

CONTEXT

Baladharshan is a project that focuses on children in a poor village in the South East of India.

A new school is being built to provide qualitative education for the children within the entire region.

The local climate can be characterised as extremely hot, accompanied by very high humidity almost all year round.

OBJECTIVE

- Increase indoor climate conditions within the classrooms of the existing design made by Houssein, a local architect.
- Ensure solutions are feasible, imitable and sustainable for comparable local, low budget projects.

METHODOLOGY

- Determining the degree of discomfort among pupils in current school buildings through a survey.
- Studying local climate and associated building techniques through literature.
- Optimisation of the thermal comfort for the existing building design based on dynamic building simulations.

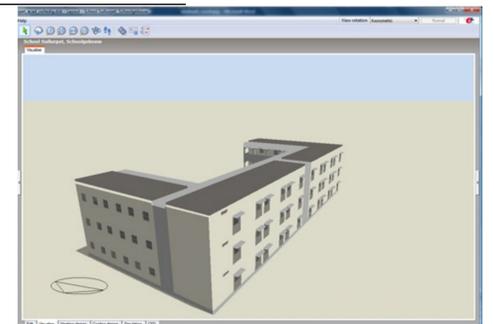
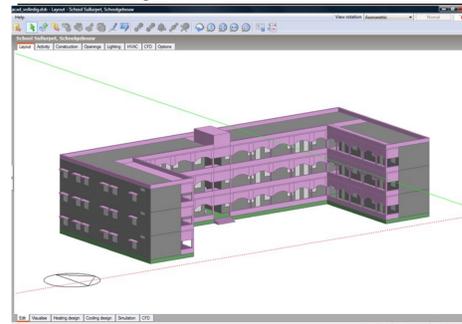
RESULTS

- Natural (cross) ventilation is the most effective passive cooling technique.
- In combination with shading of outer walls and roofs, e.g. by wall vegetation, the maximum indoor temperature can be lowered significantly, up to 2°C depending on the room type.
- The high humidity levels throughout the year play an important role in thermal comfort sensation within the classrooms.

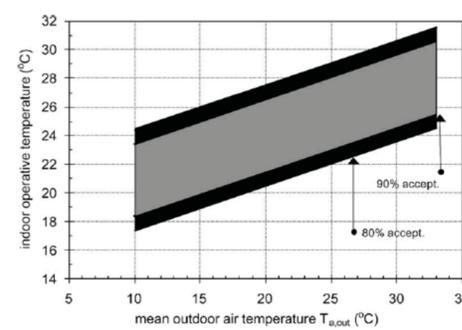


Local school building in Attakanithipa and its pupils

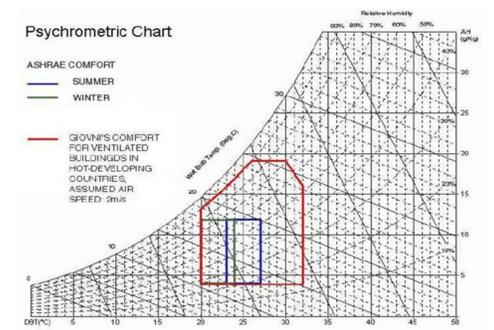
When you're in the class-room:	Always	Often	Sometimes	Never	Conducted survey among pupils in existing school buildings to determine the degree of discomfort
Is it too hot?	100%				
Do you feel like falling asleep?			100%		
Do you feel uncomfortable?			100%		
Are the windows open?	100%				
Are there any ventilators running?	83%	17%			
Is the door open?	100%				
Are the windows open together with a running ventilator?	25%	75%			



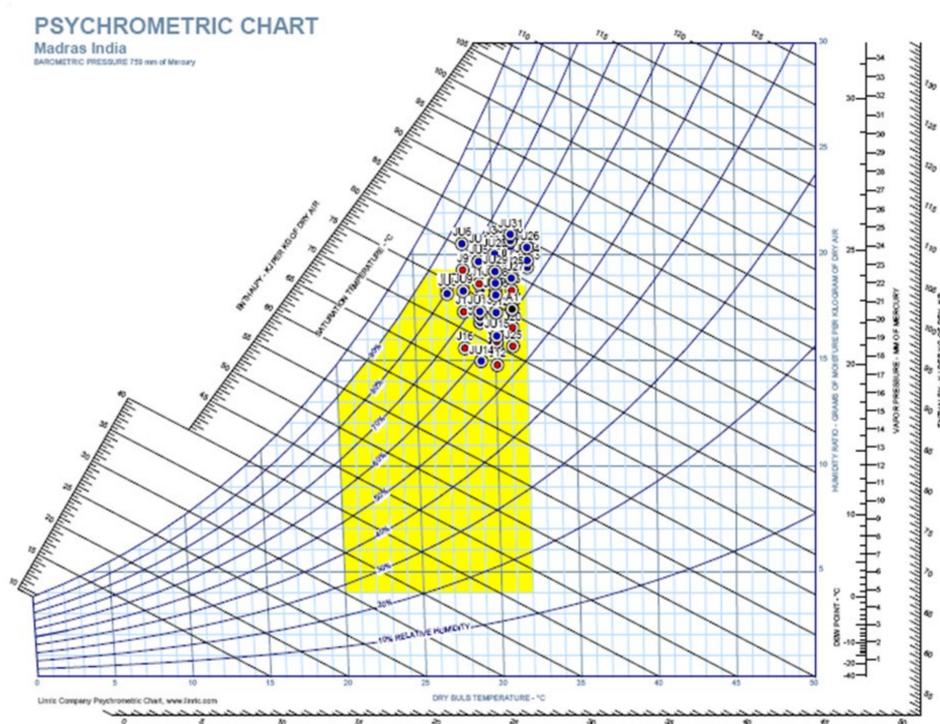
Visualisation of the simulation model for the final school building (Designbuilder)



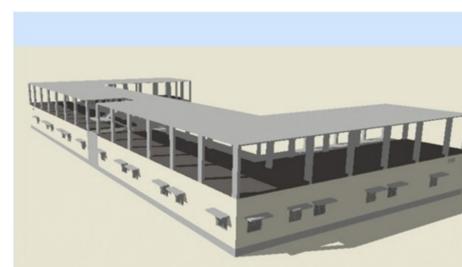
Adaptive comfort model for naturally ventilated buildings according to ASHRAE Standard 55-2004



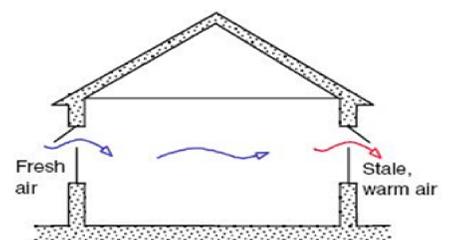
Givoni's bioclimatic chart for naturally ventilated buildings in hot climates, including local wind speed



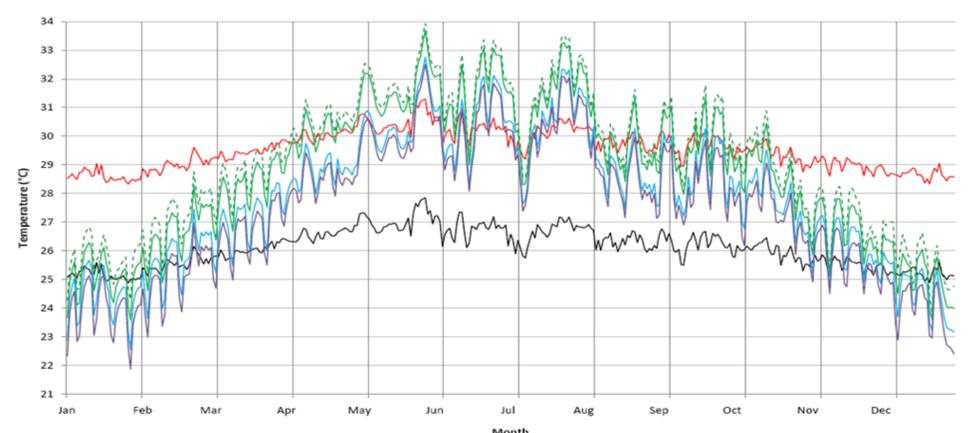
Resulting indoor comfort conditions during summer in a computer room with a shaded roof and green walls.



Visualisation of the shaded roof during the first phase of the construction process



Concept of natural cross ventilation in buildings



Evolution of the indoor temperature in a computer room for different passive design strategies, in relation to applied thermal comfort standards.