

Presented at



Auroville Green Practices

Seminar and Site Visits
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Sustainable Human Habitat



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- Conventional Methodology of Development in India
- A More Sustainable Approach: Principles and Methodology

STAGES OF HUMAN SOCIETY	DEVELOPMENTAL TOOLS / RESOURCES	DEVELOPMENTAL METHODOLOGY	OUTPUT
TRIBES	STONE TOOLS AND WEAPONS	GROUP HUNTING	LOSS OF MEGA FAUNA
AGRICULTURE	SETTLEMENTS / METAL	MONCULTURE	LOSS OF BIODIVERSITY
RELIGIONS	HIERARCHICAL SOCIETY / URBANIZATION	INTERNAL EXPLOITATION	FEUDALISM / SLAVERY
INDUSTRIAL	COLONIES	EXTERNAL EXPLOITATION	STEALING FROM OTHER CULTURES / PEOPLE
POST INDUSTRIAL	FOSSIL ENERGY	EXPLOITATION OF THE PAST	STEALING FROM THE FUTURE

In India, the construction industry is the 2nd largest after agriculture.

Every Re.1 investment in the construction industry causes an Rs.0.80 increment in GDP as against Rs.0.20 and Rs.0.14 in the fields of agriculture and manufacturing industry, respectively.

The un-organized sector or owner driven development is a considerable market force in residential and non-residential development

-ref: challenges before construction industry in India; A.Lakshar / CVR Murty. IIT.Kanpur

Model of development : Low income/ small town commercial /residential



Model of development : Local builders
RCC flat roof slabs – poor drainage, heat gain
Bad orientation of facades- no protection from rain / sun
Poor window design – ventilation / lighting



Model of Development :
Project developer upper/middle class





Model of Development : Gated communities setting the trend in design / material use and life style for middle and lower income groups

- Loading design = (live / dead / earthquake / wind / impact) x 1.5 = 50% extra
- Structural engineers add another 20% in steel to compensate for poor quality in manufacturing
- Contractors specify higher grade “Portland Pozzolana Cement of 53 grade” irrespective of type of structure. Leading to higher water use, poorer finishing and higher embodied energy
- Home owners usually add another 10% cement in the mix due to poor quality workmanship
- “_Eventual steel / cement use for most building types is 30-35% more than required”
- **Most buildings are not maintained and/ or remodeled every 20-25 yrs leading to building waste being one of the biggest urban waste.**

“ Ordinary Portland Cement comes in two grades:

1. Ordinary Portland Cement — Grade-53
2. Ordinary Portland Cement — Grade-43

Grade-53 is a very superior quality of cement (conforming to IS:12269:1987) used for critical and heavy structures like bridges, multi-storey buildings, foundations and heavy and load bearing structures requiring typical and critical construction requirements.

- This is the cement that is used everywhere today by both the organised and unorganised sector due to a myth that higher grade = better quality.

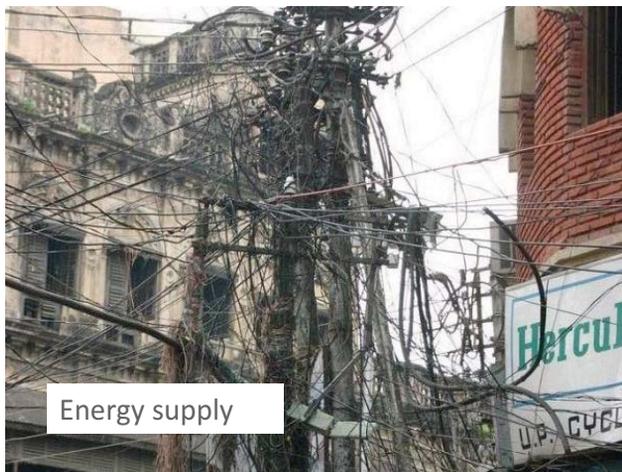
Ordinary Portland Cement-Grade-43 is a high strength cement confirming of IS 8112:1989. The cement is ideally suitable for all kinds of normal constructions of buildings, commercial complexes and residential units.”

Participants in the construction industry and their knowledge base

- **Developer / promoter** – information on market / access to capital /active network with regulation agencies
- **Owner / builder** – information from local builders / other home owners / direct information from suppliers
- **Builders / contractors** – most learn on the job, some academic background , highly competitive environment, conflict between tight profit margins and fluctuating labor / material supply
- **Planners / Architects** – market driven / aesthetics oriented, no real influence over the market.....a service provider rather than trend setter
- **Construction / project manager** – more involved in the economics of the project rather than the engineering / technical /sustainability issues
- **Construction labor** – no technical training, no job security, learning on the job; carrying forward the practices handed to them without any bias.

Construction waste production in Urban India

Mumbai produces about 10,000 tons of construction debris every day, 75% of which is dumped in natural water drainage channels, low lying lands, wet lands, along pavements and roads and in areas earmarked as green spaces.



Energy supply



Solid waste



Water supply



Urban sewerage

What are solutions/ options to these issues?

1 - **Political Strategies** – decentralization of utilities / citizens participation / transparent decision making to minimize waste & corruption

2 - **Social Awareness/ Criticism** – citizen groups to motivate and undertake direct participation and action / public information thru popular media on sanitation / energy / water / land use / green issues.

3 - **Educational Institution** – more vocational and technical institutes with on the job training for civic services like waste management, construction skills, secondary level health and sanitation workers.

4 - **Planning/ Design** – revamp the planning and design education to meet the challenges of global crisis rather than continuing with production of designers with dreams of creating iconic cities / infrastructure / projects

5 - **Engineering/ Technical** – provide multi-level education that answers the challenges of 21st century India with academic and technical skills - opportunities of job creation in green technologies.

Green / eco development principles

Planning

geophysical conditions in and around the site
habitat / vegetation / fauna / water movement
context; cultural, social, networks and infrastructure
existing systems human and environmental
climatic data

Building envelope design

Minimize or design away the extraneous
Integrate design aspects for multiplicity of function
Design for all aspects of climate at all levels
Design for durability and longevity
Select materials that use their base resource most efficiently
Design to maximise local and regional resources
Use products with recyclable materials & recycled content
Look for least toxic materials and manufacturing processes

Technologies / engineering options

- Appropriate solutions for issues that need engineering fixes
- Low energy input solutions
- Minimum operational and maintenance costs
- Adopt technologies that require minimum supervision and training
- Decentralized systems

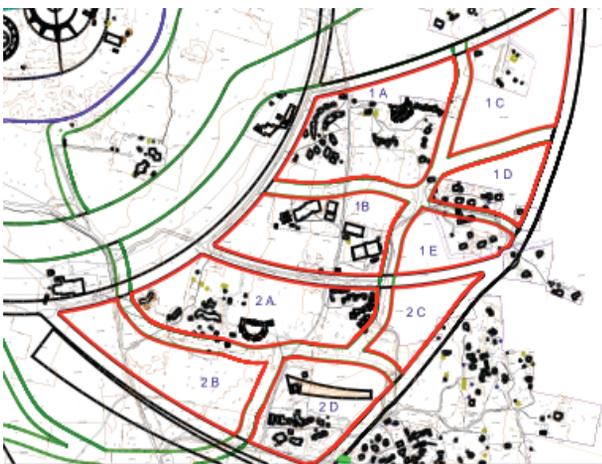
The conceptual master plan of Auroville



A city with four zones:

1. Residential
2. Cultural
3. Industrial
4. International

Matrimandir in center
Green belt surrounding it



1. Mapping of contours
2. Mapping of existing land use and vegetation in and around the site
3. Mapping and analysis of urban connectivity: transport / social / utilities network
4. Rain fall data, water flow channels and identification of rain water management and harvesting systems



Climate data and analysis

for optimization of building layout, envelope design and orientation

1. shading day & lighting – north : south orientation for sun exclusion and wall shading
2. air temperature and movement – 20-38' C with alternating land and sea breeze
3. relative humidity – 60 % (Jan) to 83% (Nov) with rainfall of 1200 mm per year
4. radiation received – min 10 hrs per day of sunshine
5. Wind speed – average 3 to 7 meters / sec with occasional cyclonic storms

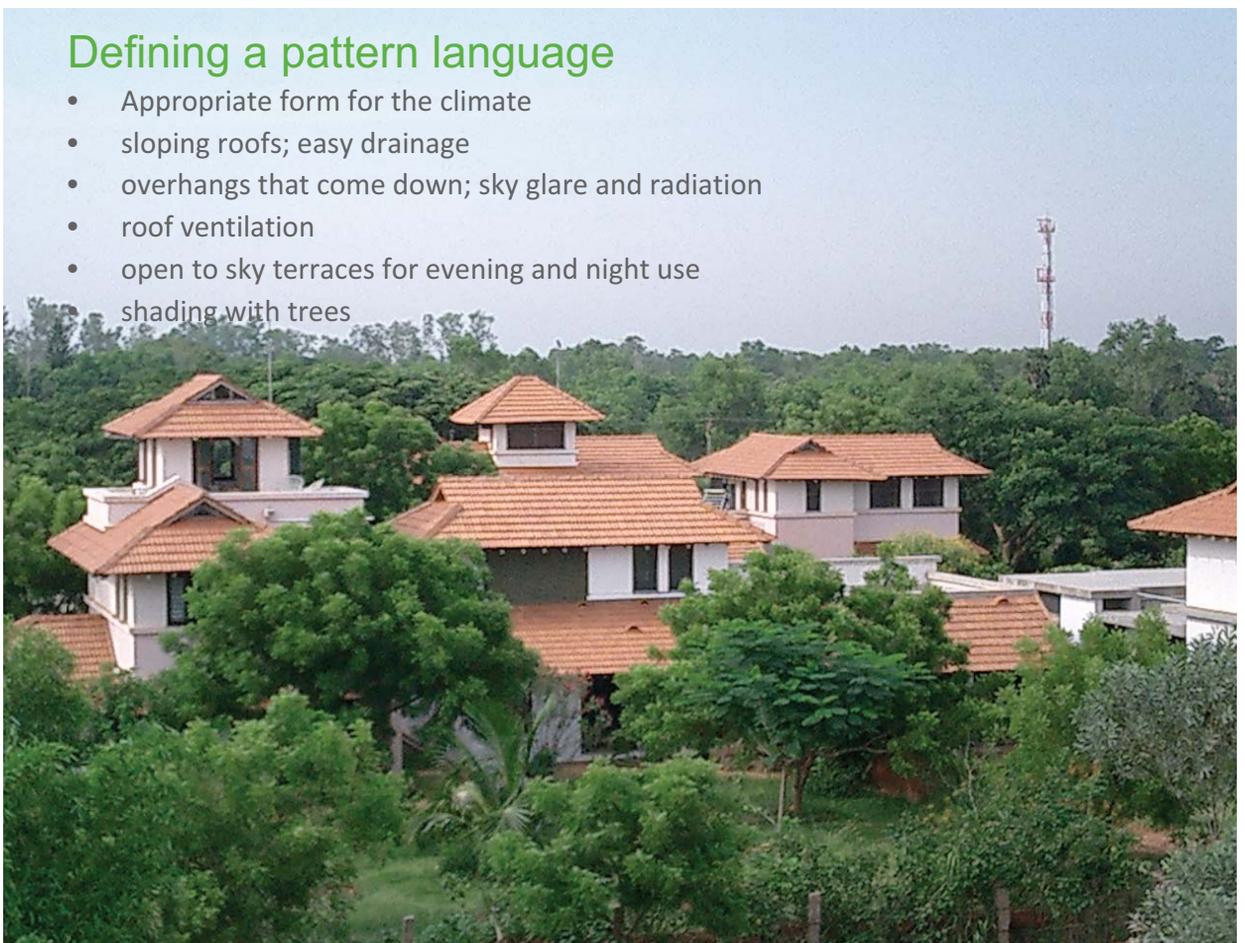
land breeze
04.00-12.00 hrs

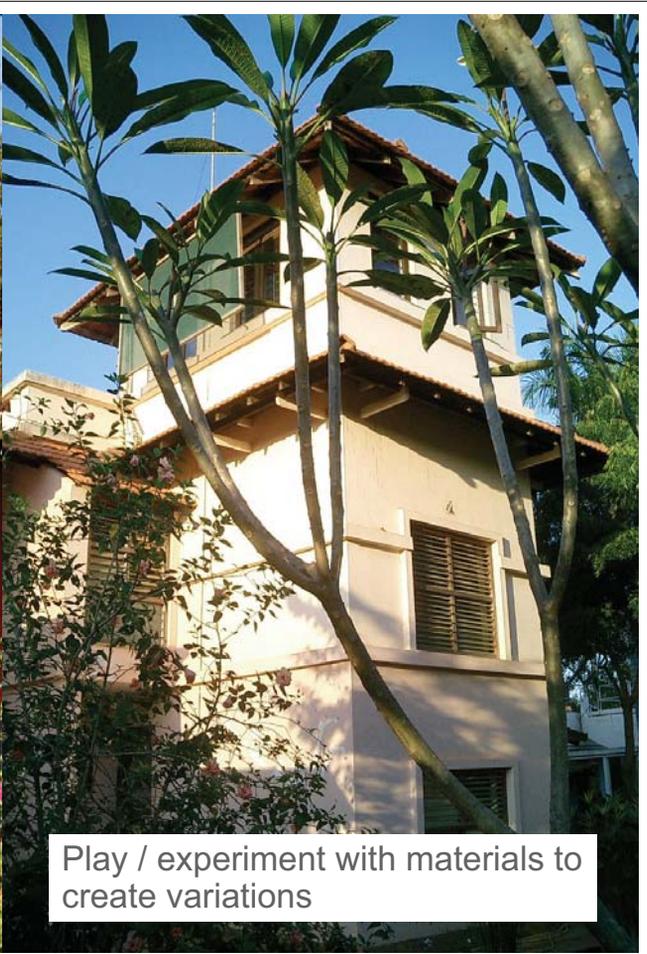


Sea breeze
14.00-02.00 hrs

Defining a pattern language

- Appropriate form for the climate
- sloping roofs; easy drainage
- overhangs that come down; sky glare and radiation
- roof ventilation
- open to sky terraces for evening and night use
- shading with trees





Play / experiment with materials to create variations



Indoor / outdoors



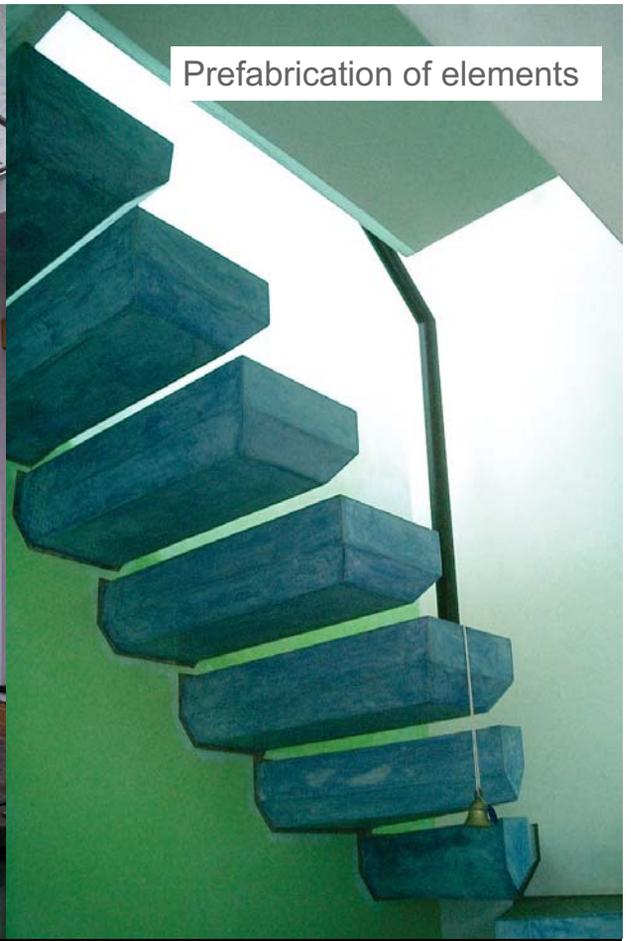
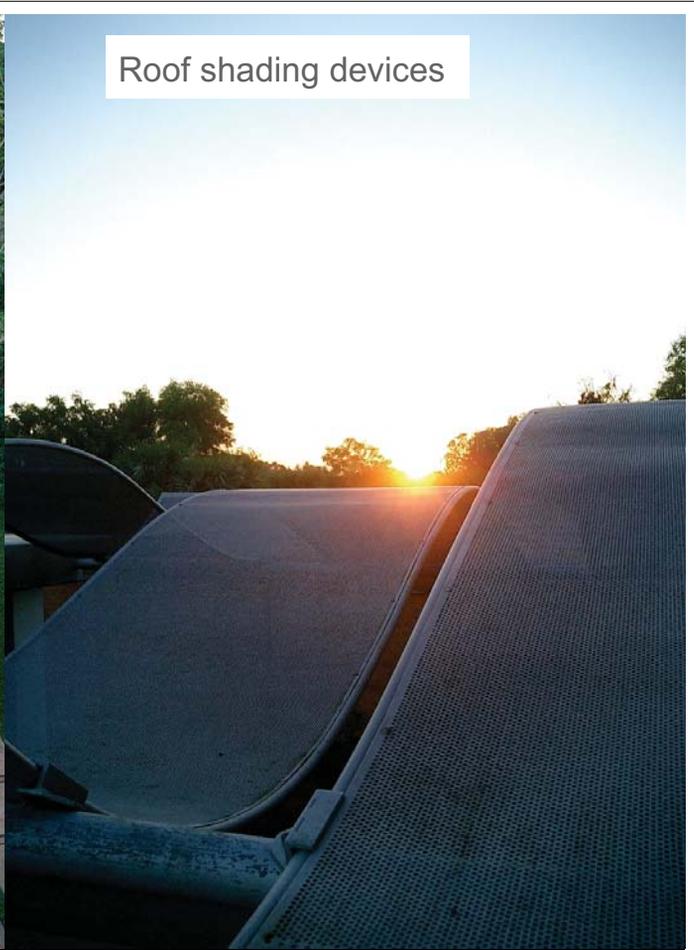
- Maximize volume to surface area ratio to achieve largest volume for least building material
- Efficient circulation pattern to minimize the built up area requirement
- Integrate storage / openings / furniture to reduce the add-on in finishing materials and time line



Multi level linkages of spaces

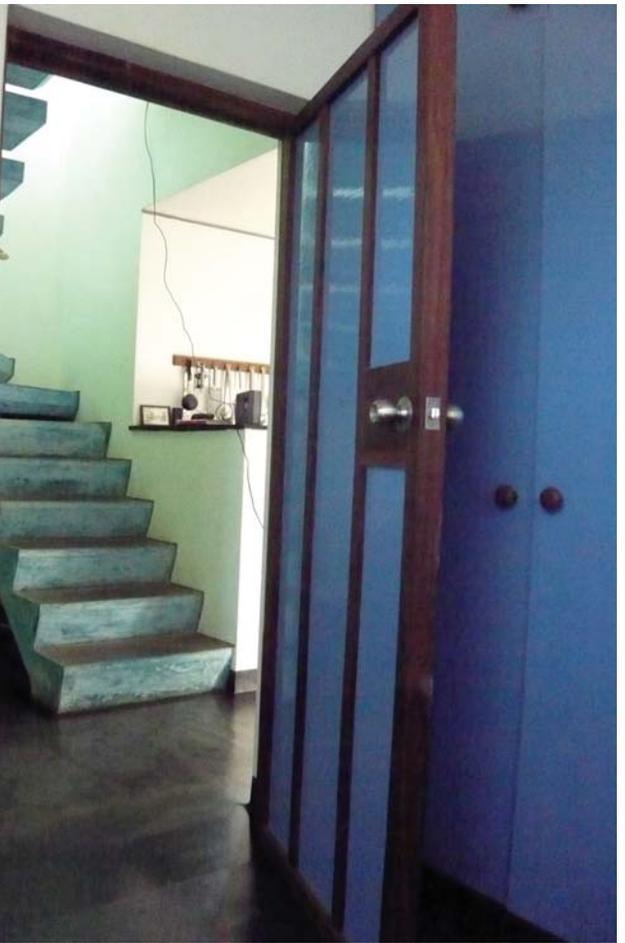


Roof shading devices



Prefabrication of elements

Roof level ventilation



Use of recycled material – wood / doors / pillars / hardware...



Integrated landscaping with local species of vegetables / fruit trees / hardy ground cover to reduce water use to have a productive green space.



Decentralised biological recycling

For every 100 inhabitants of the world :

- 57 Asians, 21 Europeans, 15 Americans (north + south) and 8 Africans
- 52 females and 48 males
- 70 of these 100 people would be non-white and non-Christians
- 6 of them will possess 60% of the wealth of the world while 80 people will be without homes.
- 70 of these will be illiterate and 50 will be dependent on the rest to survive.
- one person would be holding a university degree and one person would have a computer.

**If you have something to eat, are wearing clothes,
have a roof with a bed to sleep in every night then
you are better than 75% of human population**



“Designing is taking responsibility for your imagination”

Sustainable Human Habitat



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