

# BUILD GREEN

Charter for Sustainable Building,  
Neighborhood Design  
and Urban Mobility in Tropical Countries



Sunshading



Daylighting



Local building materials



Energy generation

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# Charter for Sustainable Building and Neighborhood Design in Tropical Countries

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Here are **30 important strategies to be considered when designing, constructing and using green buildings and when planning green neighborhood**

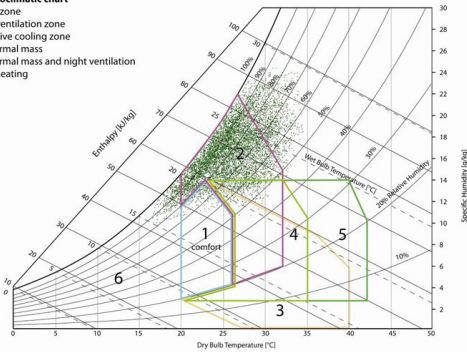
# 01

## Site analysis (context, topography and climatic data)

- Retrofit existing poor buildings and give preference to brownfield sites over undeveloped green fields.
- Assess the local context including the topography of the site.
- Collect data on temperature, relative humidity, wind's speed and direction, precipitations over at least one year and solar path and radiation.
- Establish the bioclimatic chart for the location using data of temperature and relative humidity.

Location: DAR ES SALAAM, TANZANIA  
Climatic zone: HOT HUMID  
Givoni's bioclimatic chart

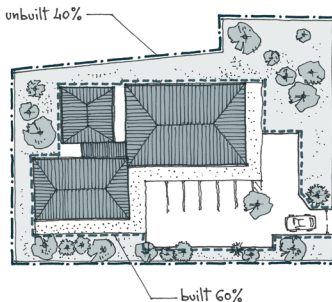
1. Comfort zone
2. Natural ventilation zone
3. Evaporative cooling zone
4. High thermal mass
5. High thermal mass and night ventilation
6. Passive heating



# 02

## Building footprint

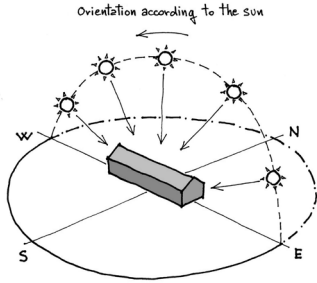
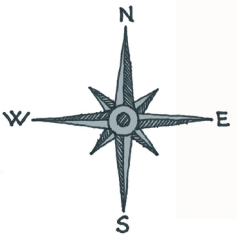
- Conform to the permitted ground coverage and should ideally cover not more than 60% of the plot.



## 03

### Building orientation

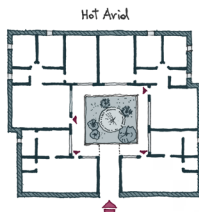
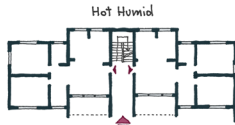
- Design the long axis of the building to be along East-West to minimize direct solar radiation penetration in the building and reduce heat gain.
- Always indicate the North direction in all plans.



## 04

### Building form / shape

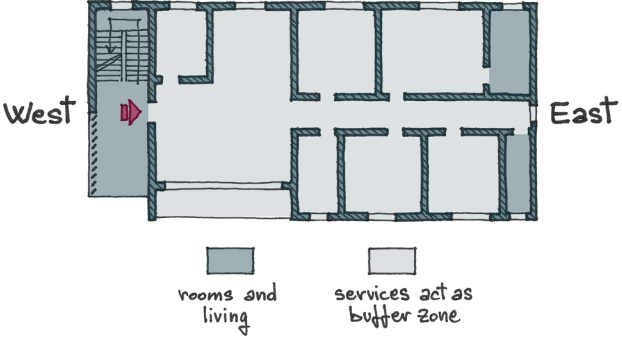
- Design according to climatic zone.
- For hot-humid region, use narrow plans to maximize natural light, cross-ventilation and minimize heat gain
- For hot-arid regions, use compact forms with courtyards to retain cold air in the building and minimize heat gain.
- Give preference to multi-story building to increase density and maximize resources.



## 05

### Allocation of spaces within the building

- Services e.g. toilets, staircases, lifts, lobbies, kitchens etc. to be located on the East and West facing walls to act as buffer zones against heat gain but benefiting from daylighting.



## 06

### Openings

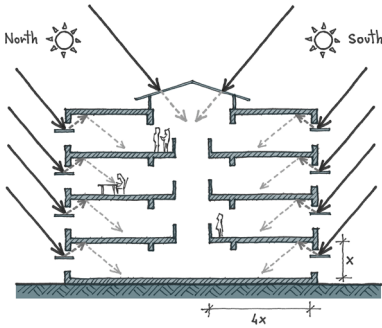
- Window sizing to be designed according to prevailing climatic conditions, and placement preferably on North and South walls; wall to windows ratio should not exceed 40%.
- Gazing walls should be avoided, unless using special treated glass.



# 07

## Daylighting

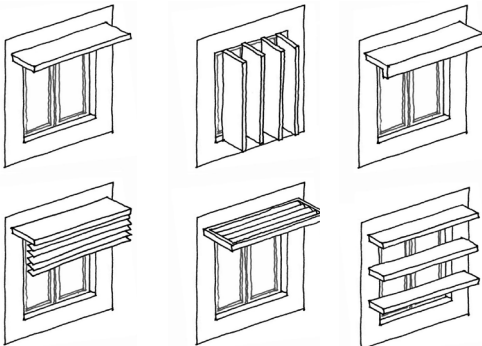
- Design buildings according to climatic region, with openings on North and South walls, narrow plans to maximize daylighting, use clerestories & light shelves in deep spaces; staircases, toilets, & kitchens to be day-lit.
- Window area should be at least one tenth of the floor area.
- The depth of the room should not exceed 2.5 times the window-head-height.



# 08

## Solar protection

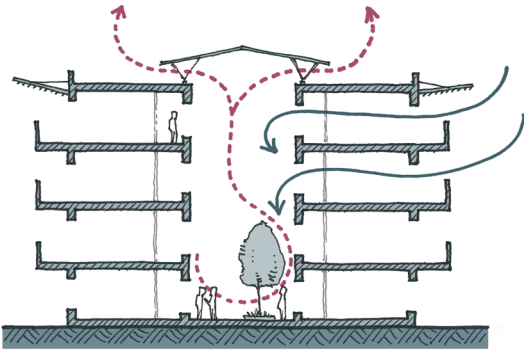
- Use sun shading devices e.g. roof overhangs, vertical & horizontal shading elements, balconies, screens, & vegetation (green walls) to minimize heat gain.



## 09

## Natural ventilation

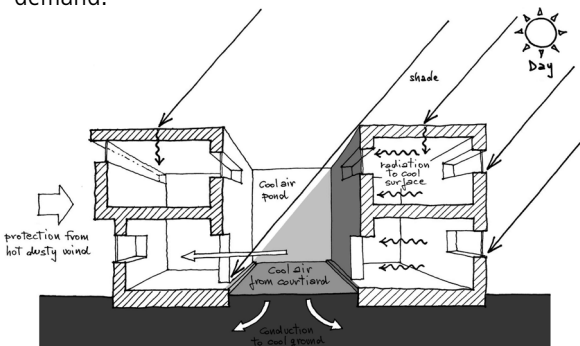
- Ensure that both cross and stack ventilation are provided by the openings.
- Make use of roof vents and openings, thermal chimneys and clerestory windows.
- Make use of insulation materials under the roof sheet and design ventilated roofs.



## 10

## Cooling

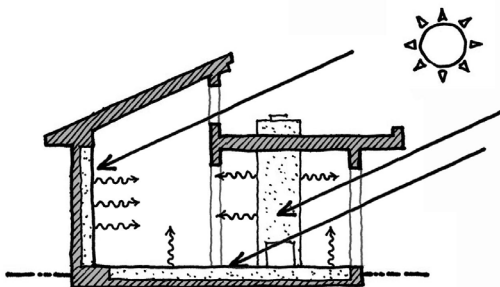
- Integrate passive cooling systems by designing water bodies and features for evaporative cooling in hot and arid regions.
- Ensure that buildings using air conditioning appliances are well insulated to limit heat gain and reduce energy demand.



# 11

## Heating

- Suitable for highland regions where passive heat gains through direct solar radiations are welcome in the building during the cold seasons.
- Design passive solar heating strategies to ensure maximum sun penetration during cold seasons.



# 12

## Building envelope and materials

- Always consider the carbon footprint content while choosing building materials.
- Give preferences to locally available building material that are more appropriate with low energy content.
- Consider recyclable and re-usable materials with low toxic emissions.
- Give preference to envelopes (wall and roofs) with low

