently he is the General Director to the Institute of Natural Fibres (INF) Poznan, Poland. He was an invited speaker in the International Conference on Kenaf and Allied Fibre (ICKAF) 2009. In conjunction to this, INTROP, UPM with collaboration of the Registrar Office, UPM and the Malaysian Timber Industry Board (MTIB) organized a Public Lecture series for him to share his knowledge and experience with Malaysian industrialists and young researchers. The Public Lecture for industries was officiated by the Director General of MTIB with the theme "Bridging The Gap In Biocomposite Technology between Malaysia and Developed Country". For Young Scientist, the event was officiated by the Deputy Vice Chancellor (Research & Innovation), UPM with the theme "Becoming Renowned Scientists: Where Should We Start?". Both events were well attended by responsive participants.

National Kenaf and Tobacco Board (NKTB) visits at INTROP, UPM

Date : 22 December 2009
Venue : Meeting Room INTROP 2

Prof.Mohd Basri Hamzah gave his welcoming remarks and introduced INTROP to the 20 visitors which included farmers, training officers and technicians from the National Kenaf and Tobacco Board (NKTB). After a short break, they headed for INTROP 3, which houses lab facilities, to study wood plastic composites production and bio-retting procedure. The visit strengthened further the cordial network between INTROP and NKTB.

Robotic Applications in the Wood Industry

Date : 11– 13 January 2010
Venue : Seminar Room ITMA

The Seminar "Robotic Applications in the Wood Industry" was jointly collaborated by Malaysian Timber Council (MTC), Universiti Putra Malaysia, and KUKA Robot Automation (M) Sdn. Bhd., and organised by INTROP. The aim of the 2 - day seminar was to expose academics, industries, and students to new technology that could be applied in the Malaysian wood industry. The seminar also aim at improving public perception towards the used of robotic and discuss the benefits that could be gained in processing and manufacturing of wood.

The Deputy Vice Chancellor Industry and Community Relations, Prof Tai Shzee Yew was given the honour to officiate the opening of the seminar which was attended by 38 participants from the industry and academia. His compact speech gave a clear message on the current situation of the national wood industry and the potential role of UPM in innovating new technology.

On the second day, the seminar was attended by a large number of students coming from several local universities. They were so impressed with the capability of the robot and to sum, this broad to mind the terminator robot of film fame. Mr. Robert Chen, the Regional Manager from KUKA gives energetic presentations in both days on the recent advancement in robotic in the company.

This was followed by a live demonstration in INTROP's laboratory focusing on robotic operation. The robotic antics were observed by Prof. Tai Shzee Yew, accompanied by Assoc. Prof. Dr. Paridah Md. Tahir, INTROP's Director, Mr. Cheah Kam Huan, MTC CEO, and Mr. Tan Meng Ho, Senior Regional Manager from KUKA.

INTROP: Activities

Briefing for INTROP's New Students

Date : 26 January 2010
Venue : Meeting Room INTROP 2

Student power is a key factor in assisting INTROP to become a leading centre for research in tropical bio-composites and forest canopy management. On this recognization the Institute has actively been canvassing for post graduate student intake in order to expand its research capacity.

The Postgraduate Day aimed at helping potential students to further their studies in the wood-based sector and to choose the right field of study. Students were given opportunity to ask questions and obtain clarification from heads of laboratory who were present during the occasion.

INTROP Writing Workshop

Date : 22– 23 February 2010
Venue : Meeting Room INTROP 2

In order for INTROP's Key Performance Index (KPI) snowball keeps on rolling in the years ahead, this programme had been developed to assist students of INTROP to focus on writing their papers for publications. For the whole two days, food and drinks were provided in exchange for their commitment towards this activity. At the end of the day, INTROP's hope was to make sure that they were able to finalize their final phase articles before submitting for publications.

UPM Postgraduate Day

Date : 11 - 13 March 2010
Venue : PKKSSAAS UPM

"Continuing the pursuit of Academic Excellence" was the theme used in the latest series of UPM Postgraduate Education Fair in 2010. PKKSSAAS UPM has been chosen to receive the visit of new students from around the world. Promoting Postgraduate education program offered by various faculties and institutes in UPM to the public was the main objective of this event. Apart from this, door gifts and also book sales were stationed there making this event worth a drop by.

If you are stuck, running out of choices for your fields of study, wait no longer and let's kick start with INTROP's booth located just around the corner. Patrons were rest assured that they get the much needed information at INTROP's booth, which had won the prize for most Informative Booth during the UPM Postgraduate Day last year. INTROP is definitely one of the best booths to deliver the right information for you in your pursuit to choose the best for your studies.

INTROP: Activities

Kursus Komunikasi dan Penyeliaan Berkesan

Date : 5 – 7 March 2010
Venue : Hutan Simpan Ayer Hitam (HSAH), Puchong

This course was an initiative by INTROP's management to develop better relation and working environment among the organization members and it was held in Hutan Simpan Ayer Hitam (HSAH), Puchong. The 3-day course was launched by our beloved Director at the Biocomposite Laboratory in INTROP 3. The distance to HSAH was less than 30 minutes and almost all the staff opted to get there with the bus provided. Everybody was very excited from the beginning to the very first step they took on the forest floor. At night, after having dinner, there was a short briefing from Mr. Mohamad Saroto Sairan regarding the course and then the participants were later assigned into smaller groups for the rest of the course.

Waking up to the call of the forest, on the second day, everyone was ready to hit the course and the many activities that awaited them. From group presentations to a mini competition, they showed tremendous dedication to make sure that his or her group would win no matter what it takes.

The best activities would have been the presentation of group identity. Each had to develop the group's own name, vision, mission, motto, logo, and not forgetting, their own group song. Each group had their own strength in one way or another but the most important thing was the spirit that everyone had shown.

The last days consisted of a short discussion on development of a new form to be used in INTROP and the prize giving ceremony. The best group went to 'Lestari Asli' with the most votes from other groups and the best participant award went to everyone present throughout this course. We hope that more programmes of this kind will be organized in the near future.

National Seminar & Exhibition on Gaharu 2010

Date : 22-23 March 2010
Venue : Auditorium, Faculty of Engineering

INTROP was collaborated with the Faculty of Forestry and Malaysian Timber Industrial Board (MTIB) in organizing a seminar at Auditorium, Faculty of Engineering. The theme for the seminar was "Towards a Sustainable Gaharu Industrial Development ". The event was supported by Persatuan Pengusaha Gaharu Bumiputera Malaysia (PENGHARUM) and Persatuan Gaharu Malaysia. The National Seminar & Exhibition on Gaharu 2010 was held with the objective to encourage sharing of two-day the latest information in order to expand current knowledge on issues of policy, natural resources, harvesting, processing, and marketing of gaharu in Malaysia. There was over 150 participants in the two days. The seminar had 3 sessions which focused on the management of Karas tree, harvesting, storing and materials preparation, and promotion, marketing and policy. Twenty speakers from industries, individual planters, academics and policy makers shared their valuable knowledge and experience throughout the seminar.

INTROP: Activities

Workshop on Fiber Morphology Analysis: Technique & Application in Pulp & Paper Industries

Date : 4 Mei 2010
Venue : Seminar Room, ITMA

INTROP with the collaboration of Dutech Scientific (M) Sdn. Bhd. had invited Mr. Yan LUO, from Techpap SAS, to give a talk on Morfi Compact, a new device by CTP and Techpap in accordance with the ISO 16065-2 standard. This workshop aims to share knowledge on fibre morphology in the paper making process and to discuss ways such knowledge may help in producing better paper quality.

The workshop was officiated by INTROP's Director, Assoc. Prof. Dr. Paridah Md Tahir and attended by many government agencies such as the Malaysian Palm Oil Board (MPOB), Malaysian Timber Board (MTIB) as well as other industries attended the workshop.



5th Dialogue, KPPK - UPM

Date : 6 April 2010
Venue : Senate Room, UPM Administration Building

Now that it has reached its 5th round, the KPPK dialogue has cemented itself as the best medium for researchers who participated in this reciprocal cooperation with the ministry to present project progress in recent years. The successful development of the KPPK dialogue for this year was made symbolic with the launching of INTROP's new book entitled Kenaf: Biocomposites, Derivatives and Economics during the event.

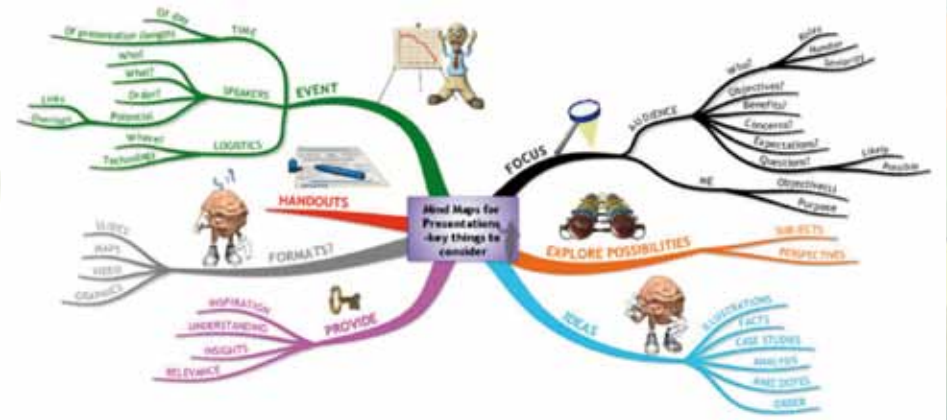

The impact of the KPPK dialogue on 6th April 2010 as with past dialogues have beyond UPM and up to the national level, INTROP, as the permanent secretariat, has again ensured a productive dialogue chaired by the honourable guest Tan Sri Bernard Dompok, Minister of Ministry of Malaysian Plantations and Industries Commodities (KPPK) held at the Senate Room, UPM Administration Building.


INTROP: INTROPIKEDIA

MIND MAPPING – HOW TO GENERATE IDEAS INSIDE YOUR BRAIN

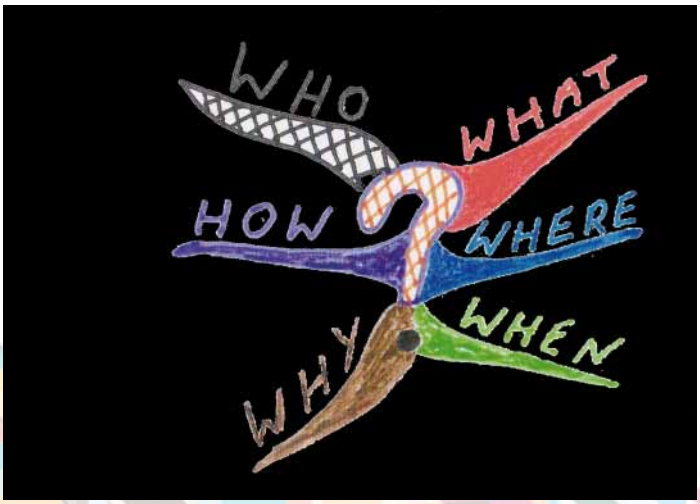
A mind map is a diagram used to represent words, ideas, tasks, or other items linked to and arranged around a central key word or idea. Mind maps are used to generate, visualize, structure, and classify ideas, and as an aid in study, organization, problem solving, decision making, and writing. The elements of a given mind map are arranged intuitively according to the importance of the concepts, and are classified into groupings, branches, or areas, with the goal of representing semantic or other connections between portions of information. Mind maps may also aid recall of existing memories.

By presenting ideas in a radial, graphical, non-linear manner, mind maps encourage a brainstorming approach to planning and organizational tasks. Though the branches of a mindmap represent hierarchical tree structures, their radial arrangement disrupts the prioritizing of concepts typically associated with hierarchies presented with more linear visual cues. This orientation towards brainstorming encourages users to enumerate and connect concepts without a tendency to begin within a particular conceptual framework. The mind map can be contrasted with the similar idea of concept mapping. The former is based on radial hierarchies and tree structures denoting relationships with a central governing concept, whereas concept maps are based on connections between concepts in more diverse patterns.



The mind mapping guru, Tony Buzan, once attended UPM's 'Unlocking Potential-Good Thinking Seminar' for three days from 22nd to 24th of February 2010, organized by Graduate School of Management (GSM). Buzan was very popular and most of the times he shared secrets of mind mapping technique and thinking effectively and creatively and on how to optimized your memory. A mind map is often created around a single word or text, placed in the center, to which associated ideas, words and concepts are added.

Mind maps have many applications in personal, family, educational, and business situations, including note taking, brainstorming (wherein ideas are inserted into the map radially around the center node, without the implicit prioritization that comes from hierarchy or sequential arrangements, and wherein grouping and organizing is reserved for later stages), summarizing, revising, and general clarifying of thoughts. One can listen to a lecture, for example, and take down notes using mind maps for the most important points or keywords. One can also use mind maps as a mnemonic technique or to sort out a complicated idea. Mind maps are also promoted as a way to collaborate in color pen creativity sessions.



A simple way to increase understanding and perspectives is to ask questions.

Mind maps can be used for: problem solving, outline/framework design, anonymous collaboration, marriage of words and visuals, individual expression of creativity, condensing material into a concise and memorable format, team building or synergy creating activity, enhancing work morale. Mindmaps can be drawn by hand, either as "rough notes" during a lecture or meeting, for example, or can be more sophisticated in quality. An example of a rough mind map is illustrated below. There are also a number of software packages available for producing the maps.

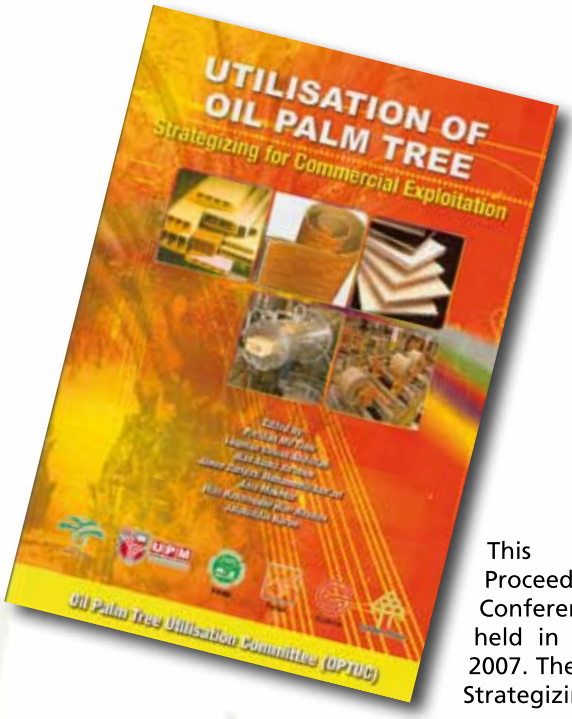
Sources: http://en.wikipedia.org, http://mind-mapping.co.uk, http://www.upm.edu.my'

Fact 5

Paper and card make up about one-third of the rubbish thrown away by Britain's homes.

Source: http://www.stepin.org/index.php?id=eb_learning

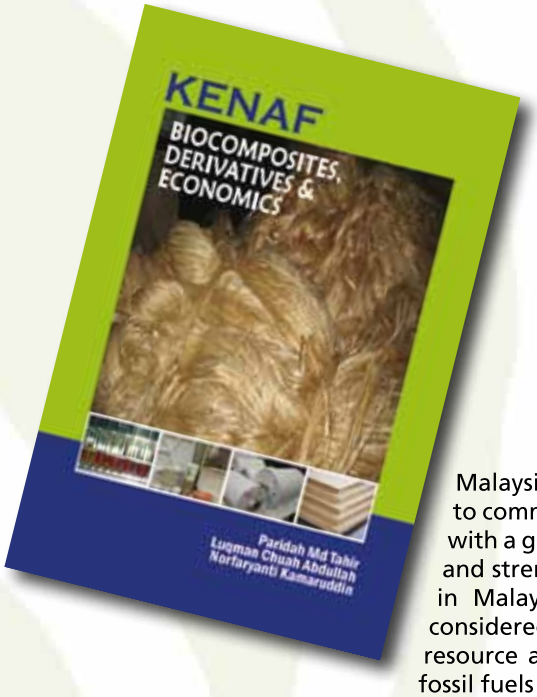
INTROP: Book Shelf



Utilisation Of Oil Palm Tree : Strategizing for Commercial Exploitation

Editors	:	Paridah Md Tahir, Luqman Chuah Abdullah, Wan Asma Ibrahim, Ainun ZuriyatiMohamed @ Asa'ari, Anis mokhtar, Wan Hasamudin Wan Hassan, Jalaluddin Harun
Year	:	2008
ISBN	:	978-983-44426-0-6
Pages	:	356
Contact Person	:	Mrs. Siti Najihah Zahari

This publication contains the Proceedings of the 7th National Conference on Oil Palm Tree Utilization held in Selangor on 13-15 November 2007. The theme for the conference was Strategizing for Commercial Exploitation. Thirty five paper were presented at this conference in both oral and poster sessions. The conference has attracted more than 120 participants comprising academicians, researchers, government officials, palm oil manufacturers, FELDA, wood-based and by-products entrepreneurs in Malaysia.



Kenaf Biocomposite, Derivatives and Economics

Editors	:	Paridah Md. Tahir, Luqman Chuah Abdullah, Norfaryanti Kamaruddin
Year	:	2009
ISBN	:	978-983-053-562-3
Pages	:	178
Contact Person	:	Mrs. Aida Mazreena Alauddin

Malaysia has identified and decided to commercialize Kenaf as a new crop with a good potential to help diversify and strengthen the agricultural sector in Malaysia. Kenaf has been widely considered as a suitable biological resource and a potential substitute for fossil fuels and wood-pulp because of its extensive adaptation, strong resistance, large biomass and rich cellulose which then can be further processed into pulp and paper, bio-composites for automotive industries, interior shelvings and building materials, as well as animal feed because of its high protein content.

Kenaf Biocomposites, Derivatives and Economics provides invaluable information on Kenaf resulting from research activities undertaken by a group of researchers in Universiti Putra Malaysia (UPM). UPM has been given the responsibility to conduct R&D, as well as, commercialization of kenaf-based products such as biocomposite, kenaf fibre reinforced thermoplastic composite, paper products and etc. The concepts and methods of Kenaf potentials are emphasized in the book.

INTROP: Book Shelf

Reading in Natural Resource Economics

Editors : Zaiton Samdin, Khairil Wahidin Awang, Khalid Abd Rahim

Year : 2009

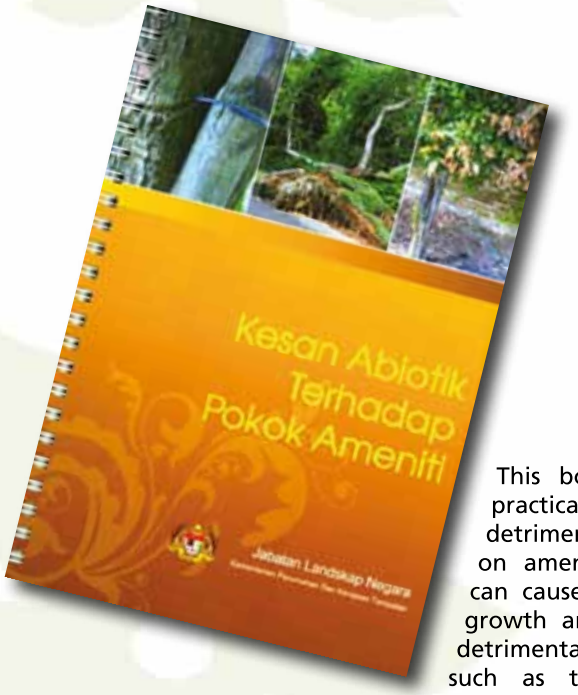
ISBN : 978-967-344-116-7

Pages : 206

Contact Person : Dr. Zaiton Samdin

Natural resources are essential for our survival. It is pertinent that we have full understanding on how to apply their usage, in particular, without harming the environment or how to optimize their utilization when it takes a much longer time to replenish their reserves. In this sense, the book is a small step towards providing knowledge on natural resources. It also has the objective of underlining the importance of these resources for current and future generations.

This book is a compilation of studies in the field of Natural Resource and Environmental Economics. Readers are introduced to two broad types of natural resources which are exhaustible and inexhaustible. The supply of exhaustible natural resources is rather limited in nature. Exhaustible natural resources are liable to degradation in terms of quantity and quality by human activities. Fossil fuels, minerals and forests, which include wild animals, are examples of exhaustible resources. On the other hand, inexhaustible natural resources can be defined as the resources with unlimited supply, and not likely to be exhausted by mankind. Inexhaustible resources include air, water and solar energy. The book covers a diverse spectrum of topics concerning natural resources including fisheries, forestry, energy and wildlife. It also gives focus to issues pertaining to the management and valuation of natural resources.



Kesan Abiotik Terhadap Pokok Ameniti

Editors : Ahmad Ainuddin Nuruddin

Year : 2009

ISBN : 978-983-42072-7-4

Pages : 43

Contact Person : Assoc. Prof. Dr. Ahmad Ainuddin Nuruddin

This book is written to provide practical information and tips on detrimental effects of abiotic factors on amenity trees. Abiotic factors can cause stresses which affect tree growth and functions. In this book, detrimental effects of abiotic factors such as temperature, wind, water, mechanical, soil and chemical on shade trees are discussed. Symptoms of the detrimental effects of the abiotic factors on trees are elucidated and solutions proposed. Pictures and schematic figures of symptoms are included to assist readers to identify the causes and symptoms of the injury. It is hoped that this book will assist and becomes a guide for urban trees managers in ensuring that landscape trees are healthy and properly managed. The book is published by the National Landscape Department (Jabatan Landskap Negara).

INTROP: New Members

Dr. Hazandy Abdul Hamid
hazandy@gmail.com

Field of Specialization:
Ecophysiology and Tree Improvement

Achievements in International Level:
Certified Arborist, International Society of Arboricultures
Member of International Association Vegetation Science

BIOREM

Recent Project:
1. Hydraulic Conductance of Different Ages and Sizes of three types Macropropagated Plants
2. Quantification of Biomass Production and Carbon Sequestration in Planted Indigenous and Exotic Forests
3. Species- Site Quality Study and Quantification of Biomass Production and Carbon Sequestration of Selected Planted Forest

What is your feeling when joining INTROP?
- *I was glad to be given the opportunity and mandate to join one of the most prominent institutes in UPM as the head of Laboratory of Sustainable Bioresource Management (Biorem).*

What is your strategy for the future of BIOREM?
- *I will appoint more credible research associates, research fellows and also research consultants in various field related to tropical forestry and agriculture, locally and internationally. Besides that, I will also ensure the lab is fully equipped with the latest equipment and facilities needed in order to achieve its vision and mission to become the national referral and R& D Centre for the development and production of fibre resources and sustainable forest management and to complement INTROP's vision and mission statement. Furthermore, I would like to ensure that lab staff increase and improve their level of knowledge and efficiency in handling various researches as well as administration work.*

What is your opinion of INTROP's working environment?
- *To me, INTROP is a really conducive place to work in. It possesses pleasant and supportive physical surroundings with caring, dedicated, positive and motivated staff members who want to make a difference and, overall, people who work as a team. Ultimately these things lead to the ideal work environment.*

How do you see INTROP 5 years onwards?
- *INTROP will stay as one of the leading institutes in tropical forestry in Malaysia. It will continually strive towards excellence in conjunction with its mission and vision statement to become the national referral and R&D centre in Tropical Forestry and Forest Products research while focusing on green technology.*

Dr. Zaiton Samdin
zaisa@econ.upm.edu.my

Field of Specialization:
Economic Valuation/Sustainable Tourism

Education and Academic Qualifications:
B.Sc. (Resource Economics) Universiti Putra Malaysia
M.Sc.(Resource Economics) Universiti Putra Malaysia

TECPOL

Recent Project:
- Robust Ecotourism Index
- The Impact of Employee's Empowerment and Emotional Labour: Evidenceives from Customer's Perspect
- Willingness to Pay in a National Park in Malaysia : A Case Study of Taman Negara

What is your feeling when joining INTROP?
- *I am deeply thankful to Assoc. Prof. Dr. Paridah Md. Tahir for giving me the opportunity to become a member of INTROP. It was a pleasure to be a member of INTROP. I have an opportunity to know more about INTROP's main activities which bring new episode into my research practices.*

What is your strategy for the future of TECPOL?
- *There are many things that I plan to do. Importantly, I'm planning to foster collaboration and synergy among INTROP (UPM), industry, academia and government. Obviously, integration among several entities will lead to the achievement of INTROP's vision i.e. become the national referral and R&D centre in Tropical Forestry and Forest Products research.*

What is your opinion of INTROP's working environment?
- *INTROP promotes harmonious working environment. We are working together for a common goal, regardless of differences, respect and believe among each other. Team work is essential in INTROP.*

How do you see INTROP in 5 years onwards?
- *Hopefully, INTROP will be a reference point for all things in tropical forest and forest products.*

Dr. Edi Syams Zainudin
edisyam@eng.upm.edu.my

Field of Specialization:
Advanced Composite / Materials Engineering

Achievement in International Level :
Graduated Member, Board of Engineers (BEM), Malaysia, since 2000
Institute of Materials Malaysia (Membership no.874), since 2004

BIO COMPOSITE

Recent Project:
- Thermo Mechanical Properties of Sugarcane Bagasse Reinforced UPVC Composites
- An Experimental Investigation on Banana Pseudo-stem Reinforced PVC Composite, Skim Penyelidikan Pensyarah Lantikan Baru (PLB), UPM
- Numerical and Experimental Investigation of Fibre Reinforced Injection Moulded Thermoplastic Composites

What is your feeling when joining INTROP?
- *It is an exciting and a challenging feeling for me at this initial stage. Despite the big responsibility to be taken care of, it is also a good feel for me because INTROP offers a good platform for me to explore and strengthen my knowledge in biocomposite materials.*

What is your strategy for the future of BIOCOMPOSITE?
- *At this point of time, focus will be on achieving immediate KPI set by the UPM top management. Continuous training should be conducted so that staff are well equipped with current knowledge and should always be in high spirit to contribute their effort on maintaining and increasing the university RU status. In the future, more collaboration should be made with industries so that more positive results could be generated from research outputs, i.e good quality of products, publications and services.*

What is your opinion of INTROP's working environment?
- *At the moment, the working environment is very good. All the staff are very supportive and energetic and I believe they can achieve INTROP's milestones despite the limited human resources and space. I do believe that the spirit should be much better and more work can be done efficiently if we have enough staff and stay together in a proper building.*

How do you see INTROP in 5 years onwards?
- *I can see in 5 yrs time INTROP will have a brighter future as the top reference centre in its own area with strong support from the Universiti, which will be a world leader in new tropical agriculture. This should contribute towards achieving the National plan under the New Economic Model (NEM) position Malaysia to lead the global green revolution.*

INTROP: Research Updates

Award Gold

Researcher **Jalaluddin Harun**
Project Title **New Approach to Use of Kenaf for Paper and Paperboard Production**

Award Silver

Researcher **Nor Azowa Ibrahim**
Project Title **Improvement on Kenaf-Ecoflex Interactions in Green Composite**

Award Silver

Researcher **Paridah Md. Tahir**
Project Title **Acacia mangium Tannin as Formaldehyde Scavenger for Low Molecular Weight Phenol-Formaldehyde Resin in Bonding Tropical Plywood Applied**

Award Silver

Researcher **Paridah Md. Tahir**
Project Title **Liquefaction of Kenaf (Hibiscus cannabinus L.) Core for Wood Laminating Adhesive Applied**

Award Silver

Researcher **Jalaluddin Harun**
Project Title **Evaluation Linerboard Properties from Malaysian Cultivated Kenaf Sodaanthraquinone Pulp Versus Commercial Pulps Applied**

Award Silver

Researcher **Jalaluddin Harun**
Project Title **Comparison Kenaf Whole Pulp Versus Softwood Pulp and Mechanical Treatment (beating) to Improve Old Corrugated Board (OCC) Applied**

Award Silver

Researcher **Jalaluddin Harun**
Project Title **Soda-anthraquinone Pulp from Malaysian Cultivated Kenaf for Linerboard production Applied**

Award Silver

Researcher **Abdul Rahim Abdul Samad**
Project Title **Determinants of Deforestation in Peninsular Malaysia: An ARDL Approach Applied**

Award Silver

Researcher **Nor Azowa Ibrahim**
Project Title **Plasticised PLA/treated Kenaf Bast Fiber Bio-composites for Food Container Application**

Award Bronze

Researcher **Hazandy Abdul Hamid**
Project Title **Water Use and Growth Efficiency of Nine Varieties of Hibiscus Cannabinus (Kenaf)**

Award Bronze

Researcher **Ahmad Ainuddin Nuruddin**
Project Title **Asplenium nidus, A Drought Tolerant Epiphytic Fern Suitable for Extreme Environment**

Award Bronze

Researcher **Rusea Go**
Project Title **Corybas: The Endangered Endemic Orchids in Our Exhausted Highlands of Peninsular Malaysia**

Award Bronze

Researcher **Ahmad Ainuddin Nuruddin**
Project Title **Assessment of Forest Fire Effects in Peat Swamp Forest Using Forest Structure Characteristics Applied**

Award Bronze

Researcher **Edi Syams Zainudin**
Project Title **A Novel Method of Handling Material**

Award Bronze

Researcher **Jalaluddin Harun**
Project Title **Preparation of Cellulose Nanofibers with Hydrophobic Surface Characteristics**

INTROP: Safety Matters

9 STEPS FOR CLEANING UP A SMALL MERCURY SPILL

1

Remove metal items

2

If decide you cannot clean the items (i.e: Porous surfaces) place in plastic bags or seal with tape

3

Pick up broken glass and/or paper towel

4

Use the eyedropper to collect mercury beads

5

Sprinkle sulfur powder over the contaminated surface

6

Put all the items trash bag

7

Seal the trash

8

Open a window and use a fan to ventilate the area to the outdoors for 24-48 hours

9

Put away the trash in a hazardous waste bin

INTROP: Guest of INTROP

4 June 2010

From :
Warsaw University of Life Sciences (WULS), Poland
Prof. Danuta Nicewicz, Prof. Ewa Dobrowolska, Dr. Piotr Borysiuk, Dr.Piotr Boruszewski & Dr. Mariusz Maminski



1 April 2010

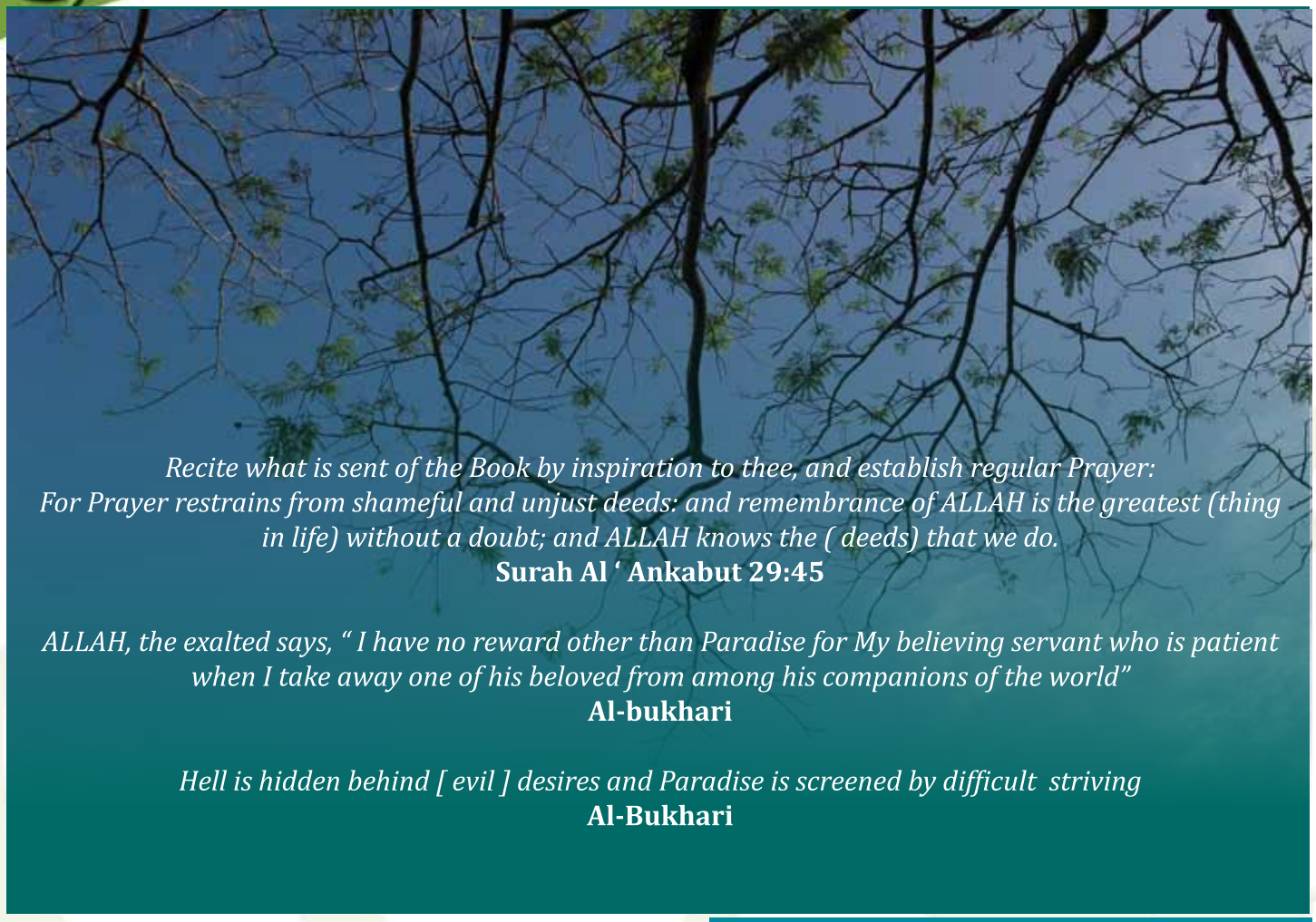
From :
Guangxi University
Prof. Chen Boashan &
Mr. Liang Jinsong



22 December 2009

From :
National Kenaf Tobacco Board

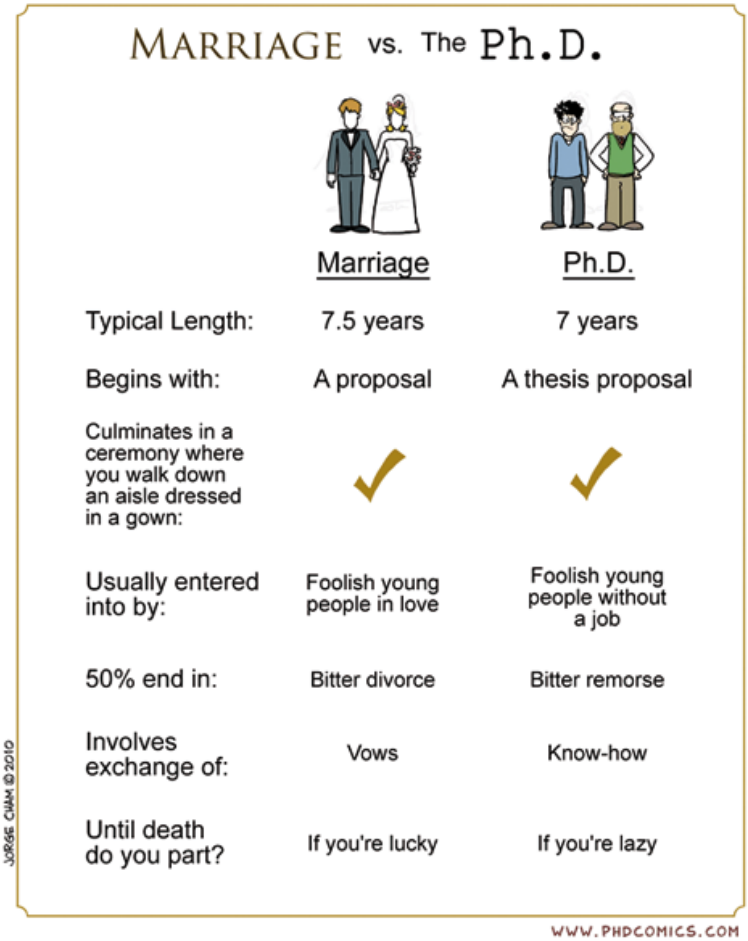


Recite what is sent of the Book by inspiration to thee, and establish regular Prayer: For Prayer restrains from shameful and unjust deeds: and remembrance of ALLAH is the greatest (thing in life) without a doubt; and ALLAH knows the (deeds) that we do.
Surah Al ' Ankabut 29:45

ALLAH, the exalted says, " I have no reward other than Paradise for My believing servant who is patient when I take away one of his beloved from among his companions of the world"
Al-bukhari

Hell is hidden behind [evil] desires and Paradise is screened by difficult striving
Al-Bukhari



Answers:

What type of supermarket bag is more ecofriendly, paper or plastic?

a) Paper
b) Plastic
c) Either is fine
d) None of the above

Quiz 1

Answer:
d. Manufacturing and disposing of both paper and plastic bags harms the environment. Bring your own reusable bags instead

True or false? During one long trip, you conserve more fuel by driving fast and getting to your destination sooner than you do by going the speed limit.

Quiz 2

Answer:
False. The EPA estimates you save about 15% on fuel by driving 55 miles (88 kilometres) per hour. Proper inflated tires and well tuned engine also improve fuel economy.