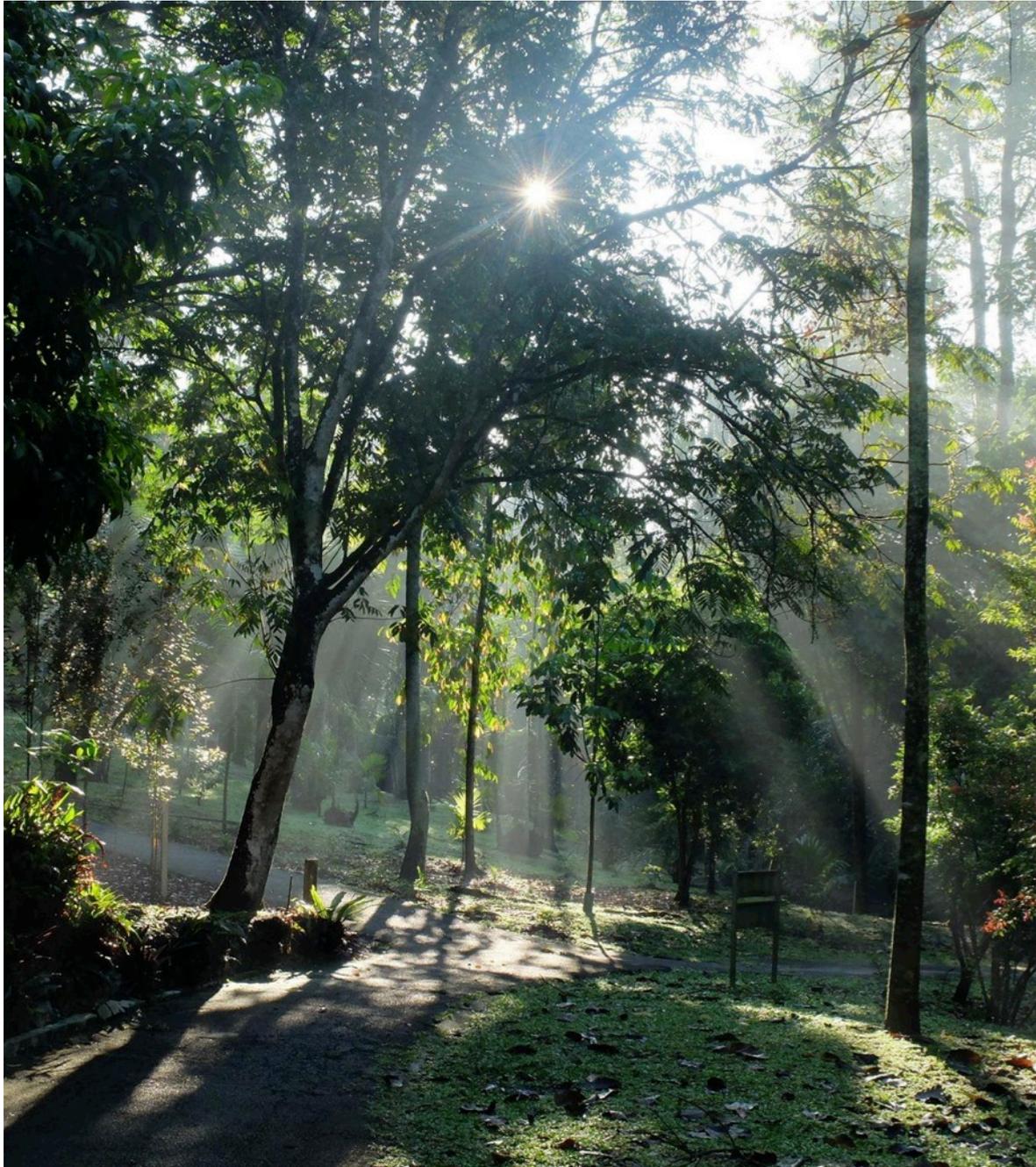


Guidelines for Landscape Management and Biodiversity Conservation, University of Malaya

The Rimba Project July 2018
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**UNIVERSITY
OF MALAYA**



**Sustainability
SCIENCE**

Introduction

The UM Sustainability Science Research Cluster (SuSci) launched its Eco-campus Blueprint in April 2016, covering eight Core Areas (Bidang Teras), all of which fall under the purview and implementational authority of the University of Malaya (UM)'s Department of Development and Estate Maintenance (JPPHB).

There were concerns that the blueprint was too academic and meant to address a primarily research audience. Thus, a series of dialogues called the 'Greening Roundtable' were held during the 2015-2016 academic year (see Appendix A, p.10). The Roundtable, comprising the Deputy Vice-Chancellor (Development), JPPHB, The Rimba Project, the Rimba Ilmu Botanic Garden and a handful of observers, discussed all parts of the Ecocampus Blueprint relevant to campus greening and biodiversity conservation.



Drawing from the outcomes of the Roundtable, this document presents operational guidelines for landscape management and biodiversity conservation centred around three Focus Areas (Table 1). In any event, a campus master plan for landscape management and biodiversity conservation is still needed, and it is hoped that the Roundtable will be a vehicle towards making this a reality.

Table 1. Focus Areas for landscape management and biodiversity conservation at the University of Malaya.

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Focus Area 1. The Greening Roundtable

1.1. Structure of the Greening Roundtable

The Rimba Project (RIMBA), a campus sustainability Living Lab administered by UM's Sustainability Science Research Cluster (SuSci), mooted the idea for a Greening Roundtable to bring together key stakeholders to discuss and implement best practices in campus greening and conservation. The long-term aim is to produce a greening policy that will be endorsed and enforced by UM's top management.

The Greening Roundtable document should contain not just guidelines but also the structure of the roundtable, and what its role is. Prof Rafiq suggested placing the Roundtable as an advisory unit assisting the Vice-Chancellor and Deputy Vice-Chancellor (Development):

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VC
 |---Roundtable?
DVC
 |---Roundtable?
JPPHB

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The following roles have been suggested for the Roundtable:

1. Act as a forum for all decisions regarding forest conservation.
2. Set policies and annual planning; take authority away from DVC and place it in the hands of the Roundtable.

It was proposed that the Roundtable can meet quarterly or so for monitoring and planning. The DVC (Development) will be the secretariat and chair, but the Roundtable may be comprised of various interested parties (e.g., researchers working on urban heating). However, it was also cautioned that the Roundtable should not admit too many members as it would end up burdened by too much bureaucracy and red tape. It should not be over-formalised.

For authority, the VC has to appoint the Roundtable, and the DVC (Development) needs to approve the budget and call for a Roundtable meeting to present a plan before implementation.

Action

Decisions need to be made on:

1. Whether or not the Roundtable can be formalised.
2. Whether or not the Roundtable will continue.
3. List of stakeholders: JPPHB, Rimba Ilmu, The Rimba Project, etc.
4. Active members vs. observers: e.g., SuSci, SDSN, UMCares, Living Labs, academics.
5. Frequency of Roundtable meetings.
6. Scope of the Roundtable: short-, medium- and long-term objectives.

1.2. Sustainability of the Greening Roundtable

There is concern from both the DVC (Development) and Rimba Ilmu that if the existing Living Labs (whose staff are funded on a contract basis) are discontinued at any point, all of these conservation efforts will collapse.

JPPHB's role is more of maintenance than social engagement due to language and time barriers. While JPPHB can support greening and conservation efforts logistically, there must be an interface. The ideal situation would be to maintain The Rimba Project and other Living Labs for the next 5-10 years. SuSci has been funding the Living Labs from 2015-2018. However, there is no progress yet as to the possibility of UM absorbing Living Lab personnel as a long-term part of the UM Development team. If a long-term Roundtable committee is formed, it is the VC's responsibility to maintain it.



Figure 1.2. Volunteers are a valuable asset in the implementation of greening and conservation strategies.

While it would be good to continue involving volunteers, even volunteers need management. There is also a time constraint factor: student volunteers prefer short-term projects (e.g., completed within one semester) with very clear goals, like tree tagging. In order to ensure long-term sustained action in landscape management and conservation, there must be a team of core staff employed for the medium- to long-term. This will be considerably more difficult without The Rimba Project or an equivalent management team.

Going forward, 'volunteerism' should be rebranded to include campus sustainability. The conventional view is that volunteering focuses more on the "human side of things," like helping out in old folks homes, orphanages and gotong-royong. Undergraduates can be involved in the conservation work of the Living Labs and research on sustainability solutions, but this must somehow be incentivised. These ideas need to be raised with the DVC (Student Affairs and Alumni) and DVC (Academic and International).

Action

1. Continue pursuing possibility of appointing Living Lab personnel in relevant roles within the Development team, with a 2- to 3-year commitment/contract, so as to reduce dependence on SuSci.
2. Negotiate with SuSci on Living Lab output; JPPHB and SuSci KPIs should be integrated and streamlined.
3. Develop strategies and systems for undergraduates to be more involved in conservation and research: find ways to incentivise this and/or incorporate it into part of the formal academic syllabus.

Focus Area 2.

Conservation of UM's Biodiversity, Forests and Green Spaces

2.1. Biodiversity surveys and conservation

Since 2014, The Rimba Project has conducted biodiversity surveys in UM's Section 12 and Jalan Ilmu bungalow zones, 15 acres each to the west and east of Jalan Universiti, respectively. The Section 12 biodiversity survey was cited as a milestone, setting the scene for a more biodiversity- and conservation-conscious approach to development. This 30-acre land bank is the focus of an ongoing conservation effort between JPPHB, UM Holdings, The Rimba Project and the Residents Association of Section 12. In 2016, RIMBA embarked on a survey of UM's land in Section 16.



Figure 2.1. The Rimba Project team during a biodiversity survey.

In May-June 2016, RIMBA completed tree tagging in eight bungalow lots of Section 12 earmarked for conversion into a commercial parking space. Private concessionaire Asiapark has commenced operations on those lots. The development of the parking and demolition of bungalows was carried out in consultation with RIMBA, to ensure that as many trees as possible were preserved.

The following zones have been earmarked for physical (re-)development in the near future:

Padang Varsiti
Ambang Asuhan Jepun
KK 3, 4, 7 and 8

Examinations Building
Jalan Ilmu
Section 16

Action

1. While biodiversity surveys have been included in the DVC's Development Checklist, survey teams need ample time to conduct surveys before developments commence. These studies should be done first before architects draw up plans. Depending on the size and scale of the construction, minimum advance notice between 2 weeks and 6 months is needed to conduct an adequate biodiversity survey.
2. It was suggested that if the developer were internal, JPPHB would pay for the survey; if external, the contractor would pay for it. If integrated into the development process, this can be a source of steady income for initiatives like the Rimba Project.
3. Biodiversity studies must be done periodically, be made compulsory reading for contractors, and included in the info packs of calls for proposals.
4. Explore possibilities for collaboration with state government, municipal council, NGOs and private enterprises to manage urban green pockets, including ideas like afforestation in empty lots.

2.2. Forest review and conservation zoning

In 2015, UM ranked 65th on the UI Green Metric tables, an increase from 73rd in 2014. Out of six evaluation categories, however, UM scored poorly on Setting and Infrastructure (SI), receiving only 654 points out of an available 1,500. Two of the six indicators for SI are 'Area of campus covered in forested vegetation' and 'Area of campus covered in planted vegetation'.

Forests contribute many ecosystem services to our urban campus, including water catchment (mitigating erosion and flooding), habitat for biodiversity (UM is home to 90 bird species, of which over 20 are migrant species), and heat regulation (maintaining pleasant ambient temperatures especially around colleges and faculties).

Out of UM's total land area of 360 ha, an estimated 100 ha is forested (see Appendix B, p.11). However, as of April 2016, UM's forest cover has decreased by 4.8% since July 2014. This decrease is approximately equivalent to 7 football fields. It was suggested that an immediate priority should be to reconnect fragmented forests to the main Rimba Ilmu/Bukit Arang area.

For future developments, it was recommended that forests be integrated into design: it is often not necessary to clear an entire forest for infrastructural development. Two approaches to landscaping were pointed out: **intrusion** is about land clearing and replanting after construction, while **insertion** seeks to build according to the land with minimal disruption. Similarly, there is a contrast between **reforestation**, which is about replanting lost forest, and **afforestation**, which is about establishing a forest or stand of trees where there was previously little or no tree cover.

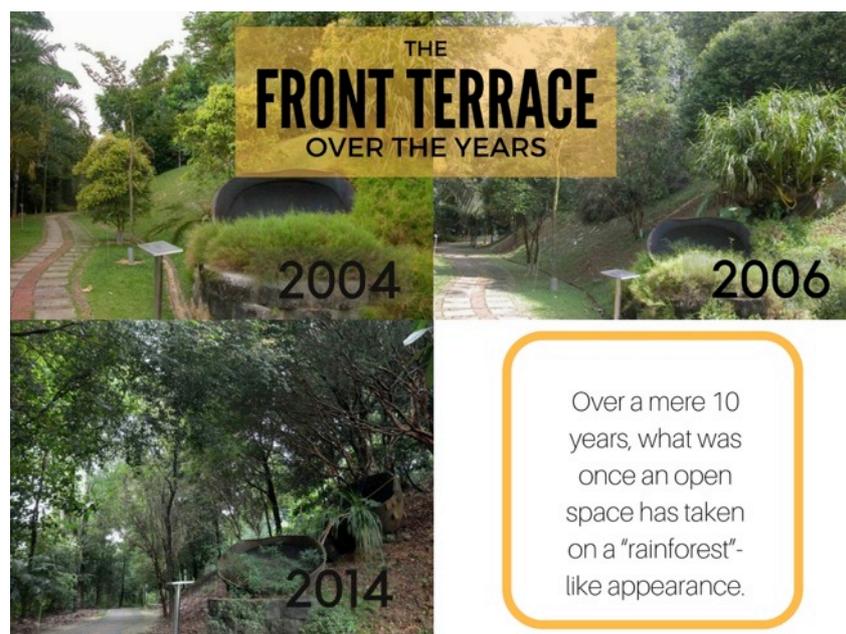


Figure 2.2. Creative selection of diverse tree species enables effective forest-style landscaping within a small area. The resulting canopy reduces ambient heat while providing a habitat for biodiversity.

Action

1. Identify forested areas that will be developed, with respective order and timeframe.
2. Investigate costs, deliverables and timeline for biodiversity corridor/forests links project, and identify potential degraded sites for reforestation. Find creative ways to improve habitats, like what was done at the Rimba Ilmu Front Terrace.
3. Come up with a reasonable conservation target and boundaries for forest preservation, e.g., should colleges and faculties have a forest quota?

2.3. Management and conservation of Rimba Ilmu

Rimba Ilmu was founded in 1974 as an arm of the then-Department of Botany. Today, it is managed as part of the Faculty of Science's Institute of Biological Sciences (ISB). The Rimba Ilmu Botanic Garden is part of UM's 60-hectare Bukit Arang forest, one of only two green lungs on the KL-PJ border that service the population from PJ Selatan in the west, to Bangsar and Kerinchi in the east.

At present, many structures in the garden are in disrepair. In October 2016, an electrical failure in the Herbarium caused the air conditioning to malfunction. ISB/Bursary claim that no funds were available for the repair thereof. A total of 70,000 accessions—some of which are type specimens (original specimens of new species)—are at risk of damage from the elevated temperature and humidity. Further complicating matters, maintenance and upgrading work in Rimba Ilmu is difficult as Rimba Ilmu receives an annual budget (excluding salaries) of only approximately RM20,000 from ISB.



Figure 2.3. Unauthorised encroachment into UM's forests can lead to damage of our trees.

Meanwhile, other problems persist. The boundaries of Rimba Ilmu are unclear, and UM's forests in general are at constant risk of encroachment. There have also been reports of animal poaching. Under the DBKL KL City Plan 2020, Bukit Arang, one of 10 sites within DBKL's city limits identified for preservation. Any exploration or development of Rimba Ilmu should be for the purposes of research, conservation and/or education, and should be with the permission of Rimba Ilmu and appointed management partners. However, the setting of boundaries needs a committee appointed by the VC. The DVC (Development) has to be in the Secretariat. If more authority is needed, it has to be a committee formed under the Board of Directors (LPU), chaired by a board member. This committee needs to be impartial, chaired by someone neutral, e.g., VC or representative.

Action

1. Set up a committee or task force to investigate gazettement Rimba Ilmu as a national heritage.
2. Conduct a mapping exercise to determine Rimba Ilmu's boundaries.
3. Determine criteria for gazettement, including: boundaries, biodiversity baseline, permissions and penalties for development, unauthorised trail making, poaching and harvesting of resources.
4. If Rimba Ilmu is to grow and/or build capacity in the coming years, a long-term caretaker plan is needed. Perhaps a joint-management scheme between ISB and DVC (Development) should be considered. Both sides should determine their respective stakeholders in park management.
5. Design strategies for better resilience in the face of technical failures, and explore possibilities for long-term external funding.
6. Propose timeline for action plan.

Focus Area 3. Estate Maintenance and Management

3.1. Protocol for developers and contractors

A lot of trees and green space become collateral during hastily planned or poorly executed construction and development works. There is a loss not only to biodiversity and aesthetic beauty, but also to initial investments of the University: it is counter-productive, for instance, to clear a stand of trees that may have cost thousands of ringgit some years back, just because a detailed pre- and post-construction inventory was not carried out.



Figure 3.1.1. A tree has been earmarked for removal during an upcoming construction.

Rimba Ilmu cited the case of damage caused during construction of the UM Arena (stadium) was. About 50-60 trees of rare species behind the bus stop were cleared during the construction; this land was under the jurisdiction of JPPHB. When approached by Rimba Ilmu, the contractors said they would “transfer” the trees somewhere else. What happened was that the contractors just removed the trees and put them on the ground, where they dried up and died out.

JPPHB suggested that the Tree Preservation Order Act 2000 (which calls for the replanting of trees with a trunk girth of over 50 cm diameter, or the payment of a RM5,000 fine otherwise), if properly enforced, could be an opportunity to tap contractors to channel resources into campus greening and conservation.

However, it was also pointed out that such a standard was unfair: it is not only large or old trees that have value. Some trees, by virtue of their rarity or ecosystem services otherwise, should be valued accordingly. Furthermore, many of those trees that were lost weren’t large yet; they needed time to grow and this unfortunate incident curtailed that.



Figure 3.1.2. Inspecting trees delivered by contractors/suppliers (left). JPPHB contract staff play an important role in supporting greening efforts and translating them into reality (right).

Action

A clear and transparent tree management protocol needs to be formulated. This may include:

1. JPPHB to consider changing contract requirements for contractors, to factor in cost and time for biodiversity studies and inventory work.
2. A landscaping checklist should be developed to factor in conservation needs before any work commences.
3. Assessment of development site by JPPHB, Rimba Ilmu and relevant stakeholders, to be counter-signed by at least both JPPHB and Rimba Ilmu before construction begins.
4. A form that lists trees to be preserved, trees to be removed and trees to be planted in replacement. The species and value of trees are to be determined by JPPHB and Rimba Ilmu.
5. Adequate timeframe for University action and notice to contractors.
6. Inclusion in all future development contracts a clause for replacement or penalty for all trees damaged or destroyed during construction. This must be based on an inventory pre- and post-construction to be done by both JPPHB and Rimba Ilmu.
7. This must also be legally binding so that contractors cannot get away scot-free. Identify legal assistance needed for the above.

3.2. Tree planting and maintenance

There are many large and old trees on campus. The wellbeing of these trees is at stake because they have yet to be identified (increased risk of accidental damage), and because they are potential lightning magnets. JPPHB is working on a survey of heritage trees on campus, including a report on the value of UM's trees.

At present, the selection of trees for planting is often arbitrary, dependent on a contractor's recommendations, a supplying nursery's stock, or a Vice-Chancellor's whims and fancies. In Prof Rafiq's words, "There is no science to it." There needs to be a more systematic approach to the selection of trees, one that takes into account landscape, functional, conservation and biodiversity values, among others. JPPHB put it this way: "the right species in the right place." In addition, it was agreed that more native species should be planted, especially rare and lesser-known species.

Under the new zoning system on campus (e.g., Chancellery zone, Rimba zone), we should have a vision of what kind of trees ought to be planted in each zone. It was suggested that Rimba Ilmu, The Rimba Project, JPPHB and urban planning experts should consider working on a catalogue of common tree species, to be used as a reference point for all future planting activities so that informed choices can be made instead of just going with whatever trees the contractor supplies. The catalogue could cover these criteria:

1. Conservation status: rare or common
2. Origin: native or not
3. Growth rate: fast, medium, slow
4. Durability
5. Recommended clear distance/radius/buffer between trees and buildings/other trees
6. Size: define large, medium, small
7. Canopy-forming ability and quality
8. Permanence: short-lived or long-lived species



Figure 3.2. Example of a tree species catalogue (from *Malaysian Threatened and Rare Tree Identification and Landscape Guideline* by Sime Darby Property).

Action

1. Ensure that all tree suppliers are credible nursery providers and not merely middlemen.
2. Ensure care for new seedlings and young trees, which are susceptible to damage from grass-cutting blades: PVC collars at the base of the trunk are seldom effective enough.
3. Prepare tree species catalogue.
4. Research and resolve dispute concerning the practice of mulching: Some assert that it is beneficial to the wellbeing of trees, while others argue that mulching attracts termites that may damage trees.

3.3. Interpretation and information management

A lot of the hard work that JPPHB puts into maintaining greenery on campus goes unnoticed, and therefore under-appreciated and sometimes even misinterpreted. Also, there is very little communication between JPPHB and the campus community. Perhaps it has always been assumed that JPPHB's role is "in the shadows" and need not be shared, but if we really want the campus community to rally in support of the conservation of our green spaces, they ought to know what goes on behind the scenes.

Pericopsis.org

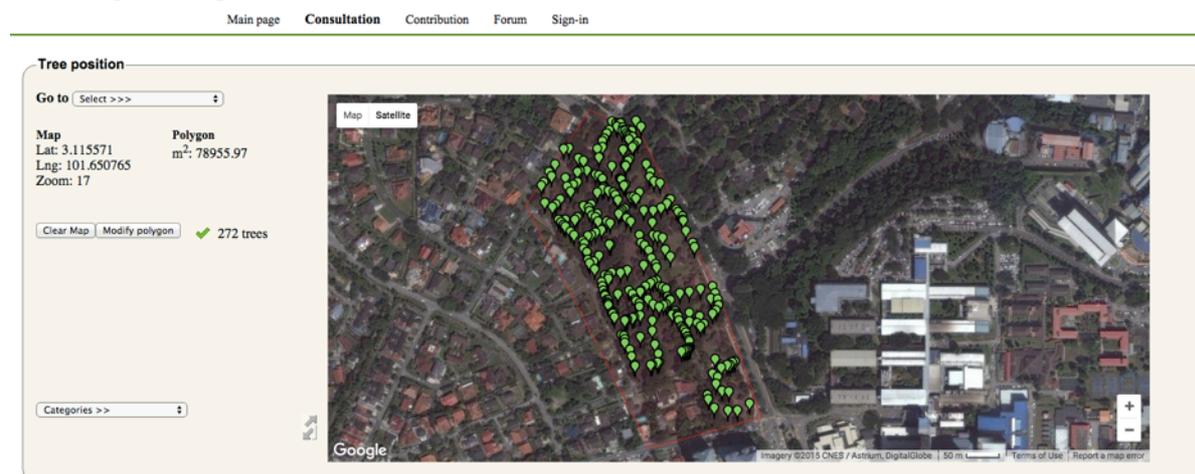


Figure 3.3.1. Pericopsis.org is an example of a user-friendly web repository for documentation and visualisation of our trees (and other flora) on campus. A similar repository can be tailor-made for UM.

JPPHB runs a web-based GIS interface that can track tree maintenance status (e.g., whether a tree is to be trimmed or removed), alongside a variety of other information, from data on individual trees and hydrography, to utilities and the built environment. Water Warriors mentioned that it would be interesting to see if there is a connection between vegetation and water bodies on campus. They are already working to develop a GIS platform on Tasek Varsiti and other water bodies on campus, in collaboration with researchers at ISB's Bioinformatics division.



Figure 3.3.2. Tree tagging is part of the Rimba Project's Trees of UM initiative.

Citing The Rimba Project's Trees of UM documentation initiative, launched at the UM Library in October 2015, the Deputy Vice-Chancellor (Development)'s vision is that the Trees of UM project will eventually cover all of UM, with specific zones, e.g., Chancellery zone. Its aim should be to get people interested in trees, for example, *pokok lontar* (the *Borassus flabellifer* palm) that is part of UM's emblem.



Figure 3.3.3. Visiting students reading the *Trees of the Library* brochure (left). Student volunteers designed and developed two new trails in Rimba Ilmu, preparing accompanying interpretive brochures as well (right).

Action

1. Develop a user-friendly online resource where the campus community can find out about trees planted and removed, along with other developments. This could build on JPPHB's GIS interface, or take the form of an updates section or sub-page on the JPPHB website. It was suggested that this should eventually be an interactive website.
2. Continue mapping and tagging trees, and support awareness building with interpretive material, e.g. print or digital brochures. Besides knowledge and awareness building, such publications can serve as a communication and branding tool for visitors, strategic partners and public dissemination.

Appendix A: The RIMBA-JPPHB Greening Roundtable

The *Guidelines for UM Landscape Management and Biodiversity Conservation (July 2018)* is adapted from ideas and resolutions put forward during the RIMBA-JPPHB Greening Roundtable series in 2015-2016. Roundtable meetings were held on 15 Dec 2015, 26 Apr 2016 and 29 Aug 2016.



Figure A1. (left) En Zulkapli, En Maszairizam, Dr Sugu and Prof Rafiq.

Figure A2. (centre) Prof Rafiq and En Ghazali.

Figure A3. (right) Roundtable convenor Benjamin Ong.

All photos by Tan Kai Ren.

Here is a list of everyone involved in one or more of the above stages:

Deputy Vice-Chancellor (Development)'s Office and JPPHB

Prof Faisal Rafiq Mahamd Adikan

En Maszairizam Masri

En Mustafa Abdul Rani

Deputy Vice Chancellor (Development)

Assistant Engineer, JPPHB

Administrative Assistant and Nursery Supervisor, JPPHB

Rimba Ilmu Botanic Garden

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En Ghazali Sabda

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Coordinator

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Garden Supervisor

The Rimba Project (RIMBA)

Benjamin Ong

Vanessa Ting

Nurul Fitrah Marican

Angeline Lim

Elena Shim

Tan Kai Ren

Raja Widad Raja Wahidin

Asif Khan

Project Officer / Roundtable Convenor

Project Officer

Project Assistant

Volunteer Rapporteur

Volunteer Rapporteur

Observer

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Living Labs

Dr Zeeda Fatimah Mohamad

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Mohd Shahrul Amin

Principal Investigator, Water Warriors

Project Officer, Water Warriors

Project Assistant, Water Warriors

Faculty of the Built Environment

Dr Goh Hong Ching

Senior Lecturer, Faculty of the Built Environment

Appendix B: UM Forest Cover Update, April 2016

1. BACKGROUND

This assessment of forest cover is based on the UM LCCF Forest Inventory Report prepared by Hamdan Omar of FRIM (2013). The forest sites within UM were identified in that report as follows:

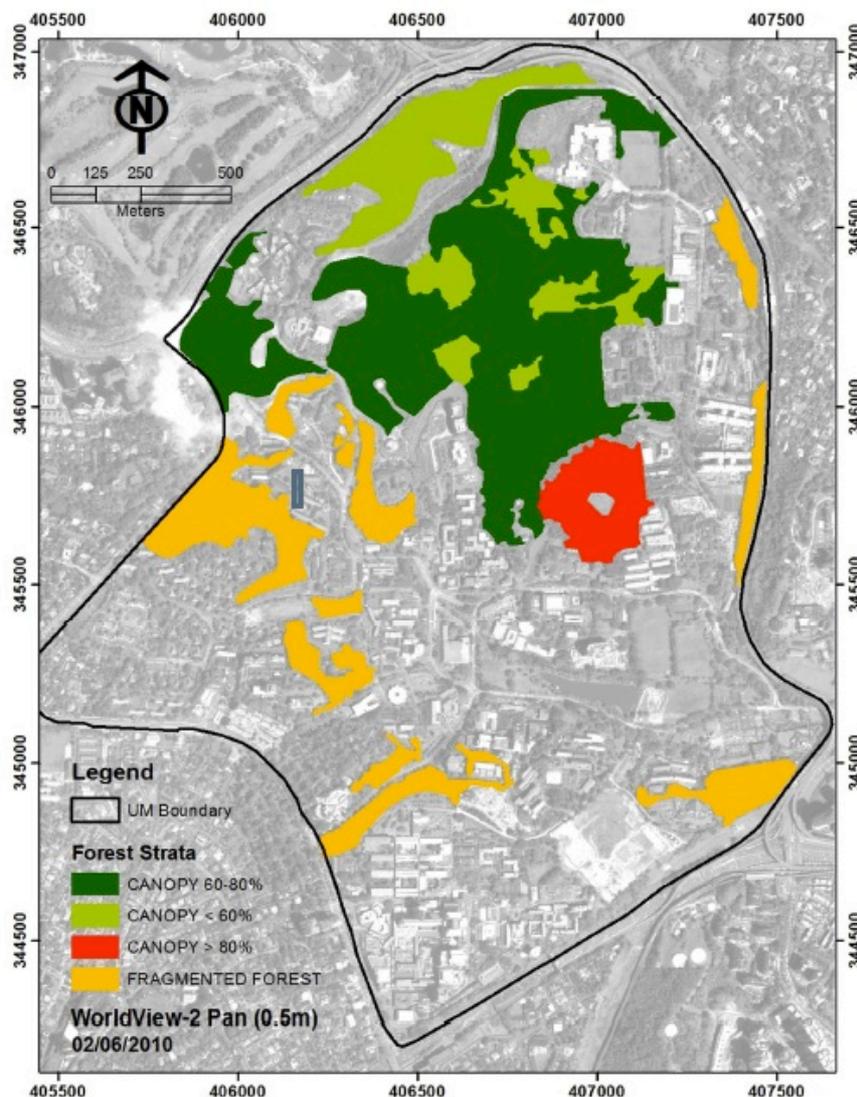


Figure B1. Excerpt from the FRIM report's 'Figure 3: Strata of forests in the study area'.

The FRIM report indicates that most of the forest sites on campus are fragmented (isolated and perhaps too small to support viable breeding populations, especially of larger animals). The largest forest sites are the least fragmented.

We note, however, that the campus boundary map in the illustration above (found on page 5 of the report) is somewhat inaccurate. MAHSA University (along Jalan Universiti) is included within the UM boundary, while the Palapes and Zero Waste Campaign sites around the Damansara Gate are not. Nonetheless, these errors almost cancel each other out, and the corrected total area of the University stands at about 363 ha, just 4 ha shy of the 367 ha stated in the FRIM report.

2. REVIEW OF FOREST SITES



Figure B2. Google Maps image of 14 forest sites in the University of Malaya.

The area of each forest site was estimated using the polygon function on Pericopsis.org, an urban tree-mapping platform run on the Google Maps engine. The total forest area reported by FRIM was 108.1 ha, while Pericopsis.org yielded a close estimate of 108.5 ha (July 2014).

Table 1. Change in forest cover of 14 sites in the University of Malaya (1 ha = 10,000 m²).

No.	Location	Latitude	Longitude	July 2014 Area (m ²)	April 2016 Area (m ²)	% Change
1	Bt Arang/R. Ilmu	3.130068	101.655006	641,352	641,352	-
2	Bt Cinta/Sprint	3.132939	101.654046	106,000	106,000	-
3	KK4/Sec 16	3.123426	101.648555	95,742	81,055	-15.3
4	KK8/Sec 16	3.128526	101.648617	61,691	54,676	-11.4
5	Law/KK1	3.116760	101.660668	37,778	30,850	-18.3
6	Eng/PJ Gate	3.116251	101.652410	27,423	19,527	-28.8
7	APM/Science	3.124519	101.652254	27,140	25,837	-4.8
8	INTAN/Arts	3.119921	101.650808	26,617	16,394	-38.4
9	KK12/Sprint	3.124723	101.661572	16,058	16,058	-
10	KK11/Sprint	3.130240	101.661143	15,481	12,820	-17.2
11	FPP/PJ Gate	3.117232	101.652316	9,784	9,784	-
12	KK7 (west)	3.126378	101.650229	7,923	6,730	-15.1
13	FBL/Arts	3.121455	101.651066	6,825	6,825	-
14	KK7 (east)	3.125548	101.651267	5,334	5,230	-2.0
TOTAL				1,085,147	1,033,137	-4.8

3. DISCUSSION

In 2014, the total forest cover as a percentage of total campus area was approximately 29.9%, while the percentage as of April 2016 is 28.5%. This is a decrease of some 50,000 m² of forested land within two years, nearly equivalent to 7½ football fields. Forest clearing for construction and development is the main cause of this decrease.

A significant portion of UM's forest cover comes from the Bukit Arang/Rimba Ilmu forest, which alone accounts for over 60% of total forest cover, and nearly 18% of total campus area.

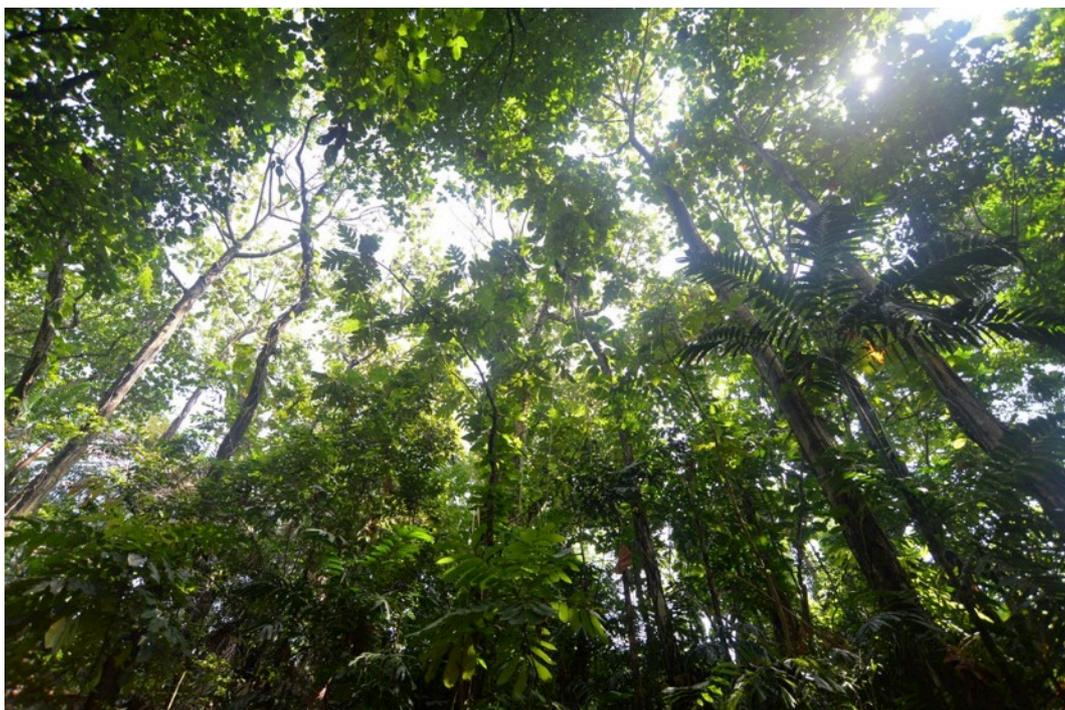


Figure B3. Site no. 11: the secondary forest between the PJ Gate and the Faculty of Business and Accountancy (FPP).

4. RECOMMENDATIONS

Besides serving as a habitat for plants and animals, forests in urban areas also help to moderate ambient temperature (thereby reducing heat), generate fresh air, and reduce flooding—the forest absorbs water far better than most drainage systems. The presence of nature in the urban landscape has also been linked to positive psychological effects in studies on the Attention Restoration Theory. Future greening plans for the University must, therefore, take into account not only the protection of existing forested areas, but also strategies to increase forest cover as well as enhance existing forests and green spaces.

4.1 Minimise net forest loss

Development should not result in a significant net change in forest cover. New developments should be creatively designed to harmonise with existing greenery and vegetation (insertion), instead of replacing or wiping out forested areas wholesale (intrusion).

4.2 Afforestation and defragmentation

Forested land that may be cleared for development should be balanced by forest rehabilitation efforts in other parts of campus. Where possible, establishment of new forest sites (afforestation) can also be considered. For example, the grass field near the 9th College Gate (coordinates 3.121273, 101.649851) lies in between two fragmented forest sites—INTAN/Arts (site no. 8) and FBL/Arts (site no. 13). If rehabilitated, it could serve as a corridor linking these two forest fragments.