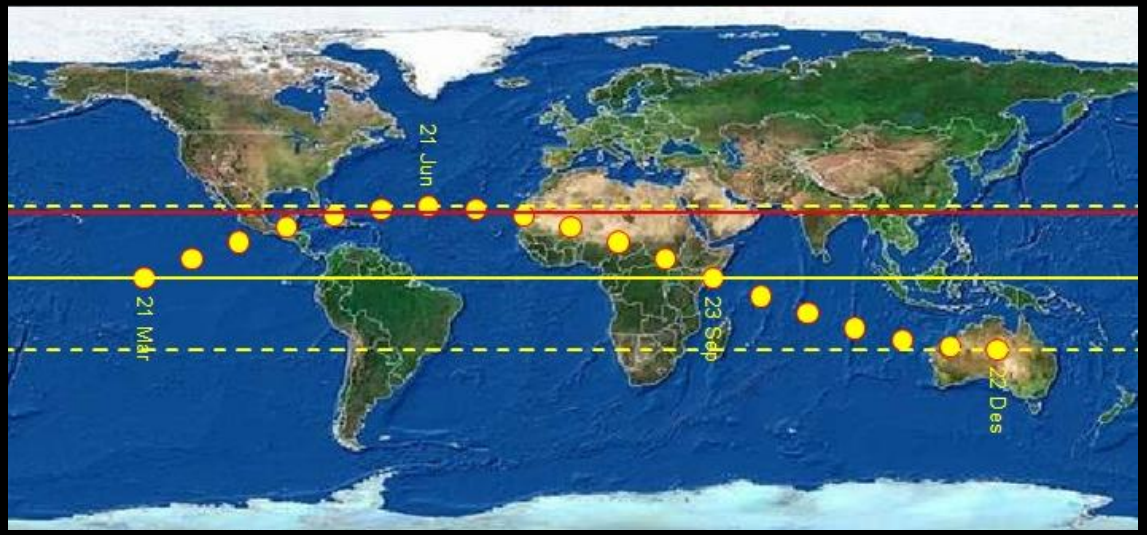
ARSITEKTUR TROPIS

Cut Nuraini/Institut Teknologi Medan/16-09-2014



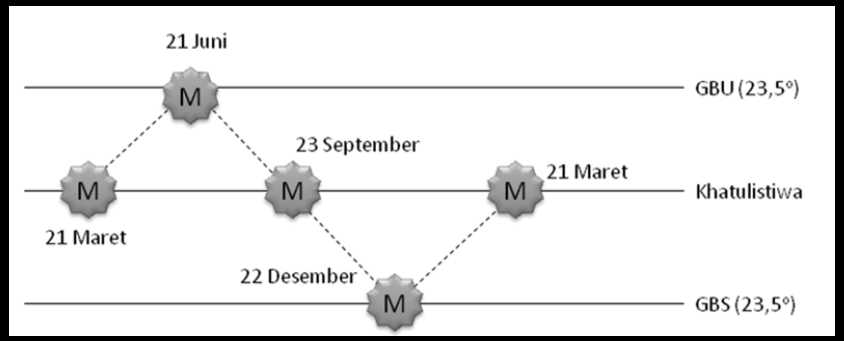
APA ITU ARSITEKTUR TROPIS ?

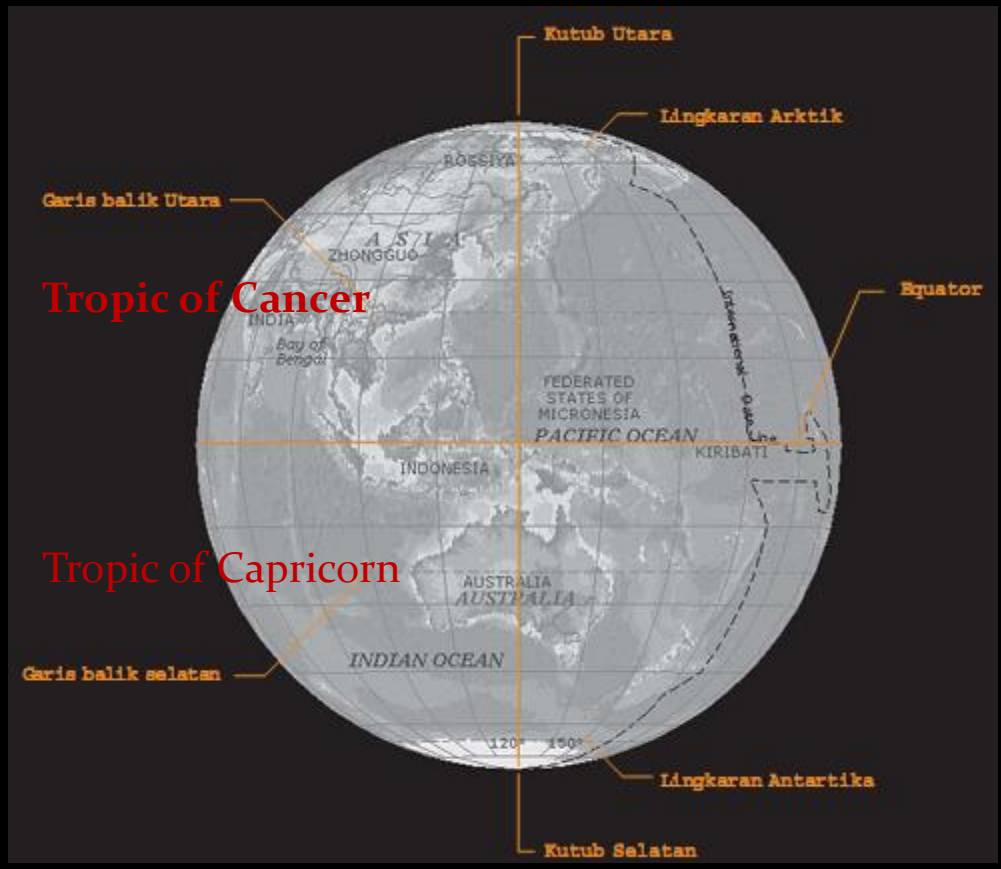
TROPIS “ *tropikos* “ artinya : Garis Balik

Garis-garis Balik adalah garis lintang 23°27’ utara dan selatan

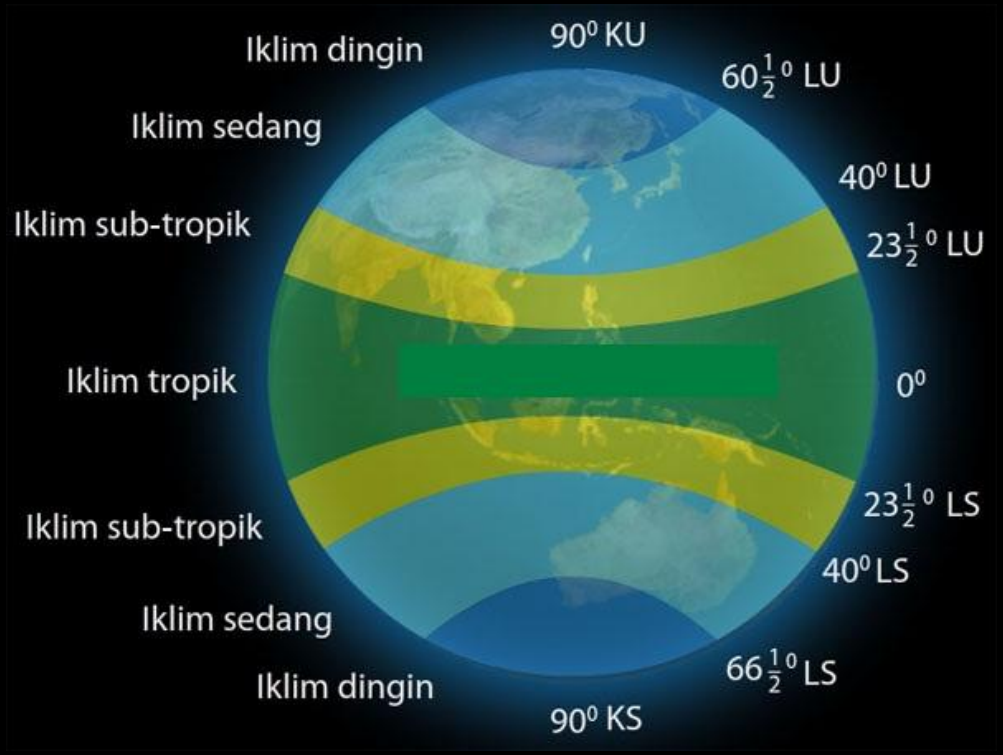
Garis lintang utara 23°27’ adalah garis balik cancer dan matahari pada tanggal 27 Juni mencapai posisi tegak lurus.

Garis lintang selatan 23°27’ adalah garis balik caprocorn dan matahari pada tanggal 23 Desember berada pada posisi tegak lurus..





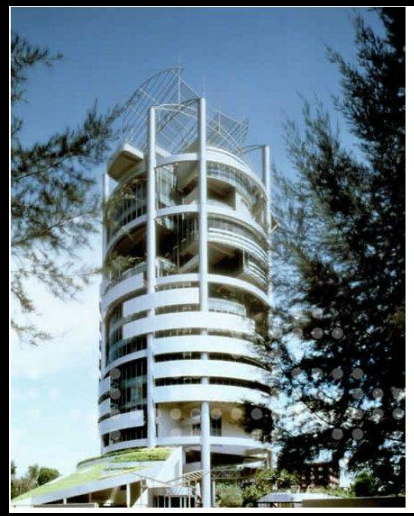
Pembagian bumi pada garis-garis tegak ini tidak mempertimbankan batas-batas daerah iklim yang sebenarnya, sehingga defenisi ‘tropis’ saat ini adalah daerah yang terletak di antara garis isoterm 20°C di sebelah bumi utara dan selatan

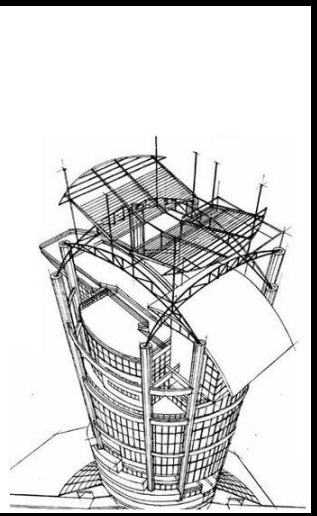


Arsitektur Tropis adalah arsitektur yang mempertimbangkan kondisi iklim dalam perencanaan dan perancangannya, baik secara mikro (bangunan), meso (lingkungan) dan makro (kawasan)

Arsitektur Tropis terus berkembang dan diwujudkan dalam bentuk beragam tema, seperti :

Green Architecture





Mesiniaga di Malaysia, karya Ken Yeang

Nagakin Capsule di Jepang karya Kisho Kurokawa

Arsitektur Metabolish

Memanfaatkan cahaya matahari secara optimal

Solar Arsitektur

Hotel Indonesia di Jakarta karya Arsitek Abel Horensen

Gedung Rektorat Universitas Indonesia di Jakarta karya Prof. Gunawan

IKLIM DAN GEOGRAFIS PADA ARSITEKTUR TROPIS

2 kategori Lingkungan yang terbentuk oleh kondisi iklim dan geografis :

1. Daerah Tropis Kering dengan padang pasir, stepa dan savana kering
2. Daerah Tropis Lembab dengan hutan tropis, daerah-daerah dengan angin musim dan savana lembab

Kondisi iklim pada suatu daerah tertentu yang meliputi area yang lebih besar dan mempengaruhi iklim mikro

Iklim makro dipengaruhi oleh lintasan matahari, posisi dan model geografis

Iklim-makro berhubungan dengan ruang yang besar seperti negara, benua dan lautan

Iklim setempat yang memberikan pengaruh langsung terhadap kenikmatan (fisik) dan kenyamanan (rasa) pemakai di sebuah ruang, bangunan

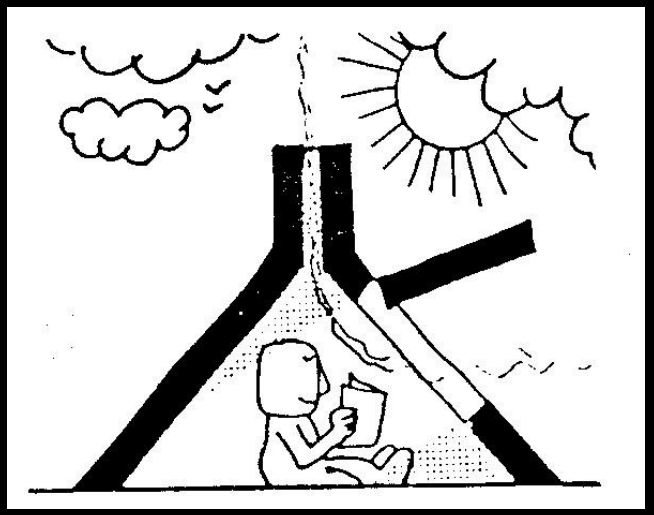
Iklim-mikro berhubungan dengan ruang terbatas, yaitu ruangan dalam, jalan, kota atau taman kecil.

CLIMATE

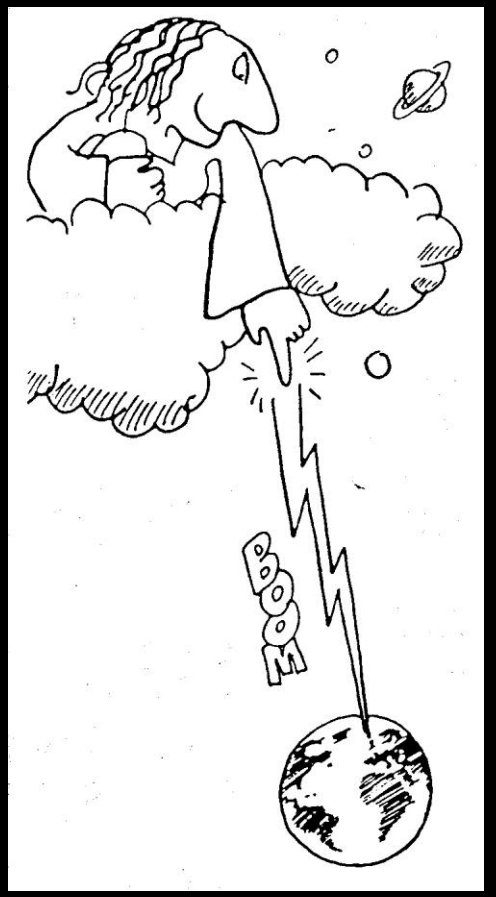
HOW SHELTER DEALS WITH THE ELEMENTS

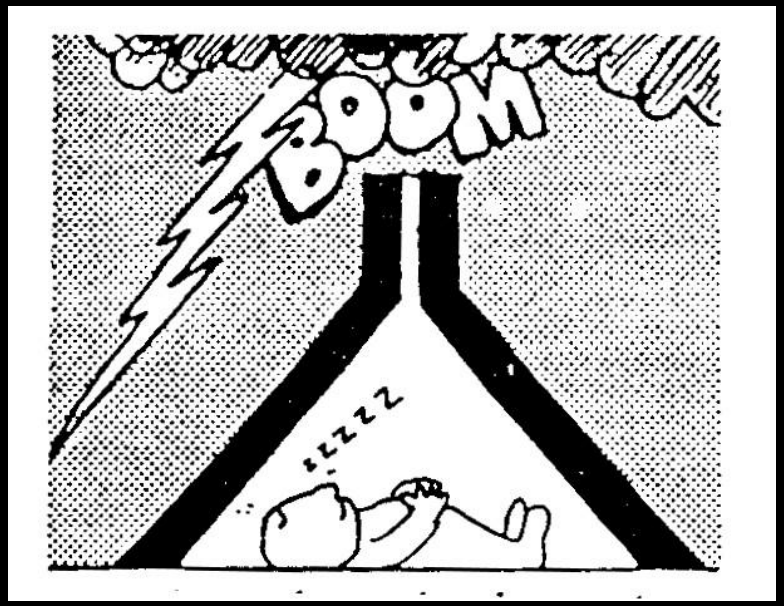
BUMI DICIPTAKAN DENGAN BEGITU BANYAK Jenis IKLIM DI DALAMNYA

Hunian manusia harus memiliki filter untuk memodifikasi iklim

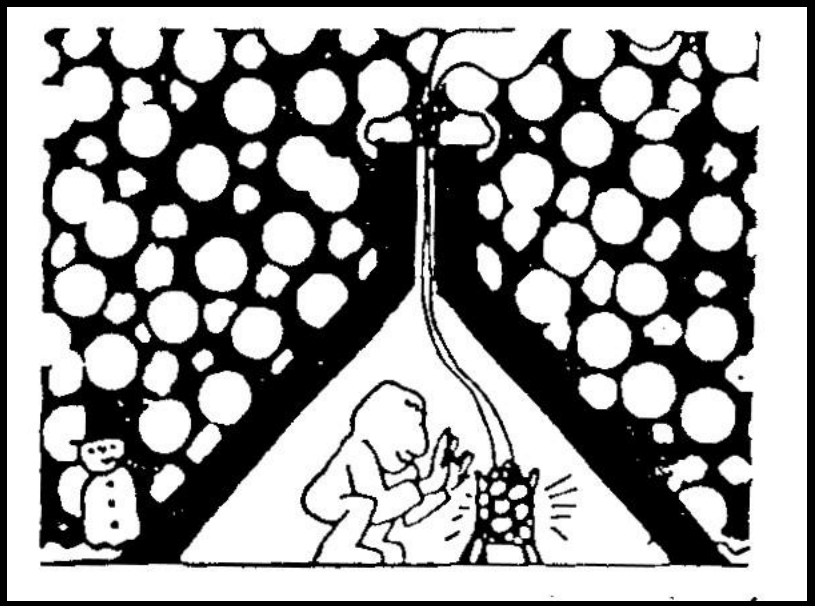


Mampu MEMASUKKAN CAHAYA, UDARA DAN SINAR MATAHARI KE DALAM





Mampu MELIDUNGI DARI HUJAN DAN KEBISINGAN

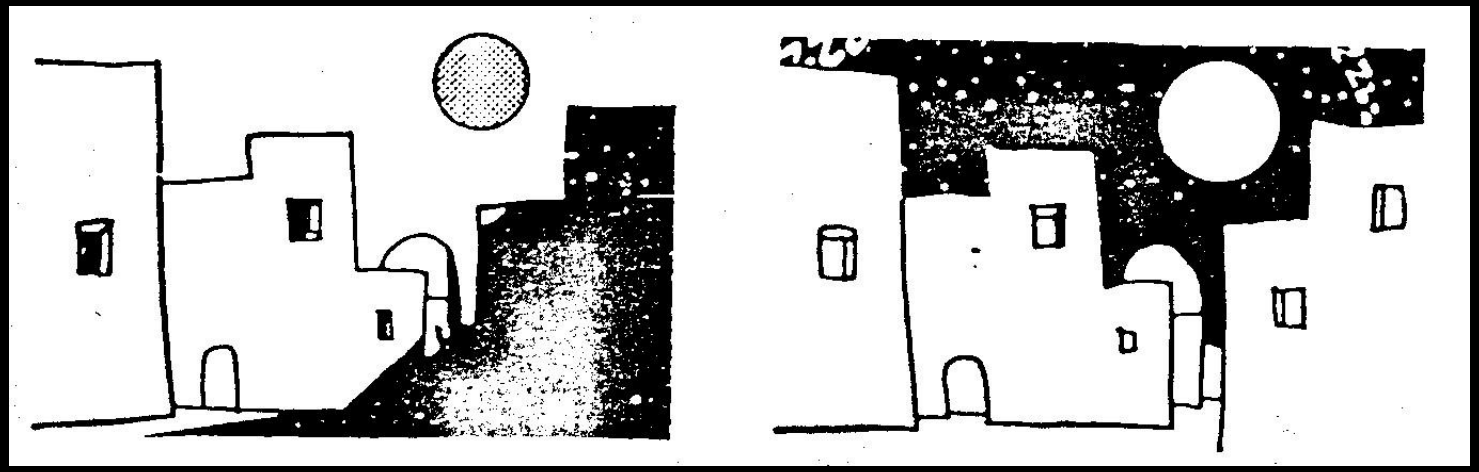


Mampu MEMBERIKAN RASA HANGAT

DALAM PERKEMBANGAN SELANJUTNYA, MANUSIA MENCIPTAKAN LINGKUNGAN BUATAN YANG NYAMAN DENGAN MEMANFAATKAN POTENSI-POTENSI LINGKUNGAN SETEMPAT YANG ALAMI

3 Jenis Tipe iklim Makro :
1. PANAS DAN KERING, 2. DINGIN DAN HUJAN, 3. PANAS DAN LEMBAB

SETIAP BANGUNAN HARUS BERADAPTASI DENGAN IKLIM melalui penggunaan MATERIAL DAN TEKNOLOGI SETEMPAT

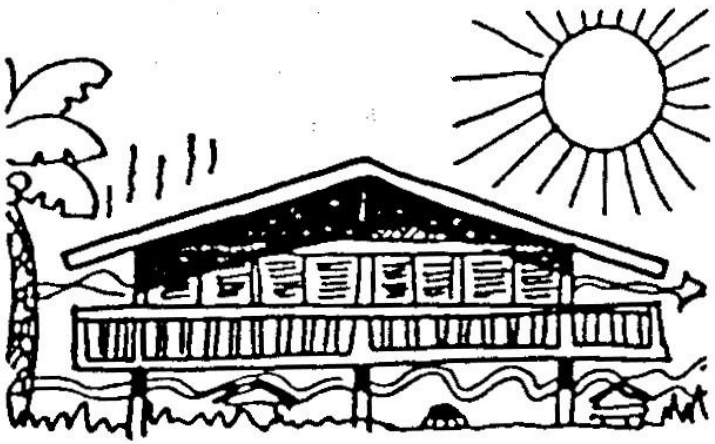


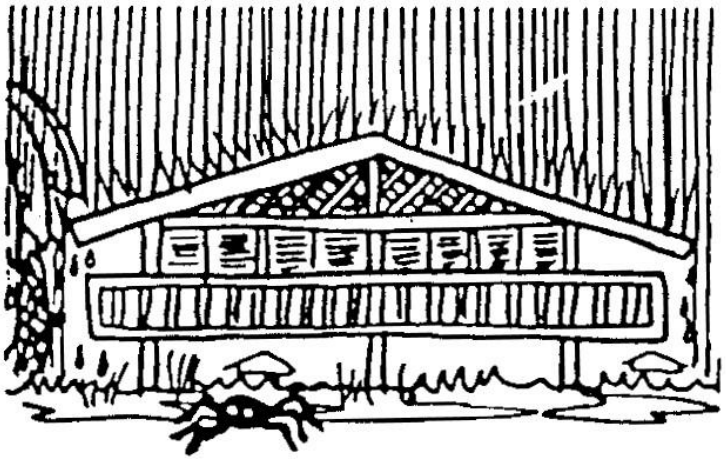
DI DAERAH BERIKLIM PANAS, DINDING BETON DAPAT MENGURANGI PANAS SIANG HARI, WARNA TERANG DAPAT MMEMANTULKAN SINAR MATAHARI, DAN UKUAN JENDELA YANG KECIL DAPAT MEMINIMALISIR EFEK SILAU

DI MALAM HARI, PANAS YANG TERSIMPAN DI DINDING BETON DAPAT MEMBERIKAN KEHANGATAN DI DALAM RUANG

DI DAERAH HUJAN DAN DINGIN, KETEBALAN DINDING KAYU AKAN MENGUSIR DINGIN DAN MENYIMPAN PANAS. KARENA CAHAYA DI LUAR SANGAT SEDIKIT MAKA DIBUTUHKAN JENDELA YANG BESAR

KEMIRINGAN ATAP MAMPU MENDISTRIBUSIKAN HUJAN DAN SALJU DENGAN CEPAT, JUGA MELINDUNGI BANGUNAN DARI ANGIN KENCANG. PERLINDUNGAN JUGA DI DAPAT DARI POLA BANGUNAN YANG MENGELOMPOK MEMBENTUK *CLUSTER*





DI DAERAH TROPIS YANG BERIKLIM PANAS LEMBAB, DINDING HARUS BANYAK BUKAAN (SIRKULASI SILANG) UNTUK MEMBIARKAN UDARA LEWAT DAN MENGHALAU PANAS KELUAR BANGUNAN. BIASANYA DIGUNAKAN BERANDA DAN *OVERHANG* ATAP UNTUK MELINDUNGI BAGIAN LUAR BANGUNAN

DI MUSIM HUJAN, *OVERHANG* ATAP MELINDUNGI BANGUNAN DARI AIR HUJAN.

BANGUNAN DIANGKAT KEDUDUKANNYA DARI TANAH (RUMAH PANGGUNG) UNTUK MELINDUNGI DIRI DARI GANGGUAN ALAM DAN BINATANG

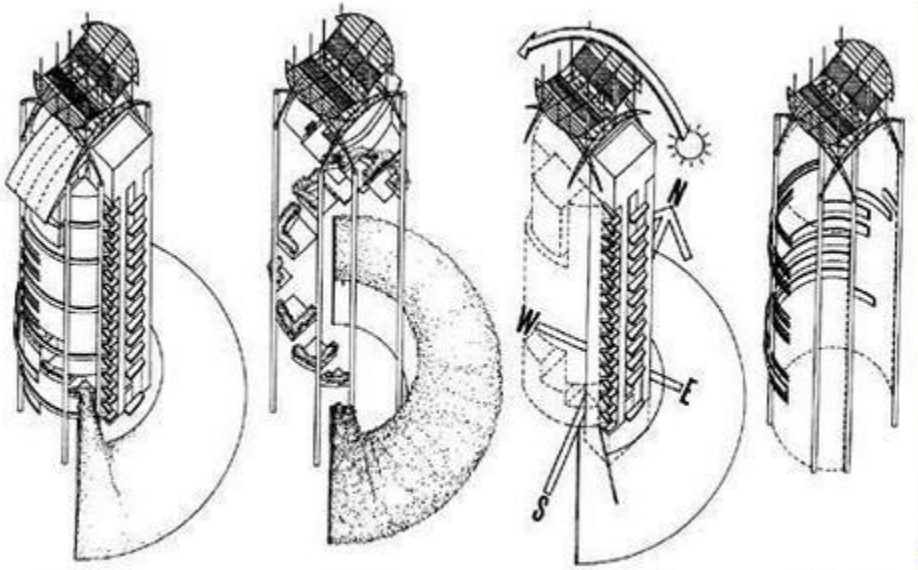
Ke-Ekstrim-an Iklim Tropis

Ciri-ciri Iklim	Masalah Umum dan Masalah Bangunan	Hal-hal penting untuk diperhatikan
Daerah Tropis Basah a. Presipitasi dan kelembaban tinggi b. Temperatur tinggi c. Angin sedikit d. Radiasi matahari sedang sampai kuat	a. Panas yang sangat tidak menyenangkan b. Penguapan sedikit karena tekanan udara lambat c. Perlu perlindungan terhadap radiasi matahari, hujan, serangga. d. Daerah di sekitar laut perlu perlindungan terhadap angin keras	a. Bangunan sebaiknya terbuka, dengan jarak yang cukup antar tiap-tiap bangunan untuk menjamin sirkulasi udara yang baik b. Orientasi U-S, untuk mencegah pemanasan fasad yang lebih lebar c. Bangunan harus lebar untuk mendapatkan ventilasi Silang d. Ruang di sekitar bangunan harus diberi peneduh, tanpa mengganggu sirkulasi udara e. Persiapan penyaluran air hujan dari atap dan halaman f. Bangunan harus ringan dengan daya serap panas yang rendah
Daerah Tropis Kering		

Ciri-ciri Iklim	Masalah Umum dan Masalah Bangunan	Hal-hal penting untuk diperhatikan
Daerah Tropis Kering a. Radiasi matahari sangat kuat dan permukaan tanah reflektif b. Hujan sedikit dan kelembaban tinggi c. Bisa terjadi badai pasir dan debu d. Perbedaan temperatur antara malam dan siang sangat tinggi	a. Perlindungan terutama terhadap radiasi matahari langsung, pantulan permukaan dan emisi panas dari bangunan sekitar b. Perlindungan terhadap serangga, pasir dan debu c. Upaya meningkatkan kelembaban	a. Letak bangunan rapat, agar sedikit menerima radiasi matahari dan dapat saling mereduksi b. Bangunan kompak dengan sedikit lubang, orientasi ke halaman dalam yang teduh c. Ruangan sebaiknya dalam dengan pencapaian melalui gang dan halaman tertutup d. Bagian terbuka yang teduh di beri tanaman dan kolam untuk pendinginan e. Konstruksi bangunan harus menyerap panas dengan baik

LATIHAN :
Sebutkan contoh karya arsitektur tropis yang anda ketahui dan indikatornya (gunakan kertas A-3)

Contoh :



Desain tiap fasad berbeda-beda sesuai dengan garis lintasan matahari

Pemanfaatan vegetasi di tiap fasade berbeda sesuai arah panas

Efisiensi cahaya matahari (solar) sebagai sumber energi alami dengan menggunakan material khusus

Seting *Shading* di beberapa sisi fasade

Menara Mesiniaga di Malaysia karya arsitek Ken Yeang

Studi Arsitektur Tropis	
Nama	
NIM	

Menara Mesiniaga

"An ecological building should not be a weapon in a retreating battle. On the contrary, it can contribute positively to the environment. A green area is a productive area. So the building can generate energy instead of consuming it." Kenneth Yeang

Description

Menara Mesiniaga, the "Bioclimatic Skyscraper"

Menara Mesiniaga is the headquarters building of the IBM corporation in Subang Jaya near Kuala Lumpur. It is 15 storeys tall building, which was designed by the architect Kenneth Yeang and his firm, TR Hamzah and Yeang Sdn Bhd.

This is one of the building where Kenneth Yeang recalls the bio climatic architecture of the 1950s and Frank Lloyd Wright's skyscraper projects, in a move towards a new architecture for the 1990s, the "Bioclimatic Skyscraper". Kenneth Yeang incorporated his ideas in transitional spaces, skycourts, vertical landscaping, natural ventilated core and providing it with sensible, energy-saving climate controls.

Afterall, the design of Menara Mesiniaga won Kenneth Yeang the Aga Khan Award for Architecture in 1995.

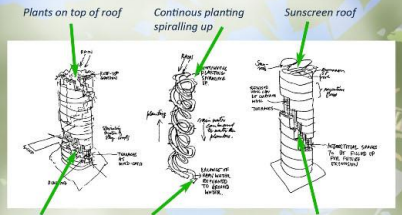
Development

Kenneth Yeang, principal architect of Menara Mesiniaga

The client as the marketing agent for IBM (Malaysia) wanted a showcase building that could improve its marketing sales and iconically symbolize their success in the high-technology products. Kenneth Yeang was commisioned to design this building for IBM in 1989.

Appropriate site analysis was completed in June 1989 and preliminary sketches were done by the architect in July 1989. Nevertheless, Mesiniaga also wanted the building to have the future option of increasing the usable floor area and the final design solution for this is to have "interstitial space" that also coped well with Kenneth Yeang's intention of having "courtyards in the sky". Basically, these interstitial spaces are cut-out from the facades as stepped atrium voids.

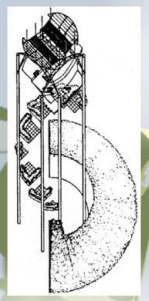
Conceptual sketches



The first design proposal had an atrium and the core in the centre of the building. This design ad voids in the lower floors and upper floors and plants flowing upwards from the ground floor. The second proposal that was approved by the client in December 1989, removed the original atrium and relocated the core on the east periphery.

Construction started in December 1990 and the project was completed in August 1992. Menara Mesiniaga's form is the result of architect's decade-long research into bioclimatic principles for the design of tall buildings in tropical climates.

Sky Gardens



Top; Axonometric view of the spiralling "sky gardn"

The most notable design of the building is the two spirals of green "sky gardens" that twist up the building and provide shade and visual contrast with the steel and aluminium surfaces. There is an order to green spiral which starts at the base and circulates up to the top of the building which makes the facade organic and random-looking, even though it is very specific.

Steooed and terraced balconies with plants on each level

Elevation view of the spiralling "sky garden" which starts from the base

Therefore, there are recessed terraced gardens or "skycourts" with plants on each level, introducing "vertical landscaping" into the building facade. Furthermore, these interstitial spaces also gave the future option of space expansion.

Functionality

For Kenneth Yeang, incorporating bioclimatic elements into the building must not ignore the prime functionality of the building, but to enhance such purpose. As a commercial office, there were spatial requirements for marketing rooms, product demonstration rooms, auditorium, exhibition place, gymnasium and swimming pool.

Entrance with mezzanine deck above

Gymnasium and swimming pool that is located on top of the roof

Meeting room

Auditorium

Sunlight Manipulation

Artificial landscape sheltering parking space from sunlight

Tall buildings are exposed to the full extent of heat, weather and temperatures. Artificial landscape was created to shelter and insulate the lowest three levels, including the parking space from the morning sun.

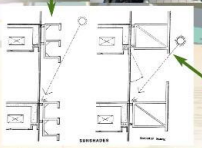
Nevertheless, there are window openings on the artificial landscape, to provide natural lighting for the parking bays.

And there are also inclined roofs ontop of the lobby for natural lighting, to reduce the energy consumption over artificial lighting.

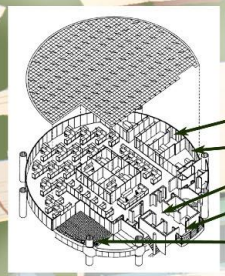
To further insulate the upper floors, recessed and shaded windows were used on the east and the west, as a response to the overhead sun path. The facade includes louvers and shades to reduce solar gain on the east and the west.

Louvers

On the other hand, curtain wall glazing was used on the north and south, as these sides have less need for insulation. Deep garden insets allow curtain walls to be installed without shades on the north and south sides. Furthermore, large multistory transitional spaces serve as in-between zones and allow air flow.



Sunshades



Artificial lighting is reduced due to natural lighting but sun and shading effects in spaces are used to control the brightness of sunlight penetrating into the interior spaces of the building.

Natural lighting

Easy access to windows

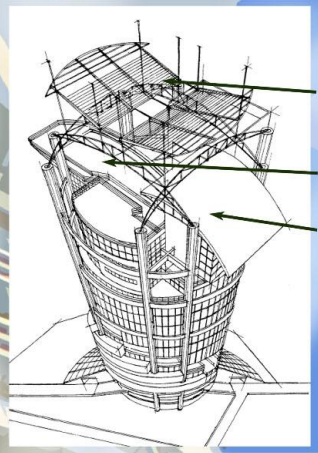
Core area facing east

Natural lighting and ventilation

Transitional spaces

The core of the building also located on the perifery east, which is the 'hot' side. Kenneth Yeang used this over the advantage of natural lighting for the toilets and elevator lobbies. Also, the core area is naturally ventilated, minimizing the use of air-conditioning. On the other hand, the location of the service core also helps to block out the morning sunlight going into the office spaces.

Roof



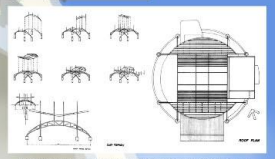
Steel structure for future installation of solar panels

Swimming pool

Gymnasium's roof

The roof is inhabitable, but as a part of Kenneth Yeang's idea of connecting the building back to the land, the roof of Menara Mesiniaga holds a pool and a gymnasium. It acts aas the social space of the b uilding.

The distinctive composition that crowns the tower will provide for the future installation of solar panels to further reduce energy consumption. The sun screen structure is made of steel and holds aluminium panels and serves to shades the pool as well as the roof of the buildings. The rain water collection system is also on the roof.



Architectural drawings of the steel roof structure

Steel structure for future solar panel installation atop the roof

Plants

Kenneth Yeang explains that plants is the utmost important element of bioclimatic architecture. Plantings should travel not just horizontally, but also vertically to generate oxygen and help cool the building down.

Vertical planting

Palms on third floor's exterior

Left of the building

Right of the building

Plan view of the artificial landscape

Sky garden