

PROMOTING SUSTAINABLE DEVELOPMENT OF HILL SETTLEMENTS- ISSUES AND OPTIONS

AR. JIT KUMAR GUPTA



Former Chairman, Chandigarh Chapter, IGBC

Founder Director, College of Architecture, IET Bhaddal

jit.kumar1944@gmail.com





- Theme -- ***Architecture for well-being.***—
- designating 2022-UIA Year of Design for Health
- to promote health in buildings/cities.



HILL AREAS- CONTEXT AND IMPORTANCE

- NBC defines Hill areas -- height>600m msl /average slope 30 degree,
- Hill areas -- India's 17% land mass & houses 11 % population.
- Hills- known to be happy/healthy places to live
- Hill Areas- also Known for dualities & limitations
- Hill Areas known to be;
 - - Gift of Nature to mankind
 - -Place for connecting/Searching nature -Space for meditation
 - - having Wonderful Climate, Environment , Ecology
 - - for humane Culture and bio-diversity
 - - Serving as Natural Bio-sphere Reserve
 - -- Rich in Natural resources, Mineral wealth , flora& fauna
 - -Abundance of Hydel Energy
 - -Preferred Tourist Destination
 - - Storehouse of Rich Cultural Heritage- natural and Manmade
 - - Capacity to promote Sustainability
 - --- Serving as water-sheds of major river systems in India –
 - -Offer enormous option for exploring nature
 - - Quality fruits/vegetables
 - - Capacity to influence Climate;
 - - Houses High degree of Eco-fragility/sensitivity
 - -Development/ Economy of Hill areas and Plains remain closely linked



HILL AREAS –CONTEXT AND DISADVANTAGES

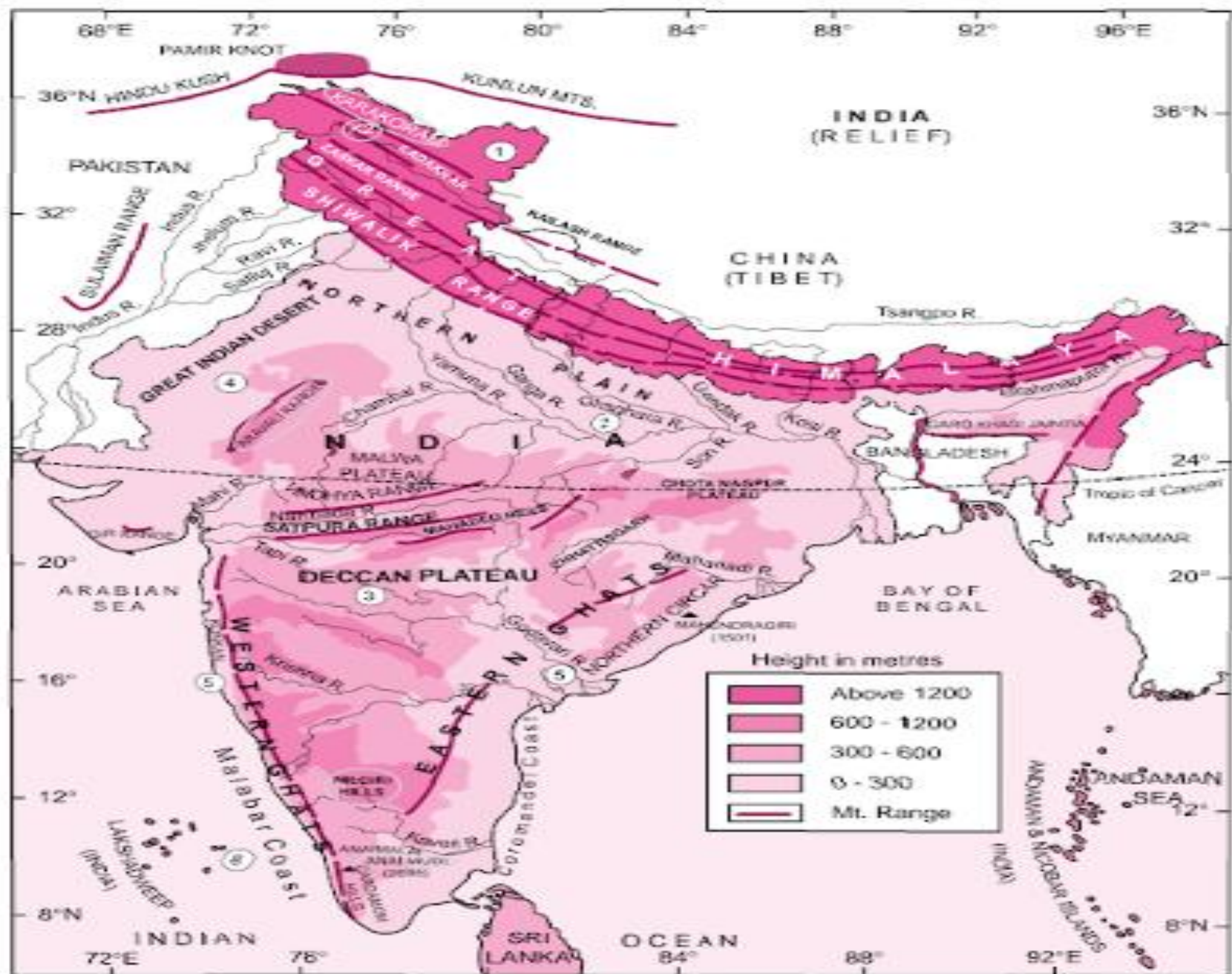
- **Despite Distinct Advantages ;- Hill Areas suffers from of numerous problems- manmade/natural**
 - **-Vulnerable to natural /manmade disasters**
 - **-Limitation of land**
 - **- Limited Carrying Capacity-supporting population/land intensive activities**
 - **-Growing Population pressure**
 - **- Growing Urbanization -Concentration of Population**
 - **- Growing Congestion,**
 - **- - Unplanned growth and development of human settlements**
 - **- -Uncontrolled /Unregulated tourism**
 - **-Limitation of accessibility / mobility**
 - **- Limitation of infrastructure & services**
 - **-- Susceptibility to disasters- natural/manmade**
 - **- large scale deforestation- for sourcing land for Agriculture/urbanization/housing/industry**
 - **- Acute problem of potable water supply**
 - **-Problem of Construction-sourcing materials /construction**
 - **- Remains lower on development.**
- 

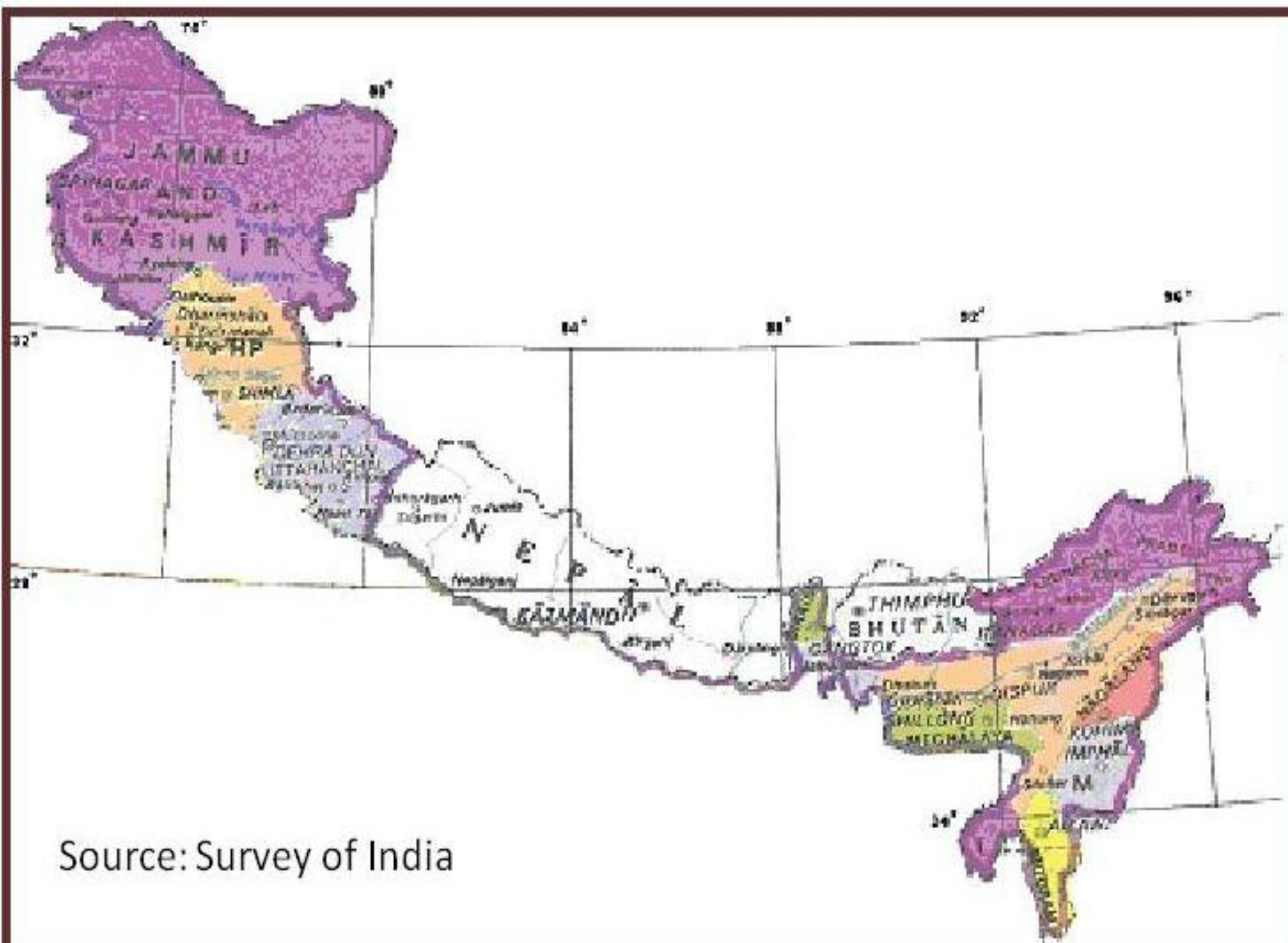
HILL AREAS –CONTEXT OF GROWTH

Stockholm Conference , 1972 on Human Environment called for;

- creating awareness among nation's policy planners about :
 - deteriorating environmental quality in hill areas
 - its adverse impact on growth /development and called for
 - Evolving strategies to make hill areas development
 - More rational and sustainable

- Promoting Development of hill areas assume importance for;
 - -Conserving / preserving/promoting /making value additions to Hills
 - -Rationalising / optimum utilisation of hills/ resources
 - ---Making hilly areas more productive
 - - Making hill cities happy and healthy places to live
 - - Making hill areas Free from disaster
 - -- Minimising flooding,
 - -- minimising changes in Agro-climatic conditions
 - -- Stopping large-scale migration
 - - Ensuring Rapid economic Growth / development of India as a nation
 - – Making India \$ 5 Trillion economy
 - -Overcoming environmental challenges
 - - minimising global warming
 - - making India Carbon neutral
- 





Source: Survey of India

HILL AREAS DEVELOPMENT- ISSUES

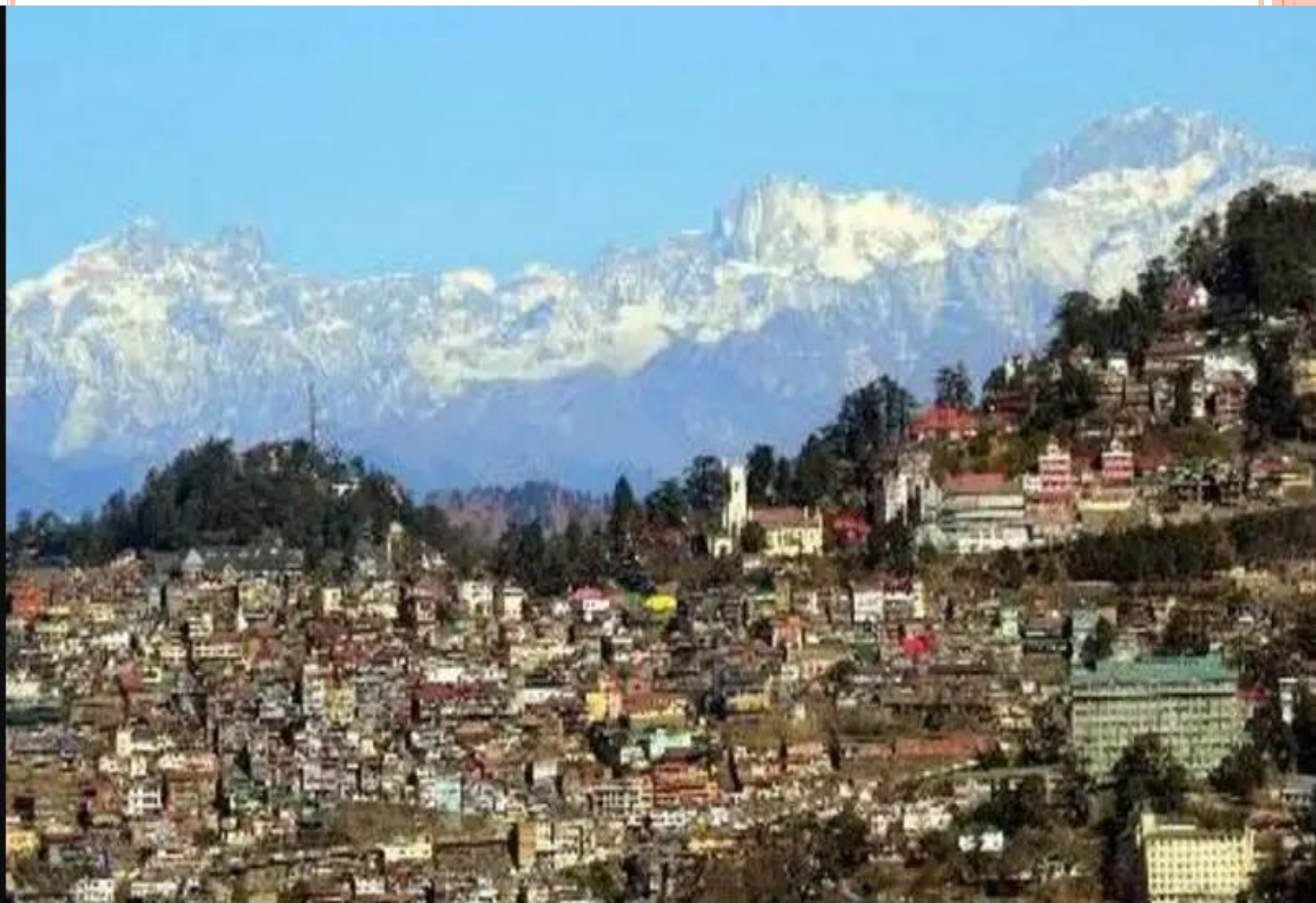


HILL AREAS-DEVELOPMENT ISSUES

- - Scarcity of buildable land,
- - Haphazard/unplanned/unregulated development of human settlements
- - Unsustainable Built environment
 - -- unscientific exploitation of natural resources,
 - -- large scale soil erosion/landslide
- - Lack of basic infrastructure/services/amenities
 - -- Linear development along road network
 - -- Uneven/unplanned development of urban system,
- - Uncontrolled Tourism
 - -- Ecological / environmental problems-
- - Submergence of forest areas under river valley projects
 - --- indiscriminate felling of tree
- - Loss of green cover,
- -declining wildlife population
 - -- Encroachment on forest lands
 - -- Mining operation
- shifting cultivation



UNPLANNED DEVELOPMENT



UNLANNED DEVELOPMENT- SHIMLA



UNPLANNED DEVELOPMENT- SOLAN



FLOODING AND NATURAL DISASTERS- UK



LAND SLIDE ON KALKA- SHIMLA HIGHWAY



LANDSLIDE AND DAMAGED CONSTRUCTION



FLASH FLOODS- HIMACHAL PRADESH





HILL AREAS- ISSUES- LAND

- Land posing major challenge/opportunities in hill areas
 - Greatest challenge/ Limiting factors to rational planning / development – Slope, soil characteristics, flora & fauna, vegetation/ rocks --their structure.
 - – Land under eco-fragile areas under great stress due to-
 - – large scale cutting of trees
 - – destruction of large flora and fauna
 - –large scale cutting/ filling of land
 - - Poor land record—land holding/ownership/demarcation/land profile
 - –high degree of land speculation
 - – Unscientific land development
 - – Poor land management,
 - - Irrational land sub-division
 - - Unscientific land conversion,
 - – Poor Land preservation,
 - – Imbalance between agricultural and non-agricultural uses
 -
- 

HILL AREAS- ISSUES-MOBILITY

- - Hill Areas face acute problems of *Accessibility*
- -Limited options for *mobility*
- -Major thrust on using *road based mobility*
- - Unscientific *Road construction* in hill areas -- promoted vulnerability of hills- leading to disasters
- - Unscientific *Disposal of Construction waste*
- -Majority of roads– *having ribbon growth* / development
- -- *unplanned, substandard / haphazard* –
- Problems of Congestion
- - *traffic & transportation* problems /parking
- -- *Encroachment* on road space
- --Roads needs;
- -- careful planning, designing, construction
- - drainage;
- protection/ safeguards from encroachment/ development
- - Exploring other means of mobility- Railways, ropeways, pipes etc





HILL AREAS- ISSUES- INDUSTRIAL GROWTH

- --Despite rich natural resources-- industrial development confined to few pockets
- -- leading to Wide spatial and economic imbalances.
- - Industries growth haphazard/unplanned
- - Polluting industries created havoc with ecology/resources
- -High degree of Pollution- air/water/ solid waste
- --Existing pattern of industrial growth / development done more damage than good to resources/ environment/ economy.
- -- Pattern of industrial growth needs critically review.
- --Vast potential offered by hill area due to;
- --excellent pollution free climate
- -- abundant horticultural
- --rare herbal flora and fauna;
- -- deposits of natural resources etc.
- - Needs to be explored and utilised



Baddi, Himachal Pradesh

Legend



Google Earth

Image © 2020 Maxar Technologies

1 km



BADDI – BAROTIWALA INDUSTRIAL BELT



PRE-BUDGET SPECIAL



INDUSTRIAL WASTE- BADDI



HILL AREAS- ISSUES-TOURISM

- Tourism -- Leverages economy / employment, transportation, growth and development, removing poverty, promoting prosperity
- Tourism Remain Double edged weapon
- Uncontrolled tourism—
- -- done irreparable damage to valuable resources /environment
- - promoted mushroom /haphazard development
- - adversely impact bio-diversity, eco-system, ecology, environment/ culture, infrastructure, quality of life growth and development
- Tourism concentrated in few areas/ few pockets/periods
- Tourism related development-- both haphazard /sub-standard.
- Carrying capacity -- a non-issue in permitting development
- Current practices-- made hill areas highly vulnerable to natural/ manmade disasters,
- - unscientific exploitation of sensitive area
- -- Absence of long term strategy
- -- Lack of well -defined roadmap for tourism
- ***Need for Regulating uncontrolled tourism***
- – promote quality Tourism,
- - promoting Eco- tourism; exploratory tourism
- Heritage Tourism; Opening new areas for tourism



TOURISTS CELEBRATING NEW YEARS- SHIMLA- MALL



MANALI TOURISM



HILL AREAS- ISSUES- HERITAGE

- Hill States-- Reservoir of manmade / natural heritage;--
 - -- temples, palaces, public buildings, public spaces, precincts, building complexes,
- -- bio-sphere reserves, lakes, dense forests, wild life sanctuaries, flora and fauna.
- -- villages, cities/ towns house
- ---- Majority of heritage lost
- -- lack of identification/ unplanned /haphazard development/ fire / destruction of buildings/ unauthorized and inconsistent uses/ Uncontrolled tourism
- Absence of appropriate building controls / development regulations --choked areas around heritage buildings.
- -- Unplanned/ substandard development
- -- Heritage conservation- low priority area
- -- *Need* strategies/policies for identifying, conserving, preserving, promoting heritage
- -architectural glory of built environment / natural areas

HERITAGE- HP















World heritage site

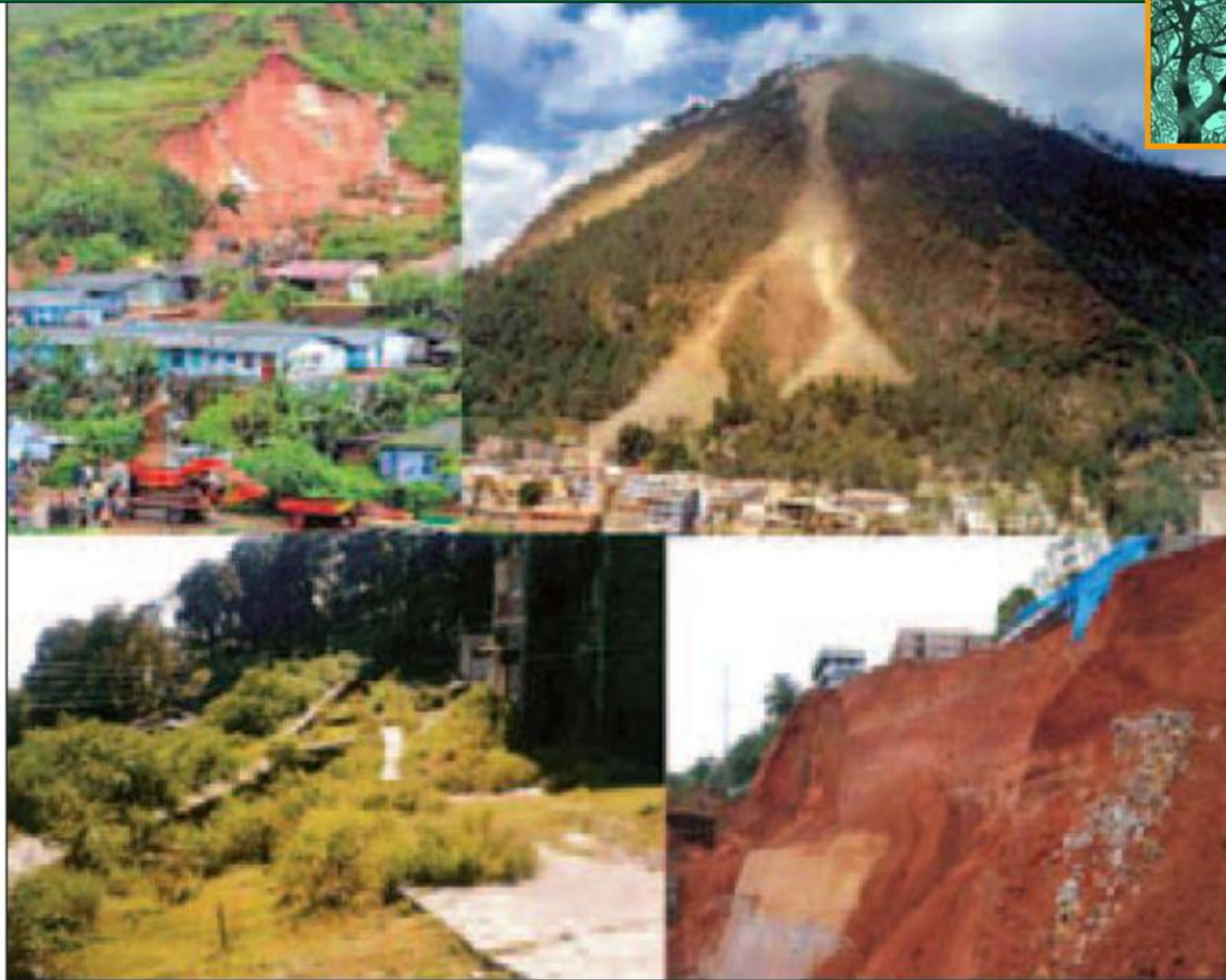
Kalka-Shimla railway

HILL AREAS DEVELOPMENT- OPTIONS

UN 17 Sustainable Development Goals (SDGs)
Transforming the health of our world by 2030



Hill Stations in India: Present Scenario



Development strategy has to be different in intent, content and approach as compared to Plains

UN 17 Sustainable Development Goals (SDGs)

Transforming the health of our world by 2030



OPTIONS- DEVELOPMENT WITHOUT DESTRUCTION

- **Critical issues for hill areas relate to:**
- **-Sustainability**
- **- Environment,**
- **-- Ecology,**
- **--Land**
- **-Unplanned, haphazard, uncontrolled urban development,**
- **- Unsustainable Buildings**
- **-- poor resource management,**
- **- poor Heritage, and culture management**

Development strategies must focus on:

- **Sound land use practices,**
- **Development of alternate sources of energy,**
- **Conservation of heritage,**
- **Planned development of Urban/Rural settlements/ tourism**
- **Constructing healthy/ resource efficient buildings**
- **Rational settlement system,**
- **Optimum utilization and development of resources etc**



APPROACH

- Hill area- planning remains a different, distinct and specialised task
- – requiring specialised, knowledge, skill, expertise, understanding
- Hill Areas ;
- - Need understanding & Knowledge
- -- Treated as-- National Treasures/ Resources/ Opportunities
- -- Housing Population- based on carrying capacity

Development based on principles of;

- - development without destruction and
- - design with nature
- - preserving , promote and enhance the fragile eco-system
- -- adopting Eco-Sensitive approach
- - promoting Sustainability
- - preserving Nature/natural resources
- -- making Environment more qualitative
- -- Promoting planned development of hill areas
- Creating /strengthening educational institutes engaged in promoting art and science of Architecture /planning of hill areas
- --Skilling manpower in planning/designing healthy/happy cities/ buildings
- - *Starting a Specialised Course – master/undergraduate/ -on Hill area Planning/ Designing Buildings*
- -- Replacing practice of project based environmental impact assessment (EIA), with Strategic Environmental Assessment (SEA)
- Creating dedicated institutions for-- integrated hill area North – Eastern Council-
- --Planning for optimum/Efficient /intensive land-use

APPROACH

- Promote non-land based economic activities to remove poverty / ensure environment Protection.
- Evolving a comprehensive human settlement policy– to discourage migration.
- Promote Non-Conventional Energy sources i.e. Solar, Hydro,
- – Adopting a Regional Approach for planning hill areas
- --- Rationalising Urbanisation
- - Promoting Sustainable cities
- – Designing sustainable Built environment-
- Planning for Compact settlement planning
- Plan for zero energy, zero waste settlements.
- Planning for safety/disaster mitigation,
- Promoting connectivity at Regional level- rail, road, air
- Promoting accessibility/not mobility at settlement level
- Planning for people and not vehicles at local level
- Planning for Sustainable Cities/Buildings
- Planning for Carbon Neutral development
- Involving communities-in project planning/development/implementation



HILL AREAS-- DEVELOPMENT MODELS

Two successful models of hill area development in world;-- European Model- Swiss Model

- **-Evolving Sound practices of land use planning,**
- **--Development of hydro-electric power -- major source of alternate energy**
- **--Preventing destruction of forest cover, planned / dispersed tourism.**
- **Japanese model,--Hill areas preserved-made low density -- 2% population occupying 75% of land**
- **Population Concentrated on plains-- 98% population occupying 25% of land area.**
- **Hill areas largely used for :--conservation of resources, -forestry-generating hydro-electric power,- promoting tourism**
- **whereas plain areas used for housing large economic activities including industry, trade, commerce and housing**
- **Both models have**
- **-- relevance, advantages, limitations, importance and contexts and**
- **--can be adopted with suitable modifications to suite needs of physical/socio-economic conditions prevailing in Himachal pradesh.**



TOKYO CITY- 34 MILLION PEOPLE



HILL AREAS DEVELOPMENT- REGIONAL PLANNING

UN 17 Sustainable Development Goals (SDGs)
Transforming the health of our world by 2030



HILL AREAS—REGIONAL PLANNING

- Adopting Regional best option for— conservation, preservation /development of hill areas without damage to ecology / environment.
- Regional approach helps in ;
- --integrated development of urban /rural areas
- --minimising friction in urban / rural settlements.
- - Optimising resources
- --altitude, slope, vegetation, soil types / rain fall used to classify state into zones--
- extremely sensitive/ high sensitive/ medium sensitive / low sensitive zones
- preservation becoming strategy for high sensitivity area
- development concentrated in medium/ low sensitivity zones
- Development focused on Ecologically degraded areas
- - for restoration , reclamation / development
- developments planned based on carrying capacity of areas.
- Development focused on valley floors / upland flats -- to relieve pressure on more sensitive areas.

HILL AREAS- OPTIONS-LAND USE PLANNING

- Rational land use planning based on:
 - -- the carrying capacity & land suitability analysis
 - -- rational use of resources.
- Very steep slope --put to intensive afforestation
- Moderate slopes -- put to a mix of horticulture plants of economic importance.
- Valley / plain/ flat lands --low eco-sensitivity zones used for
 - -- Cultivating crops -- Human habitation.
 - -- Promoting Non-polluting hi-tech industries -- requiring dust free environment / minimum land /resources -- with zero level of pollution--
 - -- to generate employment/ promote economic growth / development
- Agro based industries -- using horticulture /agricultural produce including bio-tech parks considered as priority in selected growth centres
- Vast scope of hydel power tapped for:
 - -- generating electricity with
 - -- water resources used for irrigation,-- recharging of ground water &
 - -- ensuring growth of vegetation cover in derelict areas.

2. City Soil Conservation

Land

Preserve top soil and control soil erosion, sedimentation & impacts

1. Prepare City Soil Map, Soil Erosion Risk Map
2. Have a policy in place to enforce implementation of soil erosion and sedimentation control measures conforming to National Building Code of India (NBC) 2016.

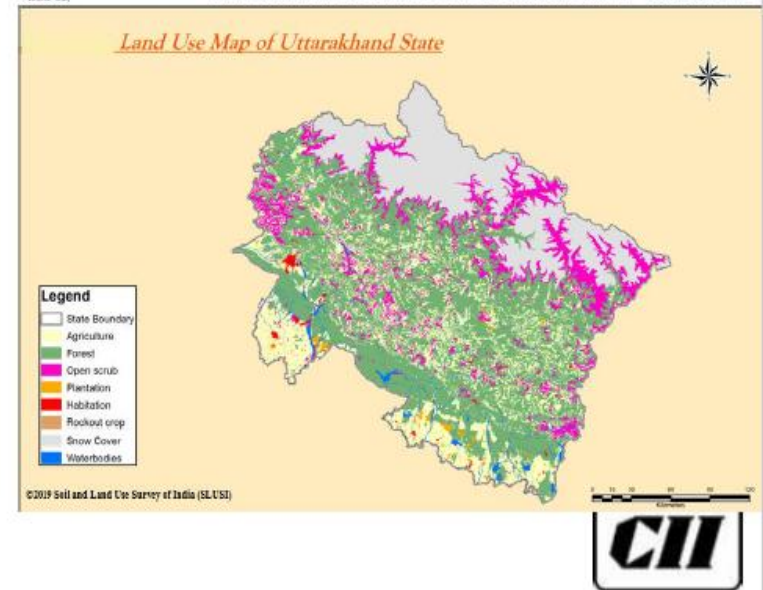
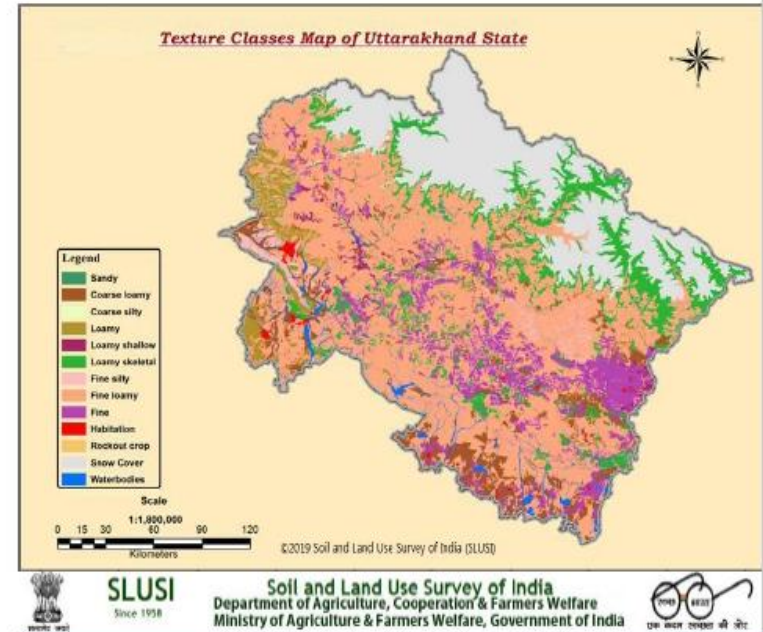


In the District http://www.camdenscd.org/x_p327.gif Erosion and Sediment Control Plan is required as part of the building permit process for construction and redevelopment projects.



Indian Green Building Council
Greening India since 2001

© Confederation of Indian Industry

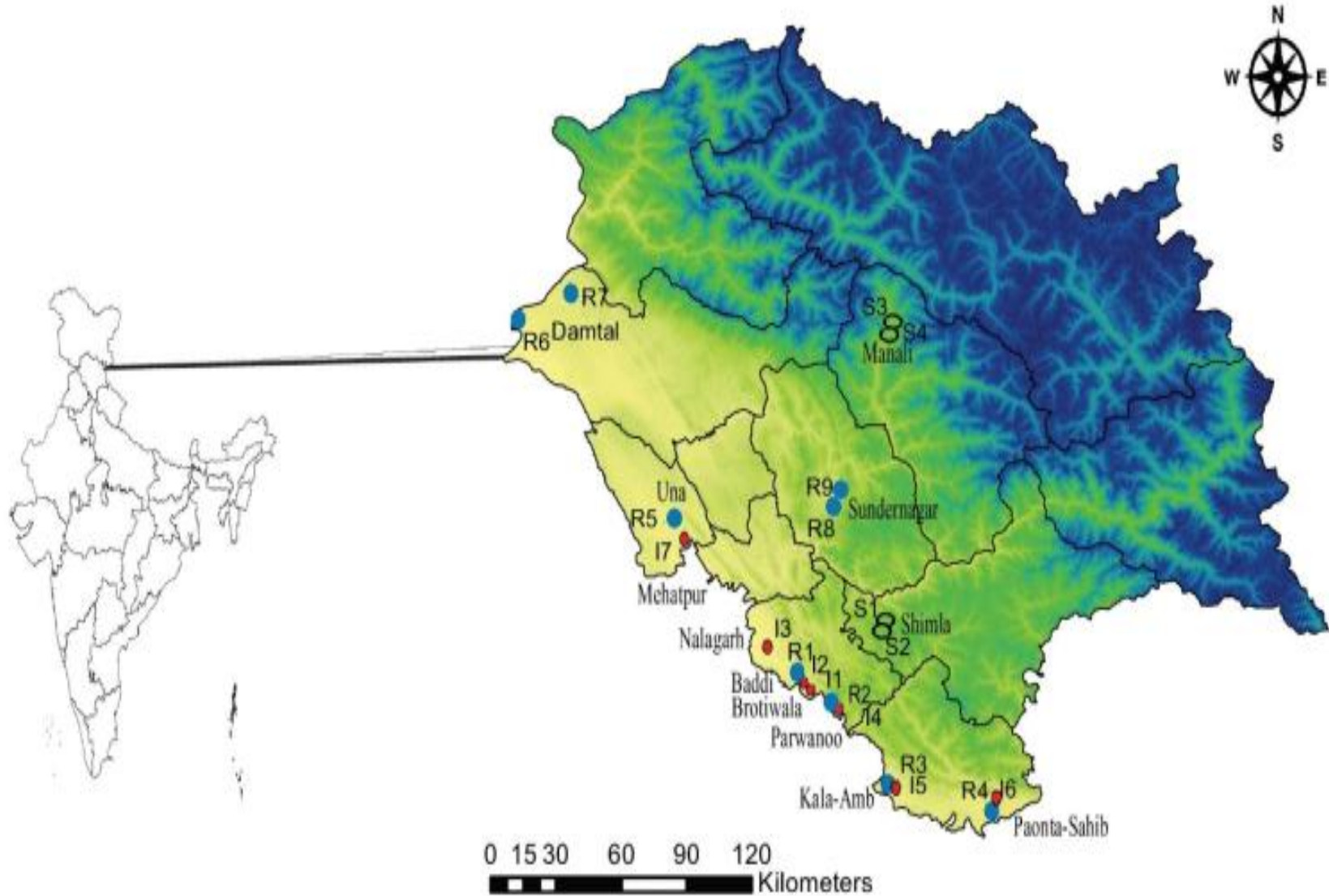


APPROACH- ECOLOGY

- Hills are; ecologically fragile areas
- While valuing socio economic / developmental needs- care for
 - –eco-restoration/ eco- development / eco preservation.
 - – conserving soil, water and increase productivity of land/ economic up-liftment
- Ecological conservation-- requires a regional approach and coordinated action by several states
- *Water* -- harvested in small ponds / reservoirs on a watershed basis and stored for use during winter and spring.
- For scientific planning information on resources e.g., minerals, soil characteristics, vegetation types and characteristics, water etc , required/ constantly updated.
- Remote-sensing techniques/ air-photo interpretation hold great possibilities.
- A perspective plan spelling out the long-term and short-term development- for regional, sub-regional, block settlement levels.
- Increasing public awareness about environmental issues/ public participation in environmental protection critical-
- Concept of eco-development to be built into all programmes .
Considering need for eco-preservation - cost of eco-restoration – needs to be built in economic projects

- **REGIONAL APPROACH- RU- URBAN MISSION**
 - o Adopting Rue-urban mission as the Best Option for promoting integrated rural development in the state--
 - o -- to stimulate local economic development,
 - o --enhance basic services,
 - o -- create well planned Rurban clusters for;
 - i. Bridging rural-urban divide- economic, technological / facilities and services.
 - o ii. Stimulating local economic development with emphasis on reduction of poverty / unemployment in rural areas.
 - o iii. Spreading development in region.
 - o iv. Attracting investment in rural areas
- 





Industrial sites



Residential sites



Ecologically sensitive sites



HILL AREAS DEVELOPMENT- PLANNING OF CITIES/TOWNS

UN 17 Sustainable Development Goals (SDGs)
Transforming the health of our world by 2030



CITIES AND THEIR CONTEXT

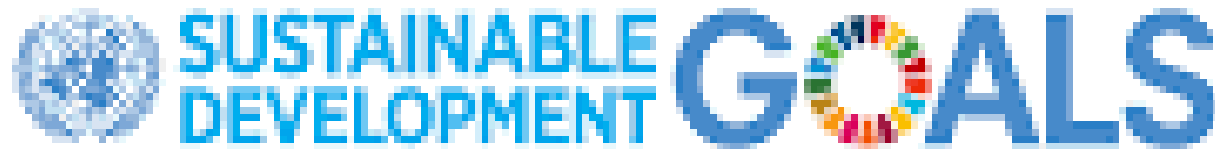
- *Cities have been part of human history.*
- *- Cities- known to command power and authority*
- *.Cities- known for both -- positivity and negativities*
- *Cities -- known for their dualities and contradictions*
- *Cities -- known to be areas of concentration of population/ activities, infrastructures, services, healthcare, education*
- *Cities -- known to be Engines of economic growth-70%*
- *Cities - generators of employment , wealth and prosperity,*
- *Cities – also known for their negativities,*
- *– where rich and poor rub shoulders-*
- *Cities – large consumers of resources/energy*
- *Cities- generators of 70% waste*
- *Cities – consuming 60% global energy*
- *-generating 70% of carbon footprints-*
- *Cities largely responsible for global warming-*



CITIES AND THEIR CONTEXT

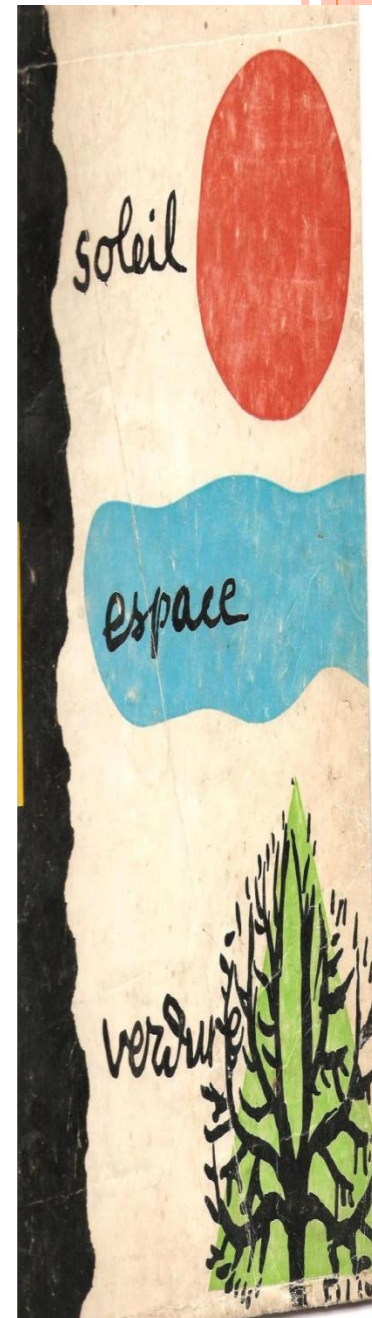
- *Cities- remain a manmade , mechanical habitat*
- *Cities- destroy nature and natural habitat*
- *-anti-thesis to bio-diversity*
- *Cities- known to be creator of best/ worst living conditions- housing both rich and poor*
- *Cities- home to large migrants/ slums*
- *Cities- remain in crisis- natural and manmade*
- *Crisis-- of population, poverty, pollution*
- *Cities – ever evolving, devolving, never static , never finite*
- *Cities – will remain dominant in future*
- *Cities- drivers of nation's future*
- *However Cities - need rationalization*
- *Cities --need to be made more-- bio-diverse; productive, effective, efficient, humane, livable, inclusive, safe, Resilient ,sustainable, Healthy place to live /work*

SDG 11- MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE ,SAFE, RESILIENT AND SUSTAINABLE



MAKING CITIES GREAT PLACES TO LIVE

- Making Cities happy and healthy places to live by—
- --Smart Visioning
- --Promoting State of art Planned Development
- - Weaving nature with development
- - Making cities Resilient
- --Making cities Inclusive
- -- Making Cities Healthy
- --Making Cities Safe
- --Leveraging Technology
- - Making cities Green
- - Leveraging landscape
- -Leveraging Culture, Heritage, Art / Architecture
- -Creating Quality Public Spaces
- -Designing happy/ low energy Buildings
- -Making cities community/people centric
- Planning for people and not for vehicles
- Promoting accessibility and not mobility
- -Leveraging Technology
- -Creating ownership for city



DEFINING VISION

- **Vision- starting point for any city to be sustainable/ inclusive/ happy/safe**
- **Vision/Eco-vision to be defined after:**
- Looking at existing strengths and weaknesses,--
- -- opportunities and threats
- -- future potential-
- Overcoming existing problems-Making best of the opportunities
- Creating vision achievable and realistic
- Making efforts focusing on achieving defined Vision
- **-Vision to be outcome of-**
- - Making Detailed study
- Carrying out in-depth analysis
- Adopting participatory approach
- Using a consultative process
- Involving all stakeholders
- Creating a think tank
- Involving intelligentia of city



CITY's ECO VISION

City's vision encompassing principles of sustainability

Singapore's Vision



A Liveable and Endearing Home

A Vibrant and Sustainable City

An Active and Gracious Community



Green and Blue Spaces



Mobility



Resource Sustainability



Air Quality



Drainage



Community Stewardship



Energy



Water



Waste



Public spaces



Commuting



Mobility

700 km

Length of cycling paths

75%

Modal share of journeys during peak hours made via public transport

360 km

Length of rail network

80%

Proportion of households within 10-min walk of a train station

HAPPY AND HEALTHY CITY

- **Choosing Clean/green energy-** based on solar/wind/ biomass/geo-thermal/ electrical transport
- **Minimizing Cars and planting more trees**
- - to improve air quality
- - what is good for trees- good for us
- **Improving mass transit –** Reduce cars/traffic jams
- **Promoting alternate modes of transport-**
- - including biking- saves money, time and environment
- **Investing in Digital Health–**
- -- reducing time spent at hospitals,
- -- reducing hospital visits,
- -- reducing crowding of hospitals, improving efficiency, - improving productivity,
- reducing investment in healthcare systems etc



HAPPY AND HEALTHY CITY

- **Reducing urban temperature/heat island-**
 - -- planting more trees
 - --greening large area
 - --reducing hard paving
 - --designing green
 - **Making Cities Spongy- keeping large area open/**
promote water harvesting
 - --ground water charging/
 - --reducing flooding
 - **Designing Green Buildings- Making Buildings**
efficient/cost-effective--
 - **Making informal sector-** integral part of planning and
 - designing cities
- 

LOCATING CITIES- SOUTHERN SLOPE





Planning Compact Cities;

-----Avoiding Urban Sprawl

-- Stopping melting of cities

Making cities more compact,

-Transforming urban economy from informal to formal

-Making informal sector integral part of planning process

-- Making cities energy efficient

--Panning for Need and not Greed

--Planning for People not vehicles

-Promoting accessibility not mobility

Providing safety

-Ensuring high quality Public Transport

Using data to detect problem

- Involving communities

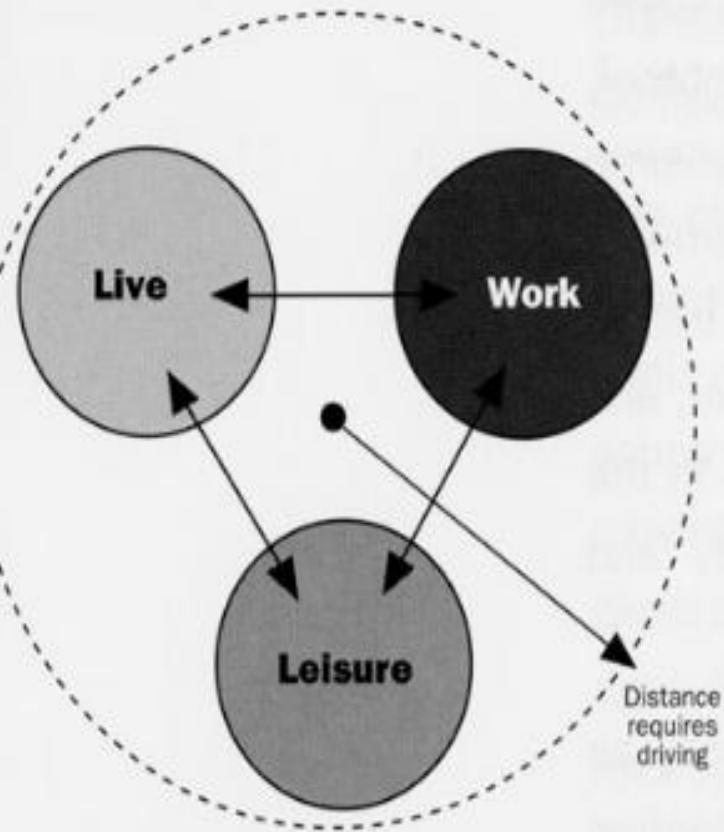
APPROACHING COMPACT CITIES

Make cities compact by;

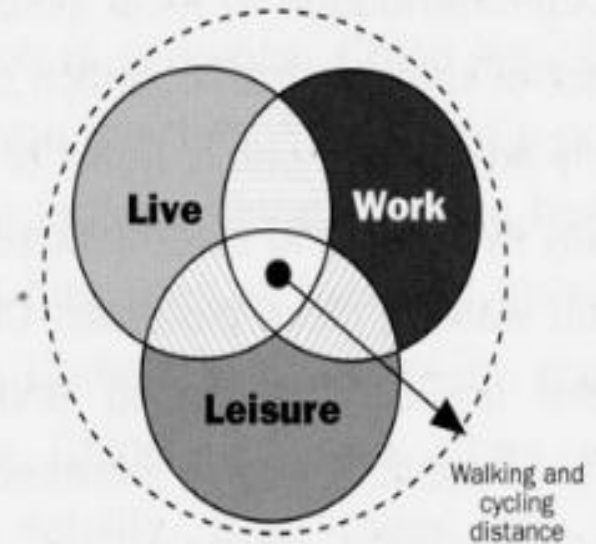
- – promoting High-density development
- adopting Transit oriented development
- Raising Height
- Rationalizing land uses /Building bye-laws
- Building inside not outside
- Building vertical not horizontal
- Building High not low
- Building mix not pure
- Building dense not shallow
- optimizing current infrastructure.

MAKING CITY COMPACT

Compact mixed-use nodes reduce journey requirements and create lively sustainable neighbourhoods



Zoning of activities leads to reliance on the private car.



Compact nodes reduce travel and allow walking and cycling.

Green Transportation pyramid

Walking



Bicycle



Public transport



Taxis



Carpools



Car



Transport systems are major emitters of greenhouse gases, responsible for 23% of world energy-related GHG emissions in 2004, with about three quarters coming from road vehicles.

Currently 95% of transport energy comes from petroleum. Energy is consumed in the manufacture as well as the use of vehicles, and is embodied in transport infrastructure.

Source: Wikipedia.org

LACK OF OPEN SPACES

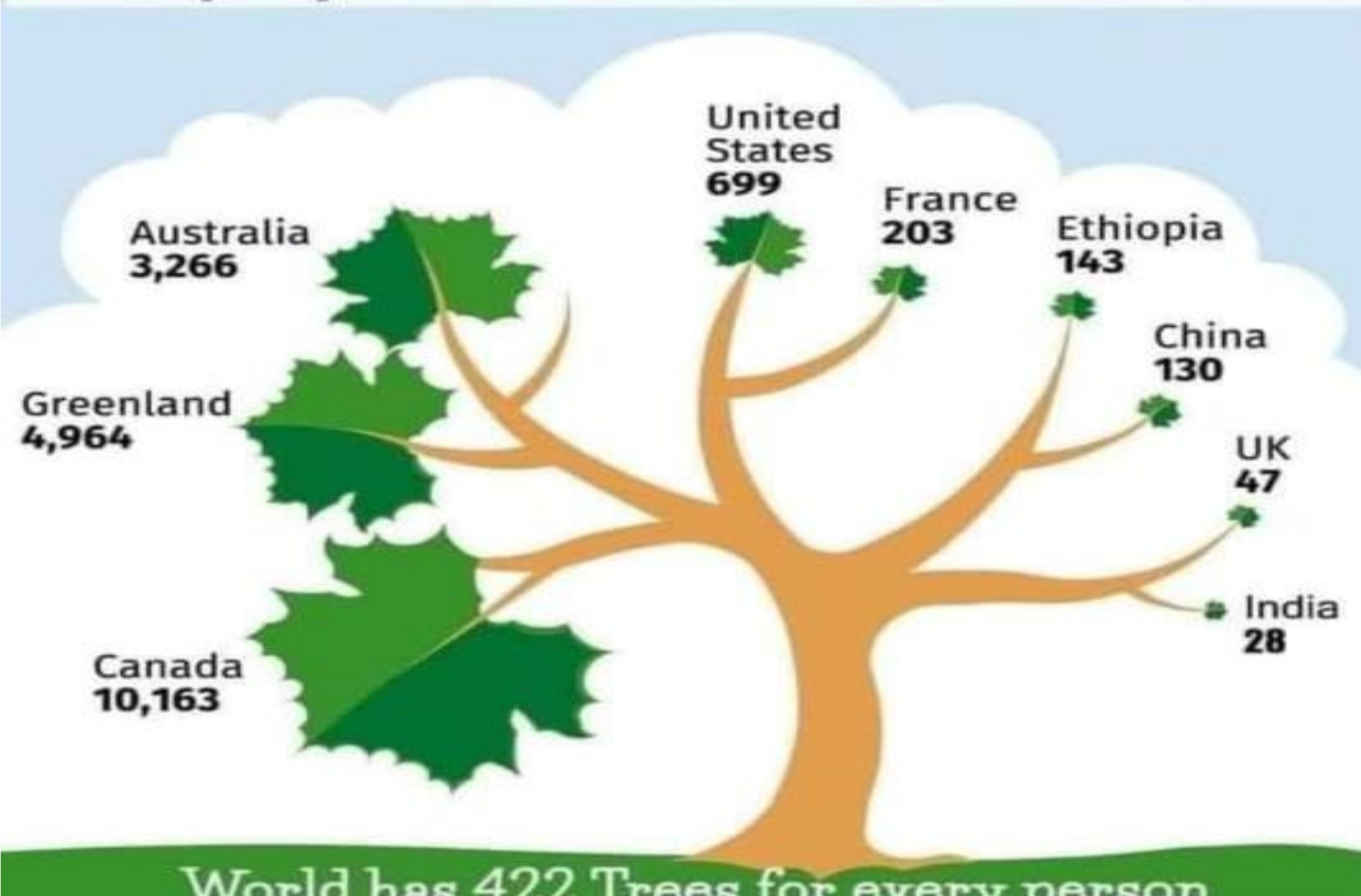
- Globally, 9 million people die every year due to air pollution.
- In London, two million people - of which 400,000 are children - are living in areas with toxic air.

Every day **33** Mumbaikars die of heart diseases attributed to sedentary lifestyles &

22 fall prey to tuberculosis, fanned by overcrowding & poor sanitation



GLOBAL- TREE COUNT



10. Mass Transit

Easy accessibility to mass transit facilities can lead to tremendous reduction in greenhouse gas emissions

Hong Kong (60% Hilly terrain)

❖ Almost 90% of all journeys in Hong Kong are via public transport.

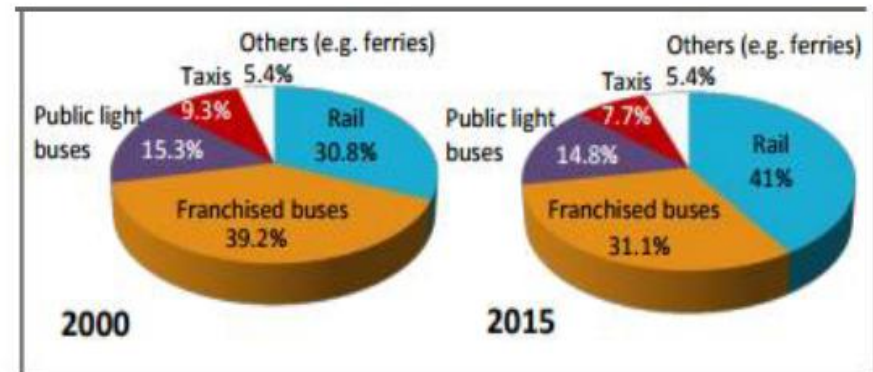
Green Metro

CO₂ EMISSION FROM DIFFERENT MODES OF TRANSPORT:

MODE	VALUE	UNIT
Passenger Car	67	gmCO ₂ /km/Passenger
Taxi(CNG)	72	gmCO ₂ /km/Passenger
Two Wheeler(Petrol)	28	gmCO ₂ /km/Passenger
Auto rickshaw(CNG)	35	gmCO ₂ /km/Passenger
Bus(CNG)	27	gmCO ₂ /km/Passenger
Metro	20	gmCO ₂ /km/Passenger

Public transport

Daily public transport patronage



Preservation of Tree Cover

Land

Have a **Tree Inventory Assessment of the city** and tag the trees for monitoring.



Chandigarh Municipal Corporation had conducted a manual survey in early 2017 that concluded with **1,65,597 trees** in the city. Administration has planted **2.5 Lakh trees** in the last one year and plans to plant around **3 Lakh saplings** as per the Chandigarh Greening Task Group

Develop a **Tall Tree Nursery** in the city

A **tree library** displaying indigenous species for projects to refer

HOW THE CITY FARED IN THE REPORT

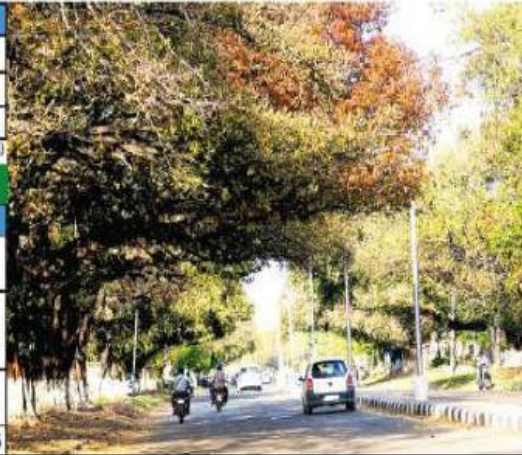
UT	2015	2017
Chandigarh	7.80	8.77
Daman and Diu	9.18	9.01
Goa	8.79	8.73

(% of total area in square kilometers)

FOREST COVER

TYPE	2015	2017
very dense forest	1.36	1.36
moderately dense forest cover	13.92	13.82
Open forest cover	6.38	6.38
Total	21.66	21.56

(area in square kilometer)



Have a **plan to progressively increase tree cover** in the city.



INDORE MUNICIPAL CORPORATION (IMC)

Approximately **2 lakh trees** are there in the city

IMC has started counting and geo-tagging of trees in city. Over 50,000 trees have already been geo-tagged.



4. Encourage Development in Environmentally Degraded Areas

Restore and reuse environmentally degraded areas

When industries decline or parts of cities are abandoned due to migration, urban or agro-wastelands or gaps in the built environment are left behind.

Barriers to redevelopment

– Liability Concerns

- Owners and Developers
- Industry and Government

– Waste Products

- Process Residuals, Metals, Steel Slag
- Industrial Chemicals and Solvents

– Open Dumping in General

- Unlined Pits, Dumps, Landfills

1.Environmental Contamination

- Groundwater
- Soil (heavy metals, petroleum)

2.Community Concern

- 3.Human Health
- 4.Local Ecology



Source: Recycling Industrial Land for Urban Redevelopment
Workshop on Global Innovations, World Bank, June 19, 2009

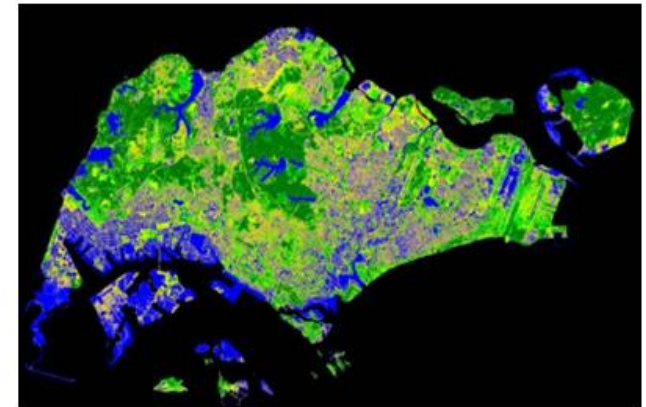
5. Public Green & Open Spaces

Green spaces can enhance health, well-being and quality of life

Public Green Spaces include

- Parks, botanical gardens
- Green spaces along water bodies (tank, nala, pond, lake, canal, river)
- Playgrounds, multi-open space

Policies for revitalizing mandis and promote urban farming as part of land use



Singapore :

Green Cover increased from 35.7% to 46.5% (1986 to 2007)

Source:
www.nparks.gov.sg

Adelaide Park Lands
Landscape Master Plan



Promote horticulture/
floriculture/ herb farm/
organic farms as a tool for
**biodiversity
conservation and
livelihood enhancement**



Source: NParks

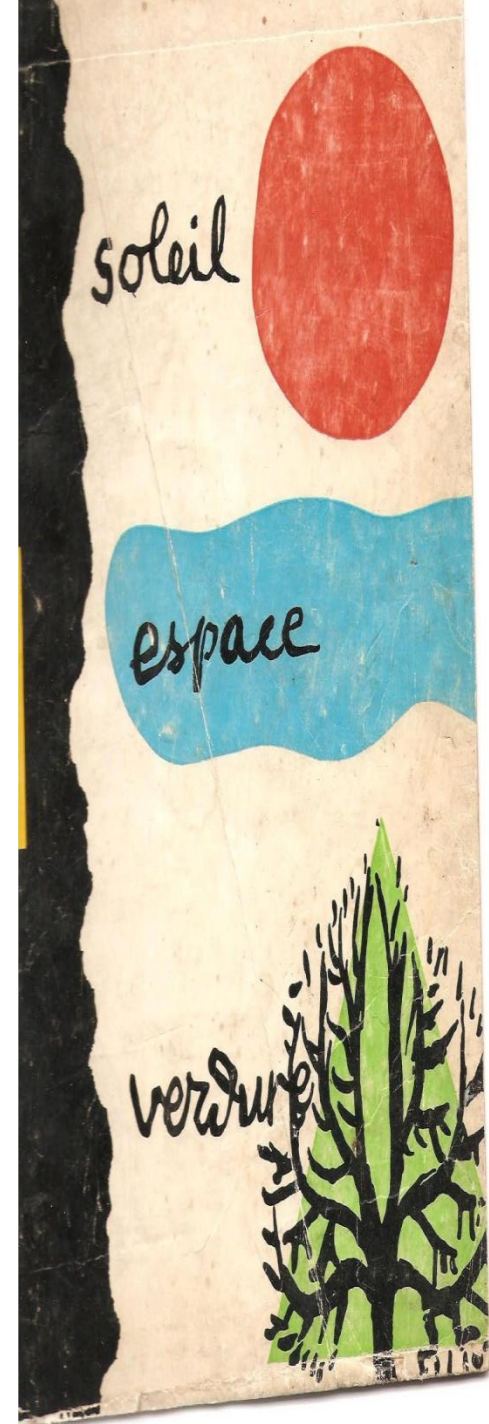
HILL AREAS- OPTIONS- ECO-TOURISM

- In tropical country like India,-- with hot/dry climate.
- tourist traffic at hill stations increased significantly
- -- damaging local natural resources, ecology /support systems.
- -- Need for limiting number of visitors ;
- - promoting economic, environmental /social development
- -- maintaining aesthetics, atmosphere, sound infrastructure /ecology by-
- - Harmonizing Tourist infrastructure/ development -- with surrounding environment.
- -- Evolving Tourism supportive policy -by involving local community
- -- Permitting Tourism development – getting with environment/socio-cultural characteristics of local community
- .-- Tourism planned as integral part of area development strategy/ integrated land use plan.

Addressing tourism related issues within Eco-Tourism policy / guidelines

- -- Evolving location specific code for tourists -- to maintain surroundings clean/disease free, protect local ecology/ respect local traditions, culture / heritage
- --taking due care to avoid exploitative use of scarce local resources, especially,--water and fuel-wood

VALUING HERITAGE



HILL AREAS- OPTIONS-HERITAGE PRESERVATION

- Heritage in Hill states – mapped/notified
- Heritage conservation made-- public movement- rather than government led program
- -Government to act as facilitator
- Heritage Preservation-- to be adequately/professionally addressed at local/ULB level - with adequate manpower/resources
- Heritage conservation-- made integral part of settlement planning process
- -- evolving strategies for conservation/ preservation / integration with existing /proposed development- on pattern HRIDAY
- -- Framework evolved to minimize damage to manmade/natural heritage
- -- Heritage areas/ heritage zones / heritage cities/towns concept implemented to protect total environment in heritage rich areas.
- -- Incentivizing -- to involve/encourage people -- making them partner in heritage preservation
- -- Discouraging destruction of heritage areas.
- --Development controls for heritage areas-- sensitively designed /implemented
- Sensitizing People about heritage-- its preservation & conservation -to make it people centric / people led movement and not government and parastatal led movement.

7. Barrier-free Accessibility

By design, all public spaces in the city should have **100% Universal Accessibility** Facilities catering to differently abled/ senior citizens

- Pedestrian pathways
- Road crossings
- Public Buildings
- Public Toilets
- Parks and recreational areas

❖ **100% barrier-free environment by 2020**



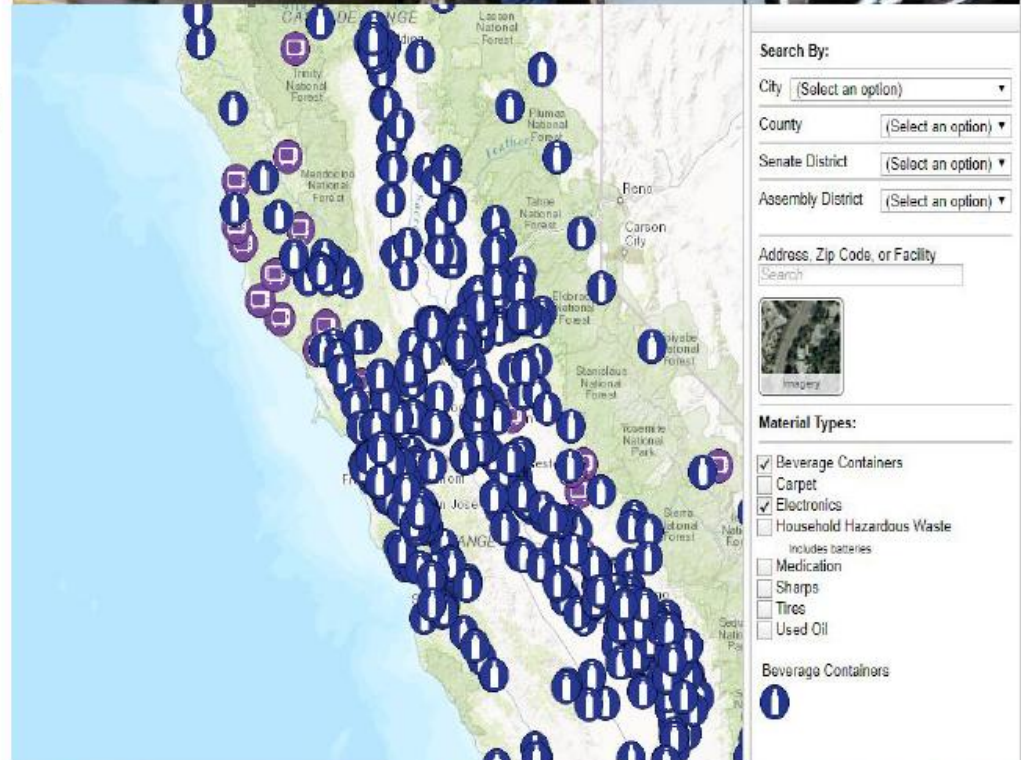
9. Solid Waste Management

Segregation at Source is key to 'Zero Solid Waste City'

The Biggest Challenge today in handling Municipal solid waste is Segregation & Recycling

California (39.25 Million population)

- ❖ 50% handled through recyclers
- ❖ Location of collection and recycling facilities for 8 different material types throughout California

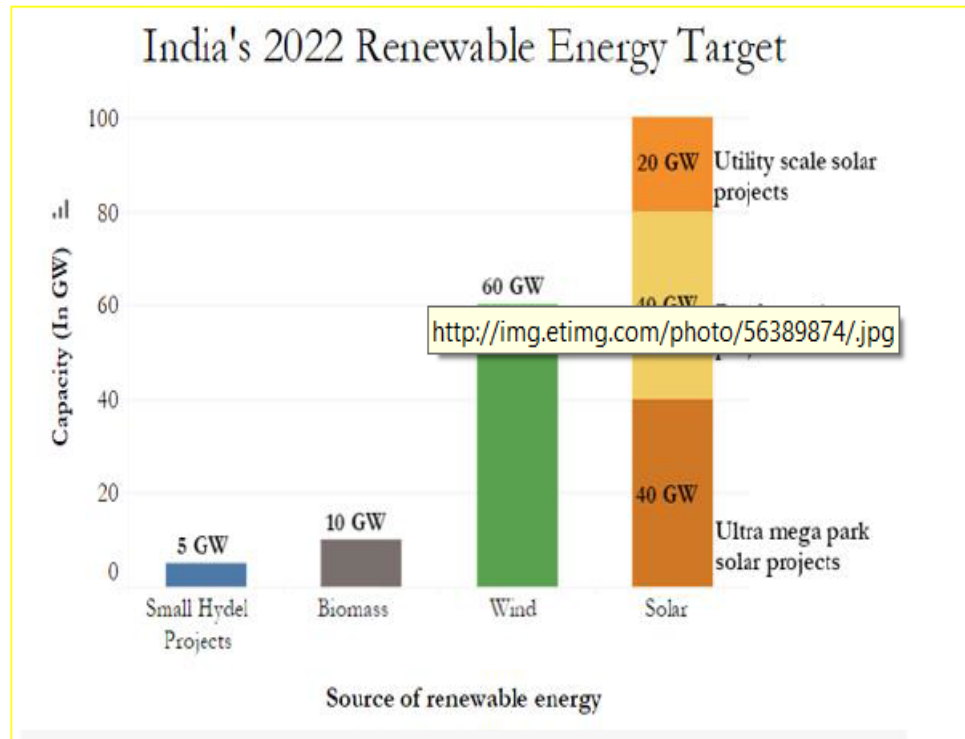


STRATEGIES- DISASTER- LAND SUITABILITY ANALYSIS

- Safety from disaster – made integral part of settlement planning/development process.
- Detailed Land suitability analysis for – planning/urbanising area carried out
- All low lying area – earmarked as no- construction zone/ green area/ water bodies.
- All eco-sensitive area/ forest area— labeled as protected area/ prohibited for urbanisation.
- All water bodies – zoned for preservation
- All existing hydro / water shed area --clearly defined/ preserved
- All existing trees --declared protected trees.
- Area coming under HT Lines-- made no-construction zone.
- Areas prone to intense tectonic/seismic activities– identified/prohibited for human habitation
- Indiscriminate road/ building construction /creation of artificial large water bodies minimized
- Earthquake-proof designs used for construction/ made part of building code
- Large projects endangering ecological balance/ displacing people --carefully considered

12. Renewable Energy

Transition towards renewable energy can help cities to become Low Carbon Cities



- ❖ India has set renewable power deployment target of 175 GW by the year 2022

➤ Reached 80.47 GW as on 30 June 2019

Vancouver, Canada

Malmö, Sweden

City of Växjö, Sweden

Inje County, Republic of Korea

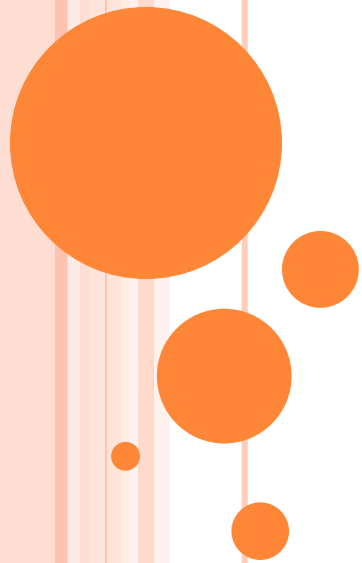
Pingtung County, Taiwan

Kasese District, Uganda

- ❖ Cities targeting 100% RE by 2030-50



QUALITY LEADERSHIP



- # • QUALITY LEADERSHIP
- Quality Urban Development would require:
 - well defined city ownership-ULBs
 - Well defined city Leadership- Mayor
 - Building a High performance team
 - Adopting professional / Management Approach
 - Promoting Training and Development
 - Investing in Learning
 - Creating Culture of Accountability
 - Securing Stakeholders Consensus
 - Launching Pilot Programs in cities
 - Prioritizing/defining Agenda for City Growth
 - Each City to have a starting Point
 - Mayors of Curitiba, New York, Washington, Rio-de Janeiro,, Bogota, Toledo ,London---, created highest degree of urban Leadership/Governance to make cities Smart



JAIMY LEARNER- MAYOR CURITIBA



HILL AREAS DEVELOPMENT- DESIGNING HAPPY & HEALTHY BUILDINGS

UN 17 Sustainable Development Goals (SDGs)
Transforming the health of our world by 2030



BUILDINGS- ROLE AND IMPORTANCE

- **Buildings-- integral part of human history, growth and development since inception**
- **Buildings -- would continue to define future journey of human growth**
- **Buildings-- constitute manmade environment-**
- **Buildings-- remain vital for human growth**
- **Buildings – are living organism**
- **Buildings – cater to all human activities**
- **Buildings- full of dualities and contradictions**
- **Buildings -- largest consumers of energy**
- **Buildings - largest consumers of resources**
- **Buildings – largest generators of waste**
- **Buildings- largest polluter of environment /ecology**
- **Buildings --- responsible for largest carbon footprints**
- **Buildings -- responsible for global warming**
- **Buildings -- major determinant of global sustainability**
-

BUILDINGS- ROLE AND IMPORTANCE

- Buildings– providers of optimum/worst living conditions
 - Buildings -- make people healthy/sick
 - Buildings --critical because 80% human life spent in buildings
 - Buildings vital to overcome human/ ecological concerns
 - Making Buildings Sustainable-- essential for value addition to resources, environment ,ecology
 - Studies revealed —
 - A Green School-- makes learning easy and more meaningful
 - A Green House--- makes people happy and healthy
 - A Green Hospital-- cures patients quickly
 - A Green Shopping Mall-- can increase sale / profits
- 



WORLD
GREEN
BUILDING
COUNCIL

SUSTAINABLE DEVELOPMENT GOALS



HILL AREAS- OPTIONS- GREEN BUILDINGS

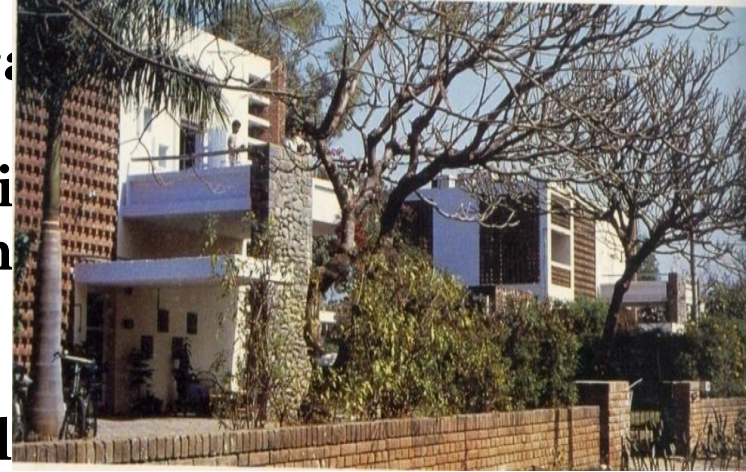
- Built environment --consumer of large energy
- Need for Reducing energy requirements --innovative building designs solutions.-- Designing with nature
- sourcing sun as major source of light / heat for meeting energy requirements of buildings
- In Hills southern, eastern / western slopes used-- for constructing to maximize use of solar energy
- Constructing buildings on Northern slope prohibited.
- Buildings with minimum footprints --to cause minimum disturbance to site.
- Preserving Existing trees, flora /fauna
- Available Water sources preserved / conserved
- Walls / roof -- used for heat gain / retention in building
- Using Local Materials for construction
- Improving local construction technologies
- Upgrading local construction skill
- Incentivizing the Green Concept in buildings- with government taking the lead



BUILDINGS AS CONSUMERS OF RESOURCES

• Built environment impact environment / consumption of resources:

- 16% of world's fresh water withdrawn
- 25% of wood harvested.
- 30% of consumption of raw materials
- 50% of global energy consumption
- 35% of world's CO2 emission
- 40% of Municipal solid waste.
- 50% of Ozone depleting CFC's still in use
- 30% of the residents having sick building syndrome
(Roodman and Lenssen, 1995)

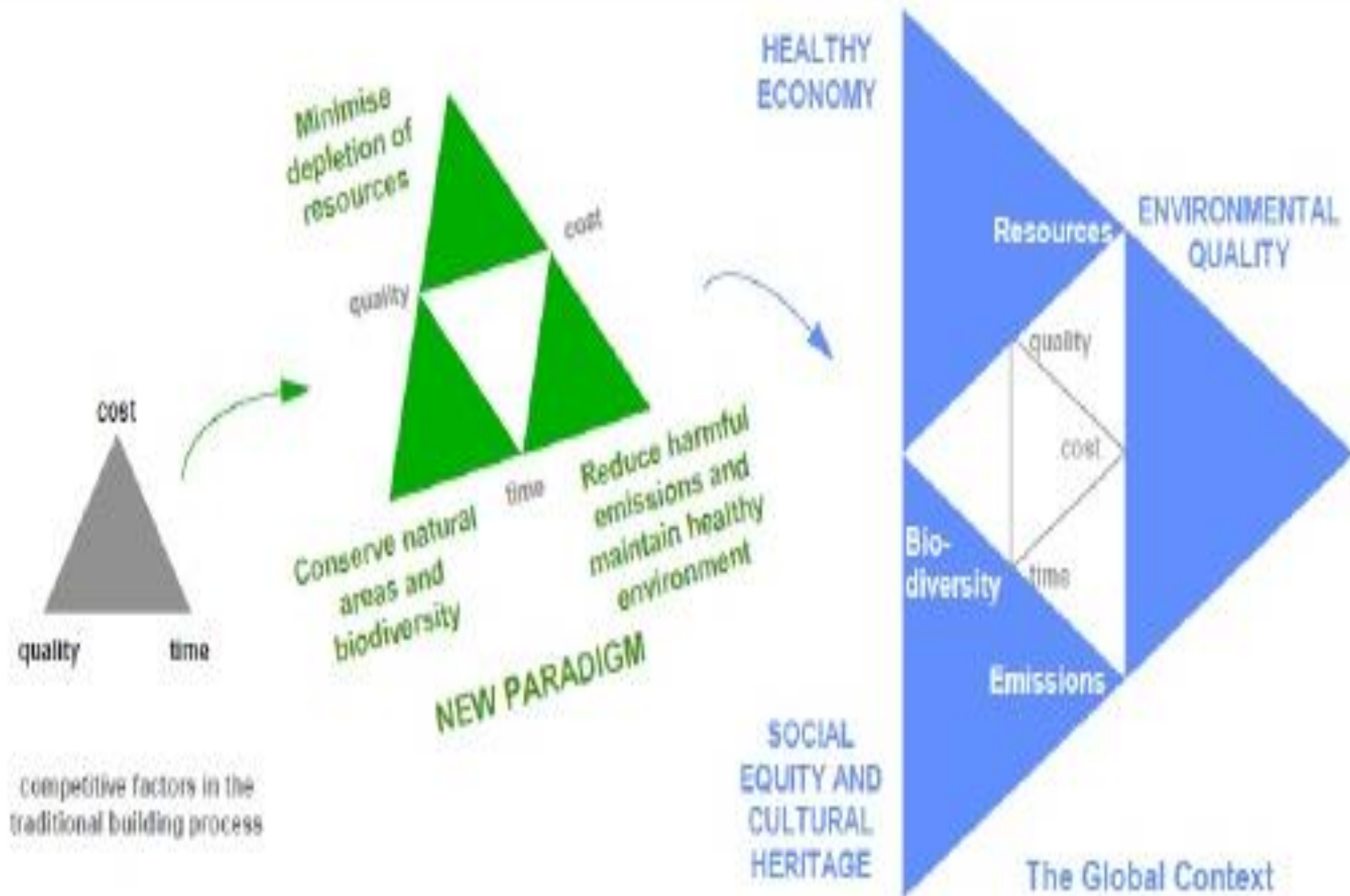


- 70% global warming--outcome of buildings / transportation
- Existing buildings--low concern for energy conservation.
- Considering annual addition of- 700-900msqmts- energy/environment implications can be critical.
- Buildings need to be designed /constructed / operated with utmost care for sustainability/resources considerations--- energy/

DESIGNING BUILT ENVIRONMENT

Aspects of Built Environment	Consumption	Environmental Effects	Ultimate Effects
• Siting • Design • Construction • Operation • Maintenance • Renovation • Deconstruction	• Energy • Water • Materials • Natural Resources	• Waste • Air pollution • Water pollution • Indoor pollution • Heat islands • Stormwater runoff • Noise	• Harm to Human Health • Environment Degradation • Loss of Resources

PERCEPTIONS



DEFINING- GREEN BUILDINGS

DEFINITION:

- "A green building is one which uses less water, optimises energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building."



GREEN BUILDINGS – DEFINITION

- A Green Building is one which;

***Conserves
natural
resources***



***Uses less
Water***



***Optimizes
Energy
Efficiency***



***Generates
less
waste***



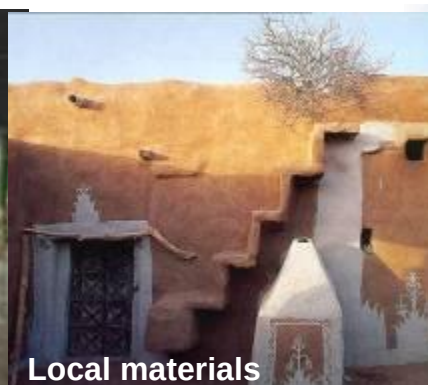
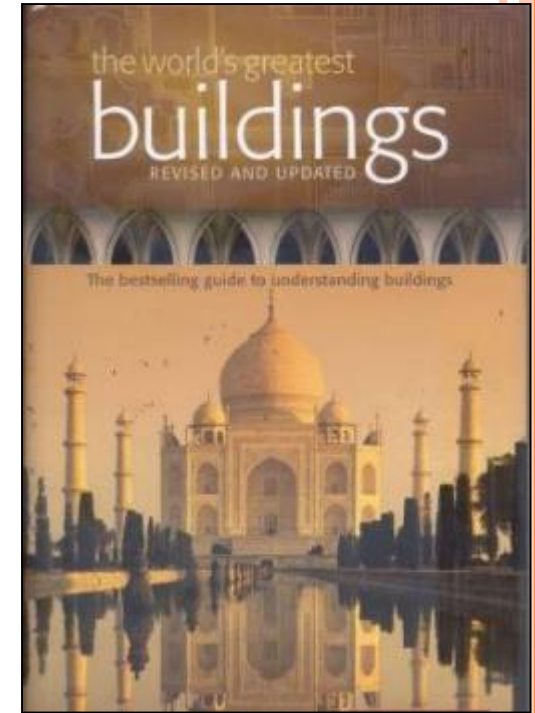
***Provides
healthier
spaces***



REDISCOVERY OF THE INDIAN ETHOS

- 5 elements of Nature
(Panchabhutas)-Supported by

Prithvi (Earth)	Site Selection and Planning
Jal (Water)	Water Conservation
Agni (Fire)	Energy Efficiency
Vayu (Air)	Indoor Environmental Quality
Akash (Sky)	Daylight, Night Sky Pollution



GODREJ IGBC BUILDING- HYDERABAD



BENEFITS OF GREEN BUILDINGS

**ENERGY
USE**

24%* -50%**

**CO₂
EMISSIONS**

33%* -39%****

**WATER
USE**

40%**

**SOLID
WASTE**

70%**

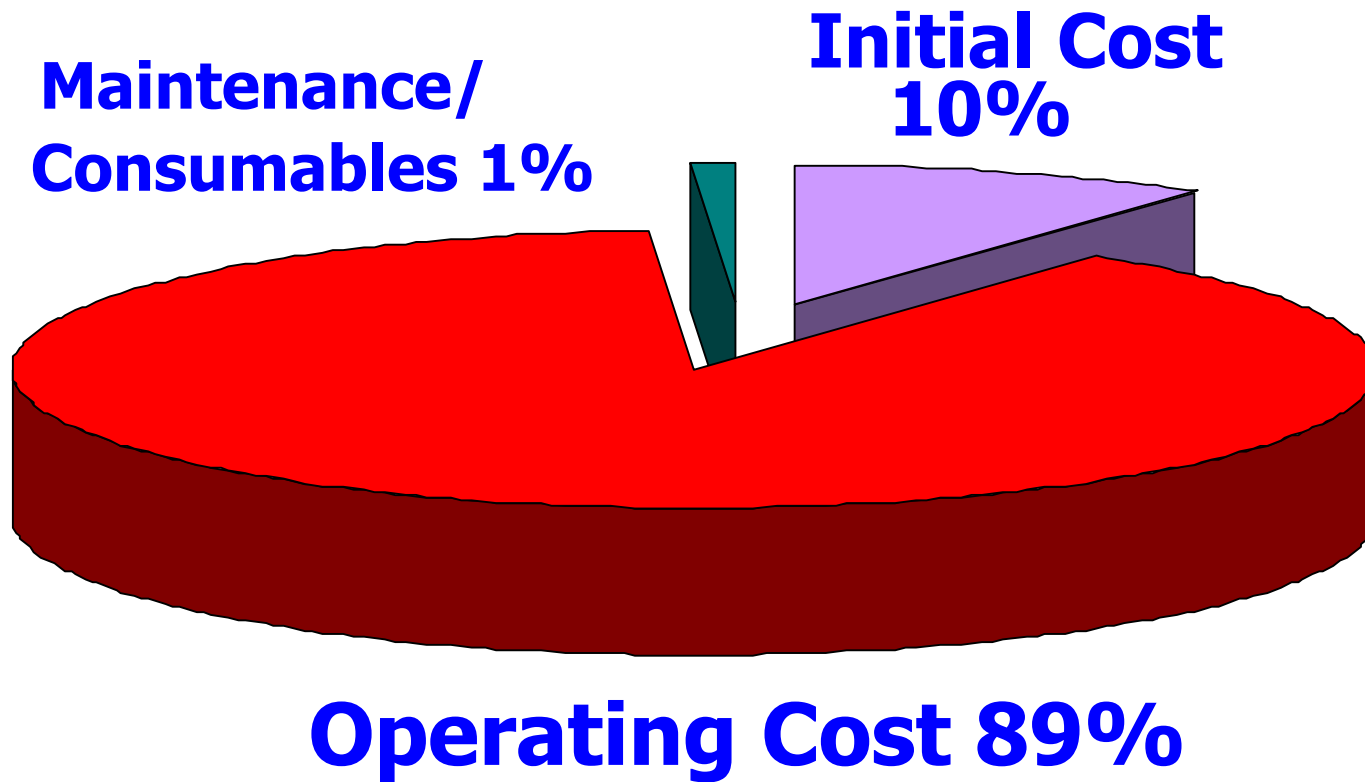
Green Buildings Can Reduce...

* Turner, C. & Frankel, M. (2008). Energy performance of LEED for New Construction buildings: Final report.

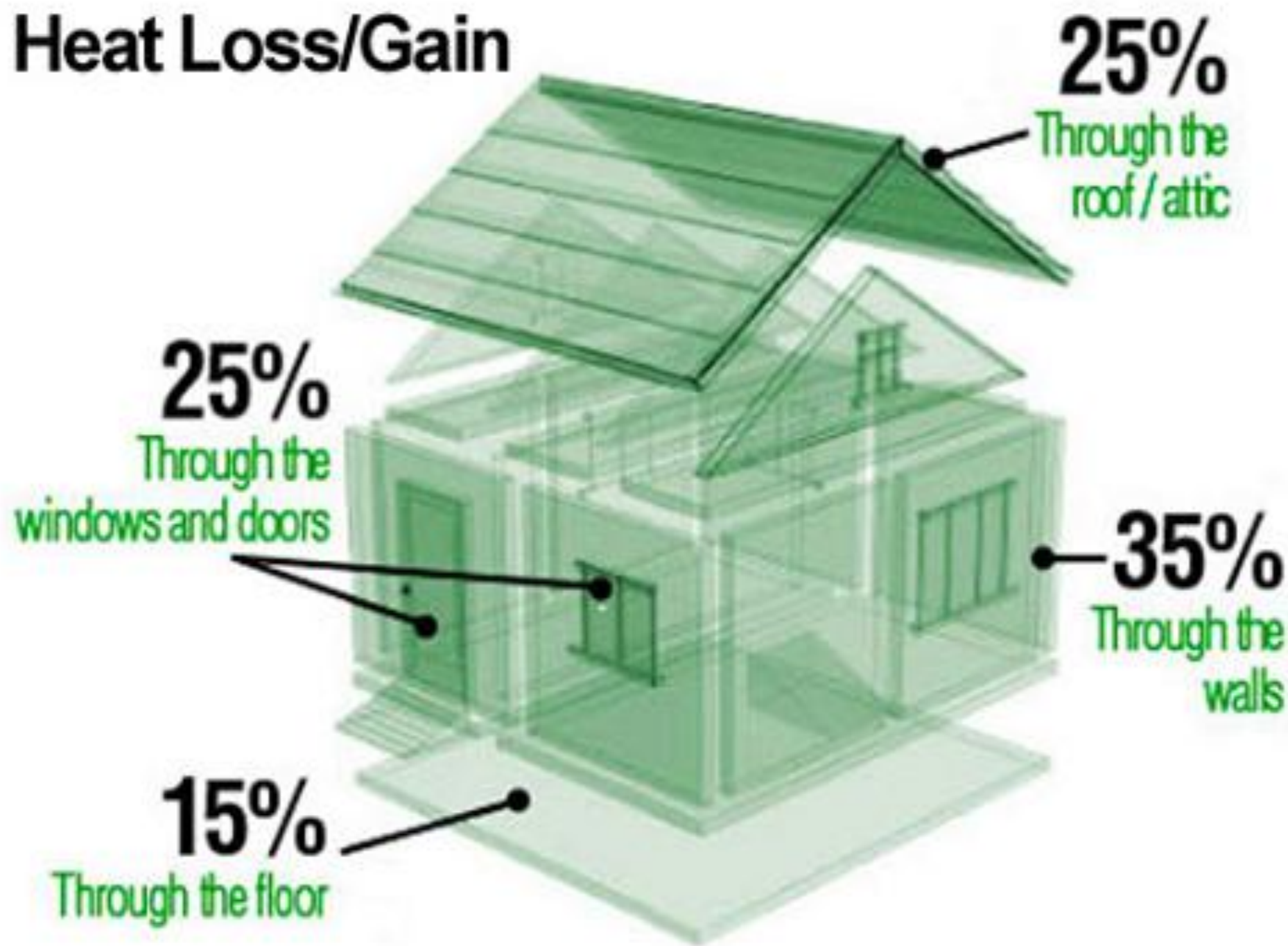
** Kats, G. (2003). The Costs and Financial Benefits of Green Building: A Report to California's Sustainable Building Task Force.

*** GSA Public Buildings Service (2008). Assessing green building performance: A post occupancy evaluation of 12 GSA buildings.

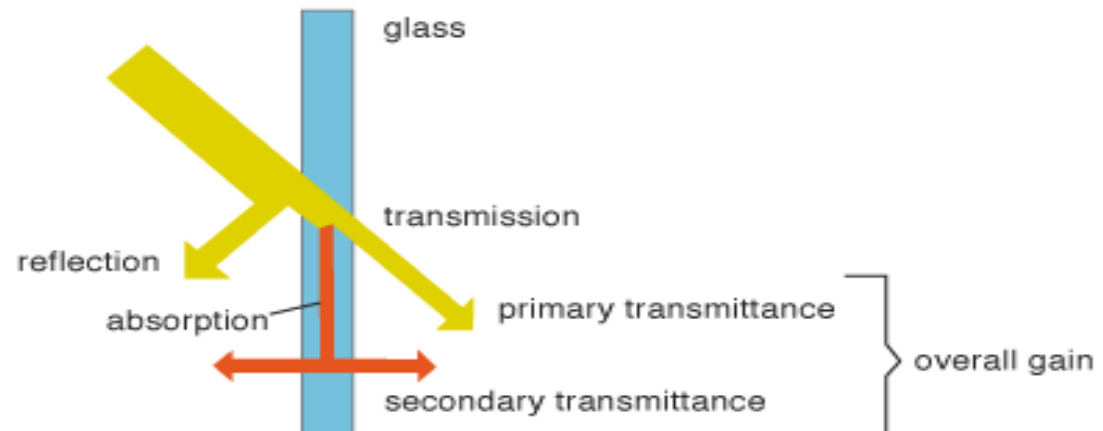
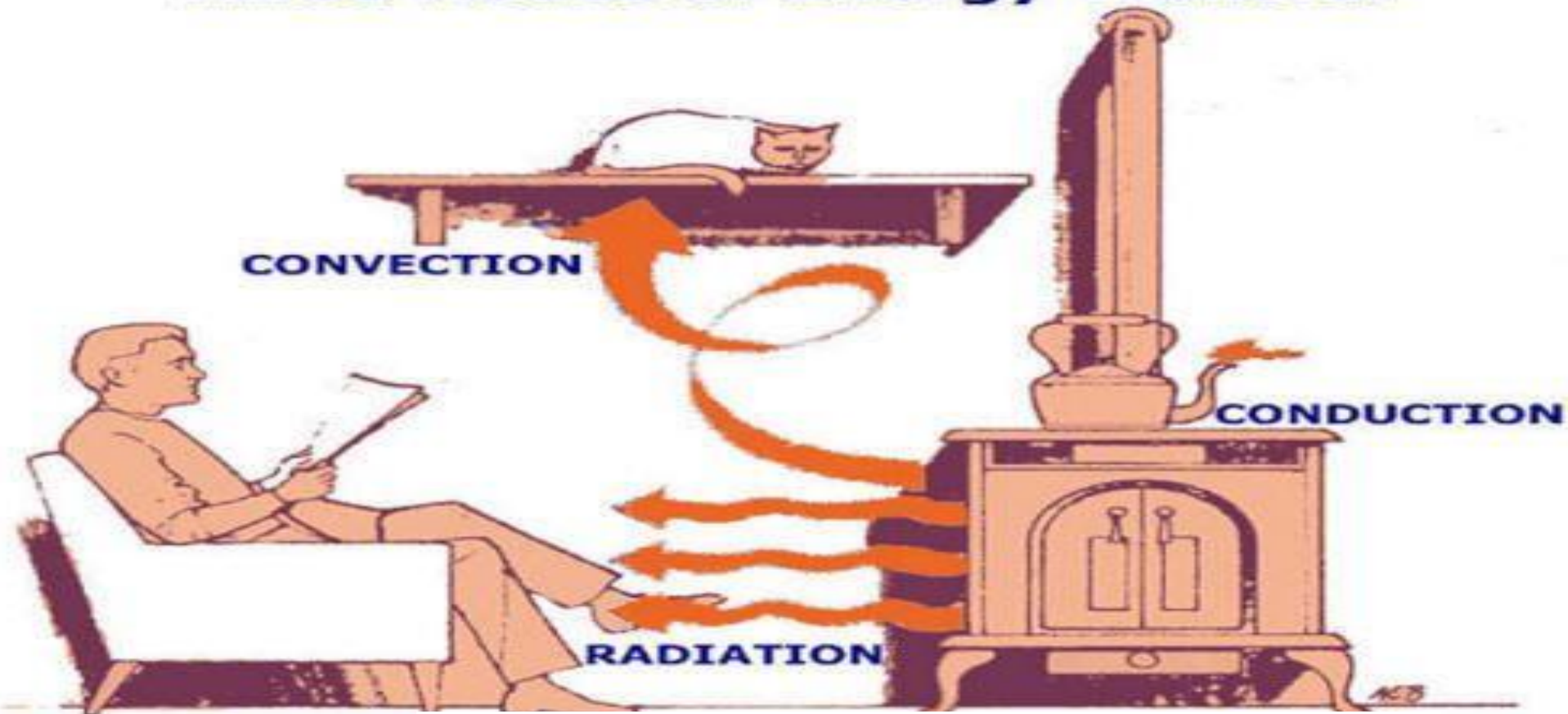
GREEN BUILDINGS- LIFE CYCLE COSTS



Heat Loss/Gain

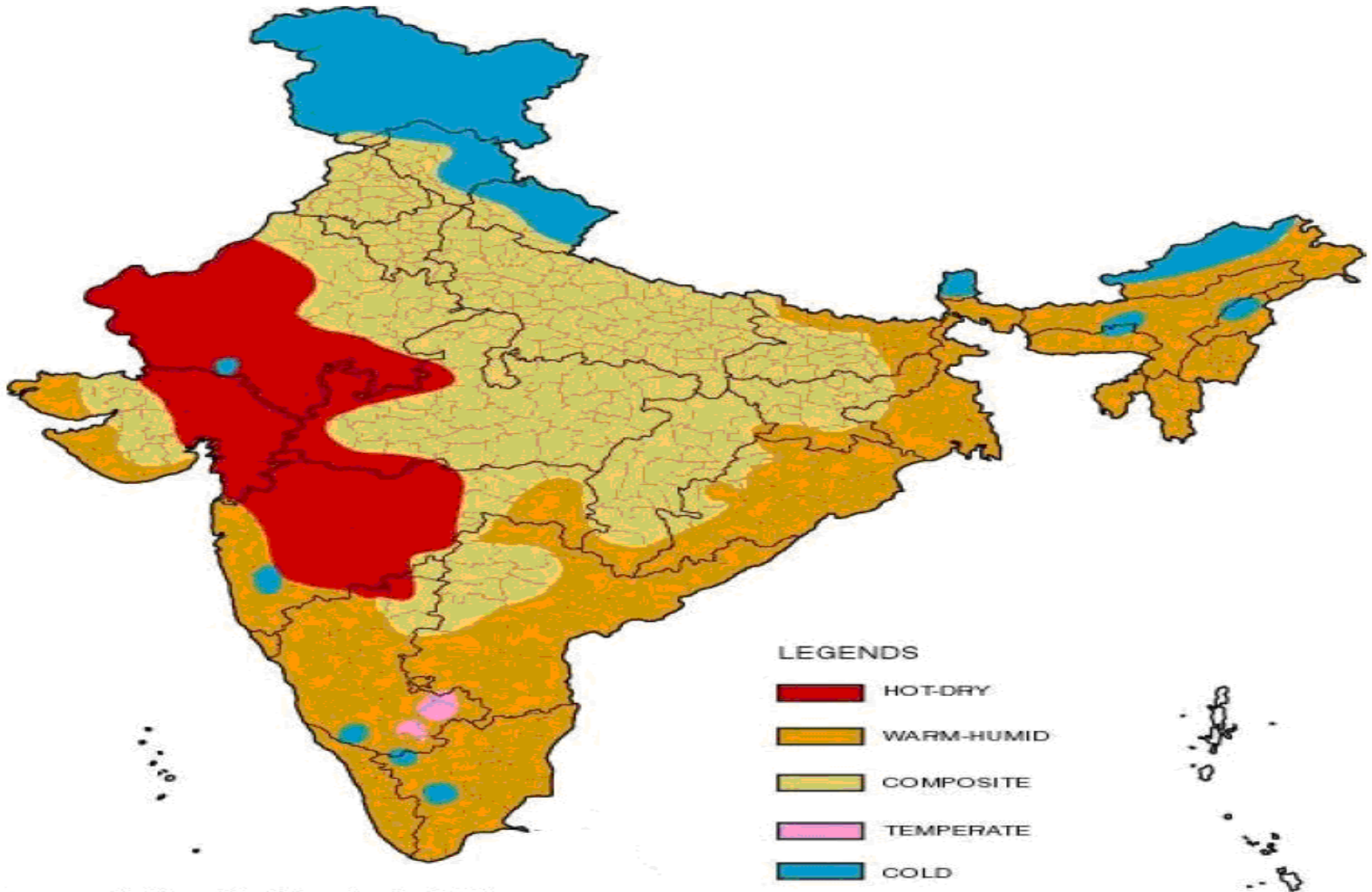


Three Modes of Energy Transfer





INDIAN CLIMATIC ZONES



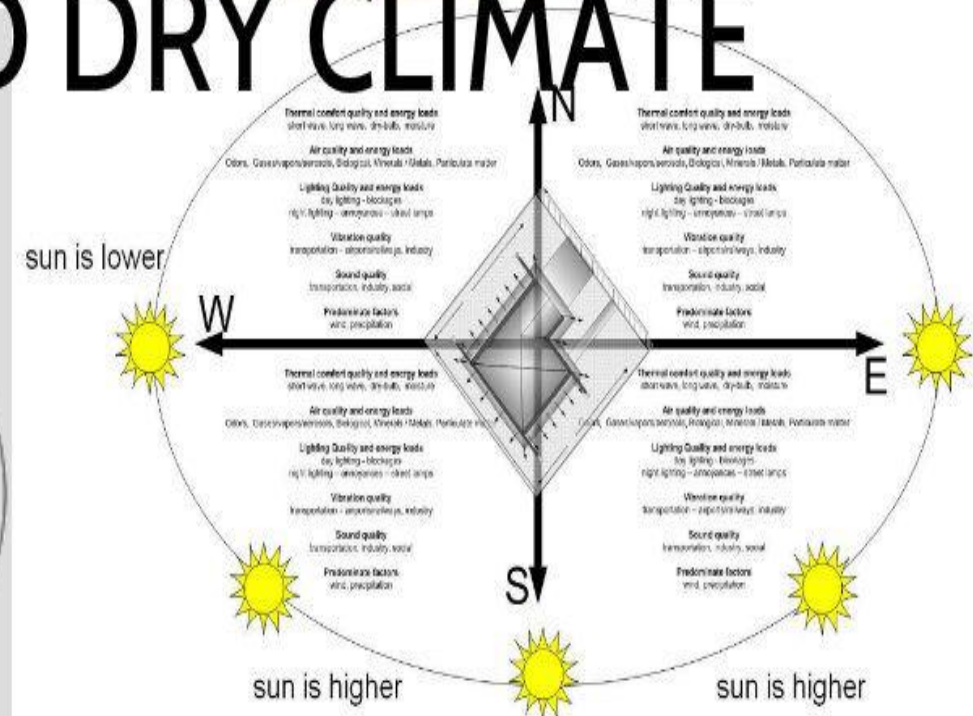
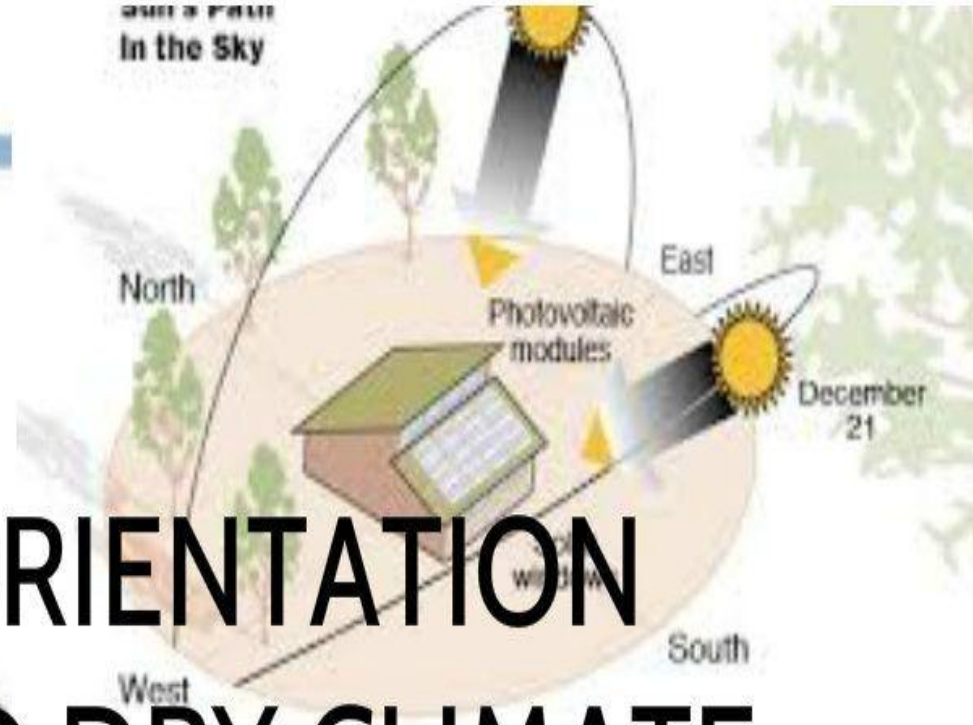
Source: National Building Code 2005

Orientation of Building

- The main living are located on the southern facing side and bedroom on north of the



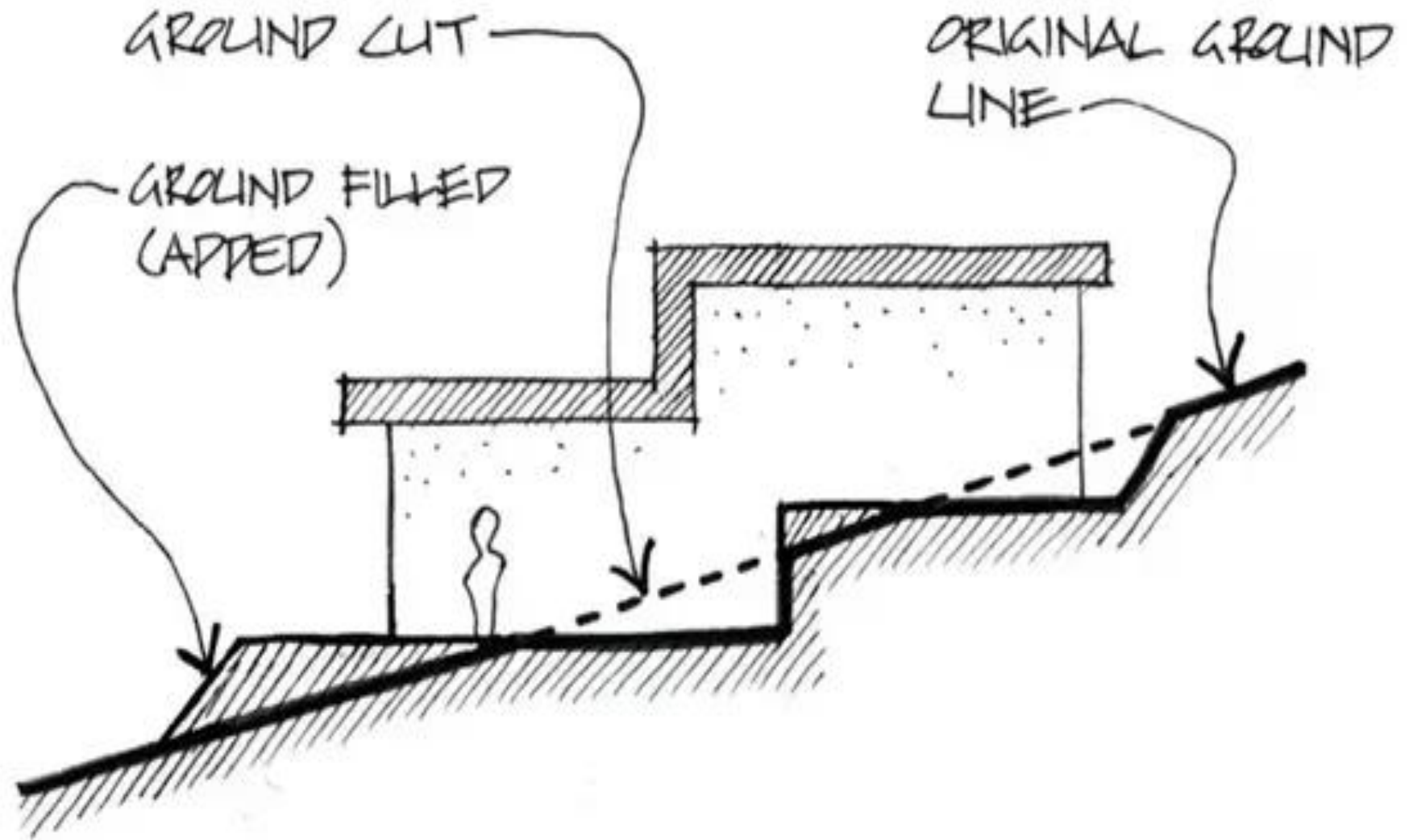
BUILDING ORIENTATION FOR HOT AND DRY CLIMATE



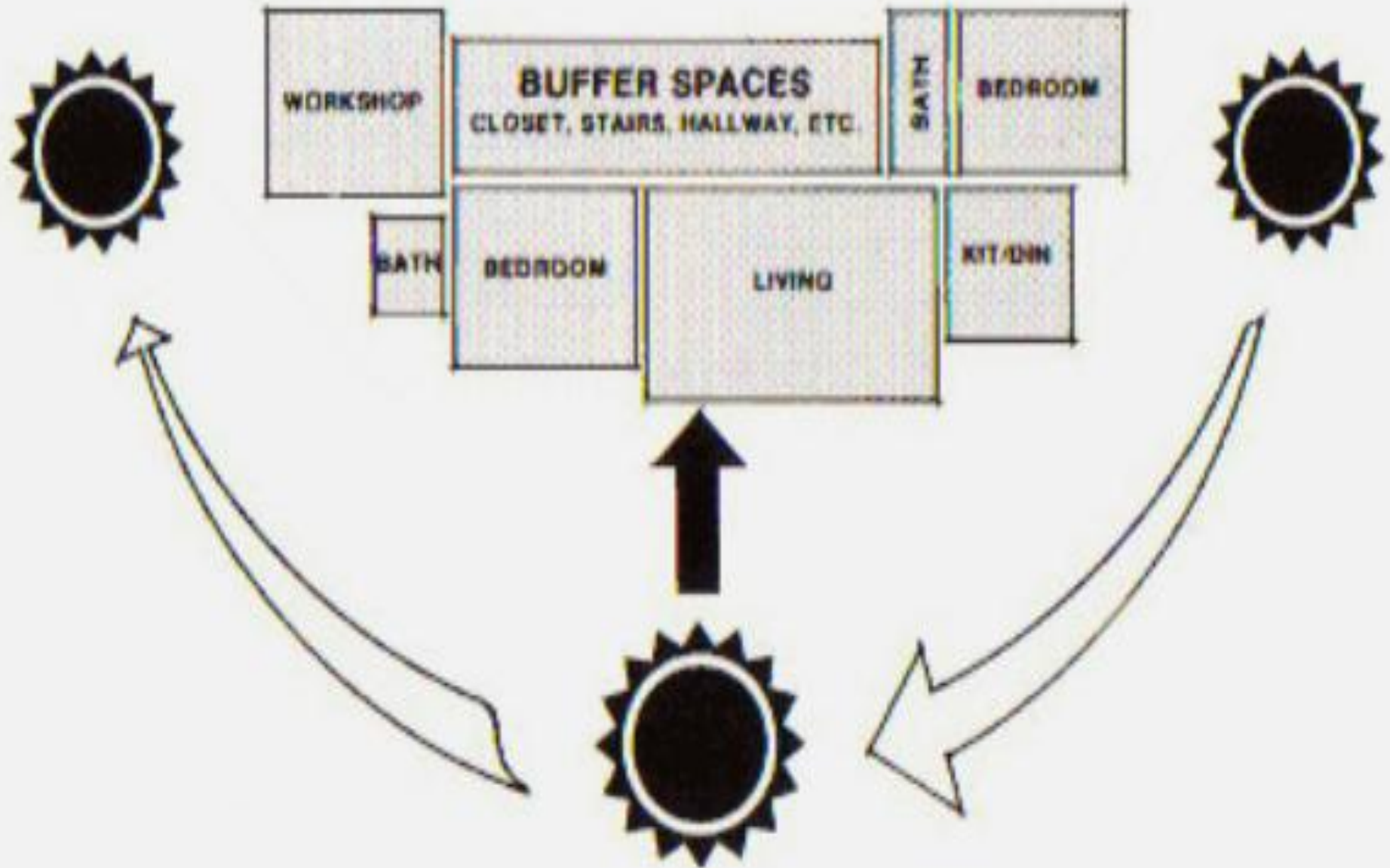
CHANDIGARH



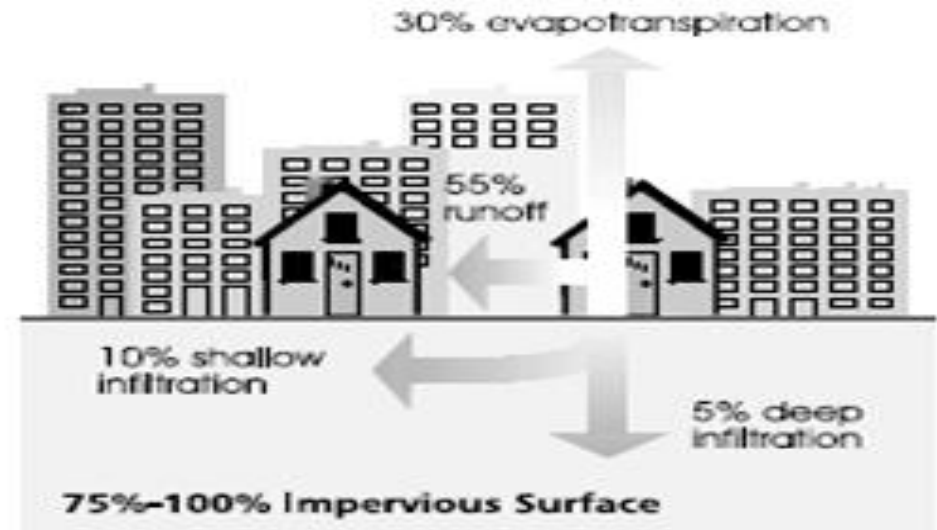
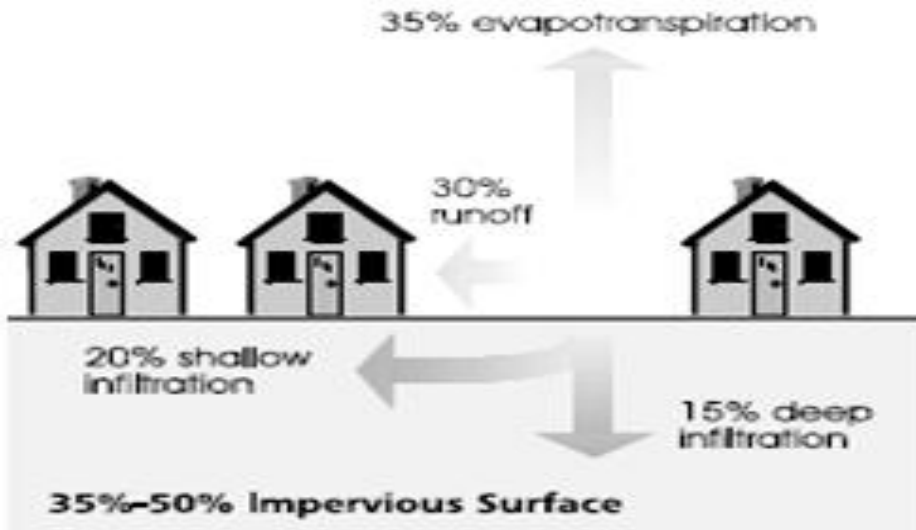
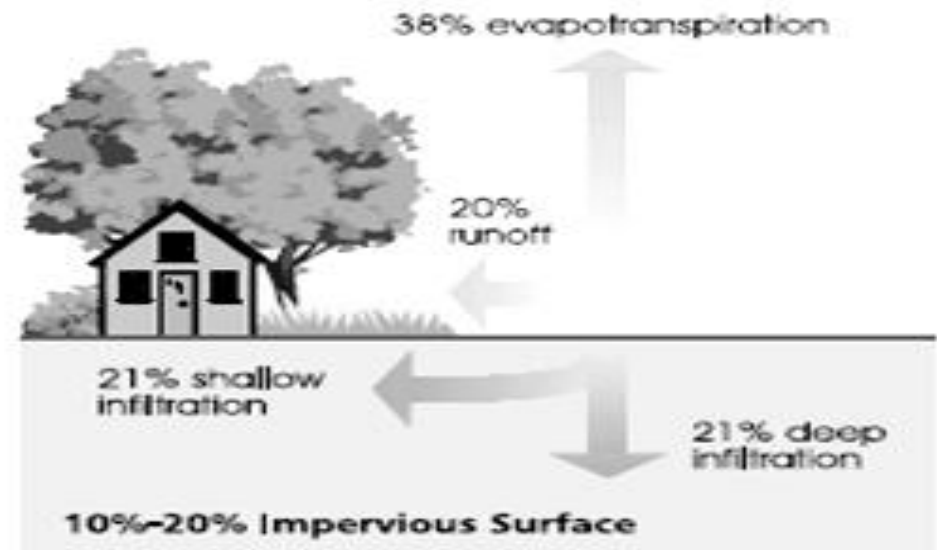
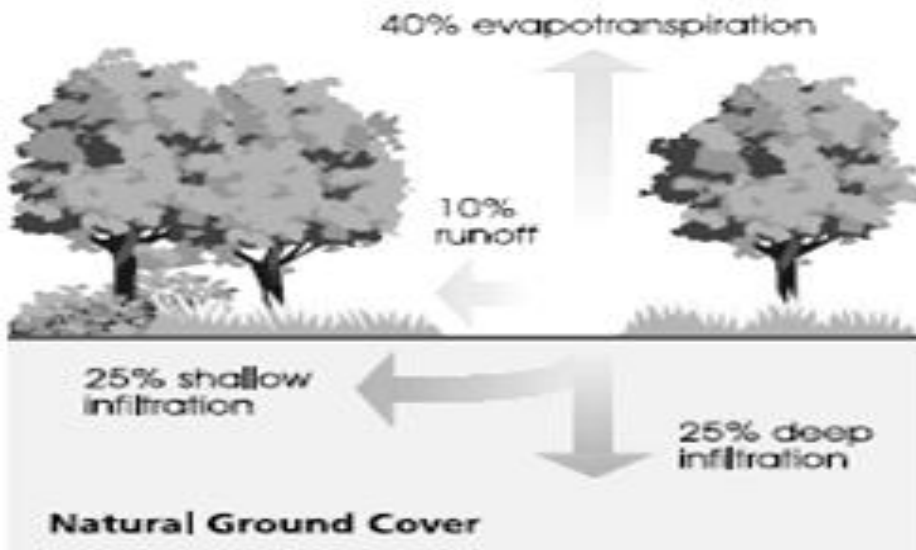
MANAGING SITE- MIN. CUTTING & FILLING



PLANNING FOR SPACES IN BUILDINGS

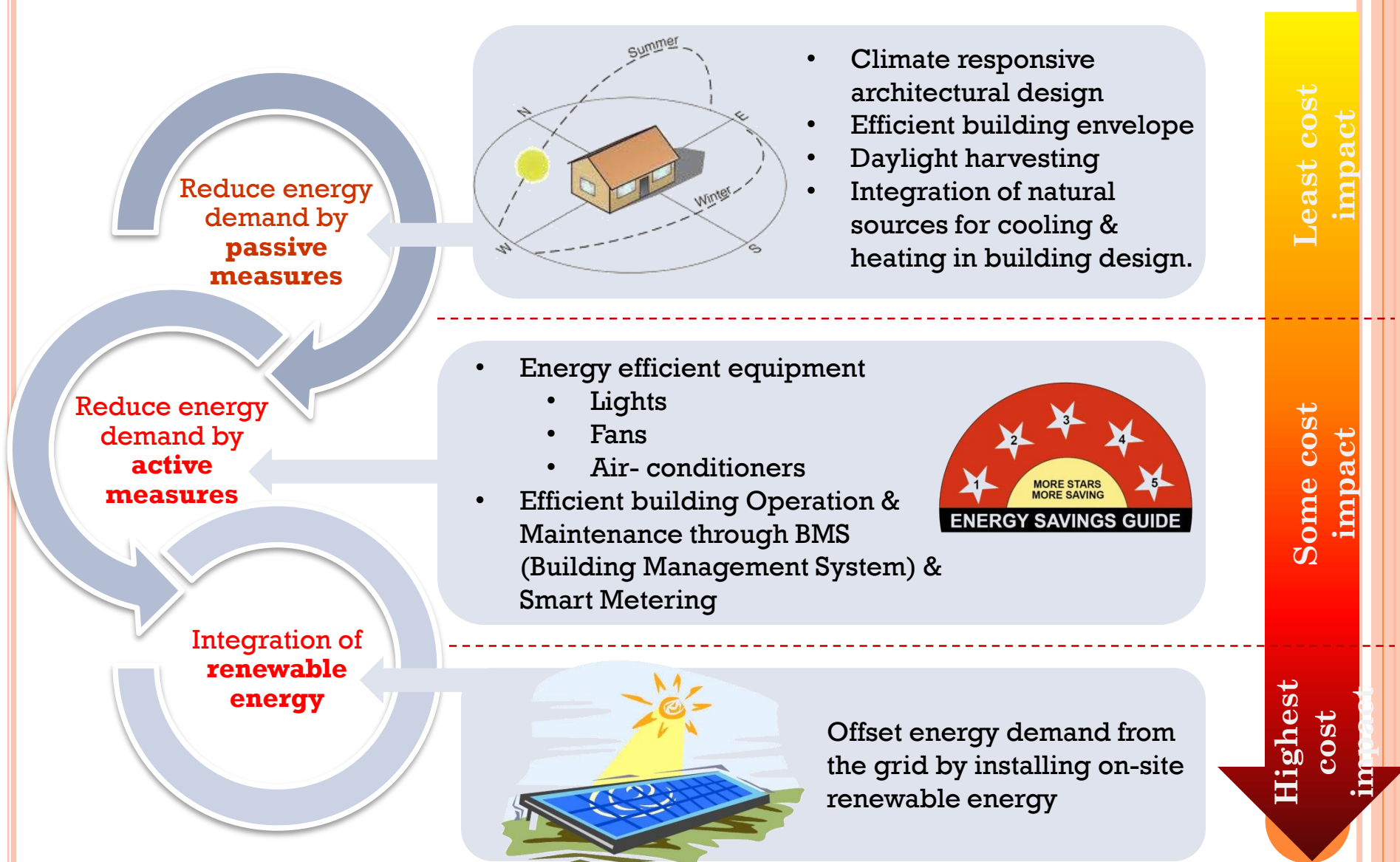


IMPACT OF BUILDINGS- MINIMIZING BUILDING FOOTPRINTS





COST EFFECTIVE STRATEGY FOR ENERGY EFFICIENCY



BAHRAIN WORLD TRADE CENTER - BAHRAIN



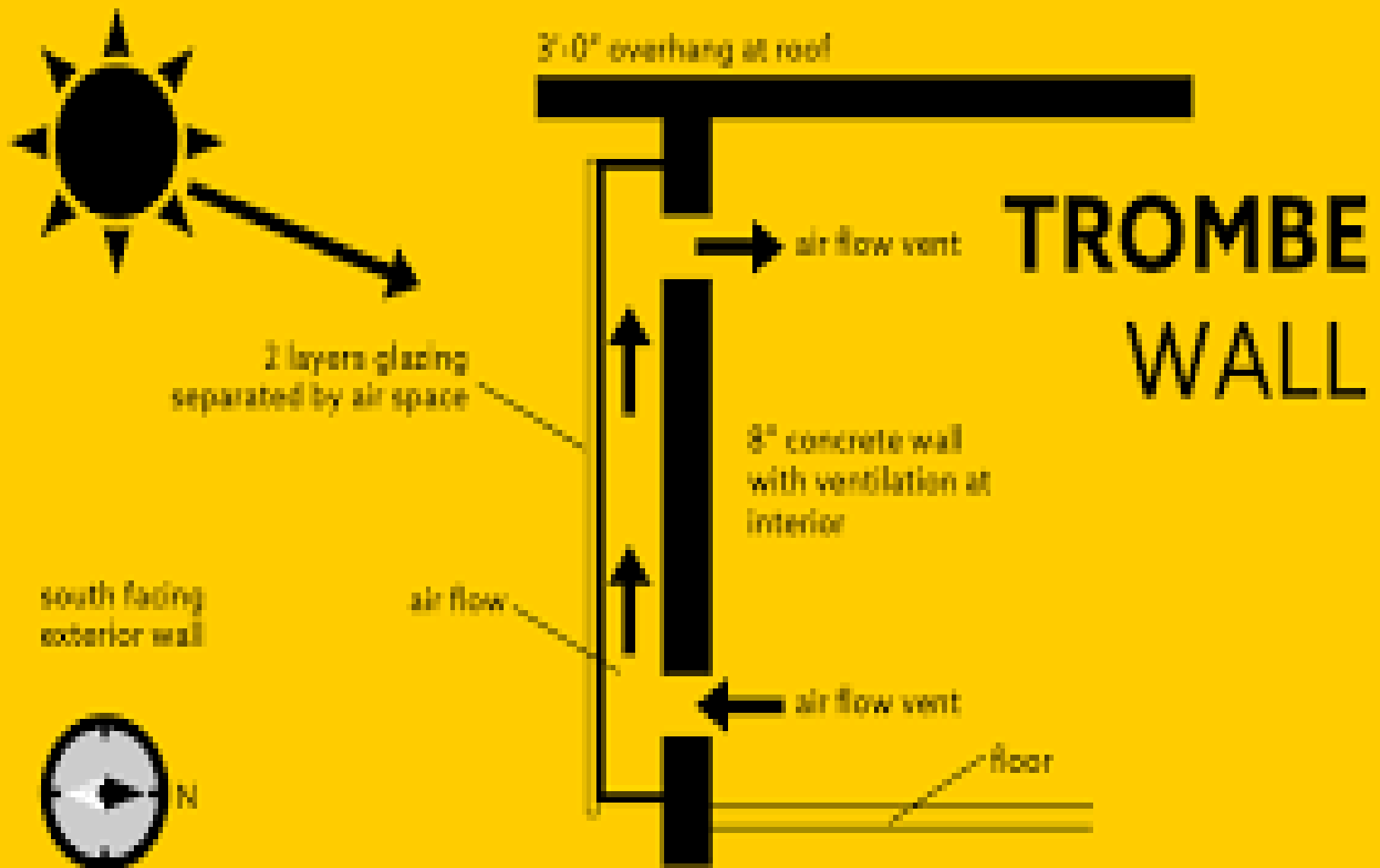
- Generating 15% energy from windmills
- Two 240 meter twin sky scrapers joined by three windmill--, each 3 meters wide, attached to walkways
- :designed/ built by Atkins in city of Manama

APPLE PARK - CUPERTINO



- Apple Corporate headquarters hold 12,000 employees
- one of the most energy-efficient buildings in world.
- Temperature regulated with high tech ventilation-- tubes laid in ceilings & floors for cooling

TROMBE WALL



SOLARIUM



Please

**USE WATER
WISELY**



**EVERY
DROP
COUNTS**

Water Conservation

❖ Present Issues

- Water Management
 - ❑ 3.7% of world's water resources, 17% of world's population
- Depleting Ground water
 - ❑ 21 Cities in India may run out of ground water by 2022
- Stress on Municipalities
 - ❑ Rapid Urbanization leads to stress on water supply
 - ❑ Treatment of Waste Water

Efforts to Address the issues through the rating systems



Rainwater Harvesting Pits



Rainwater Harvesting Ponds



Water Efficient Plumbing Fixtures with Aerators



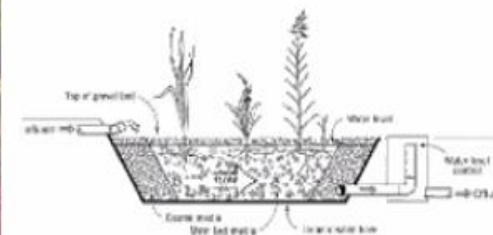
Waterless Urinals



Dual Flush system with Low Flush rates



Efficient Irrigation System



Building Materials & Resources

❖ Present challenges

➤ Waste Management

- ❑ Waste Segregation is negligible
- ❑ Most of the landfills in the country are stressed
- ❑ C&D waste management is a major issue

➤ Building Materials

- ❑ Materials used for construction are not sustainable

Efforts to address the challenges through the IGBC rating systems



Sustainable Building Materials

❖ Focus Areas:

i. Building Reuse/



ii. Reuse of salvaged Material



iii. Material with Recycled Content



iv. Local Material/ Regional Material



v. Wood Based Materials



GREEN MATERIAL - FLY ASH BRICKS



GREEN MATERIAL - AUTOCLAVED AERATED CONCRETE



Advantages

- AAC has been produced for more than 70 years, and it offers several significant advantages over other cement construction materials, one of the most important being its lower environmental impact.
- ** Improved thermal efficiency reduces the heating and cooling load in buildings.*
- ** Workability allows accurate cutting, which minimizes the generation of solid waste during use.*
- ** Resource efficiency gives it lower environmental impact in all phases of its life cycle, from processing of raw materials to the disposal of waste.*
- ** Light weight saves cost & energy in transportation.*
- ** Light weight saves labor expenses.*
- ** Light weight increases chances of survival during seismic activity.*

GREEN MATERIAL--UPVC(UNPLASTISIZED POLYVINYL CHLORIDE) DOORS AND WINDOWS



The Vinyl windows

- **Excellent insulators :**
- **Reduced heating /cooling loads**
- **Prevent thermal loss** through frame / sash material .
- **Not impacted by; weather/**
- **air pollution / salt,**
- **acid rain**
- **industrial pollution**
- **pesticides**
- **smog,**
- **discoloration and**
- **structural damage .**
- **User friendly**
- **Eco- Friendly ,**
- **Readily accepted**



BAMBOO- ADVANTAGES

- Bamboo-- Higher Compressive
- Bamboo -- High Tensile Strength
- Earthquake Resistance –
- Lightweight -.
- Cost-effective
- Durable -
- Fast Growing
- Simple designing-
- Reducing use of wood
- Eco- friendly
- Promoting Employment
- Promoting Welfare of society/po
- Reduced Global warming-
- Improved indoor air Quality-



An infographic shaped like a house. The roof is orange and contains the title 'Indoor Air Quality'. Below the roof are two colored boxes: a blue one on the left with '90%' and 'of our lives spent indoors', and a green one on the right with '2-5x' and 'More pollution indoors than outdoors'. Below these is a dark blue banner with 'Common Indoor Air Pollutants'. Underneath are five colored boxes, each with a pollutant name and its source: Airborne Particles (green), Indoor Formaldehyde (orange), Household Odors & Gases (blue), Ozone (red), and Carbon Dioxide (teal). At the bottom is a dark blue footer with the logo 'DRJOCKERS.COM' and the tagline 'SUPERCHARGE YOUR HEALTH'. The background is light blue with a yellow sun in the top left and white clouds scattered around.

Indoor Air Quality

90% of our lives spent indoors

2-5x

More pollution indoors than outdoors

Common Indoor Air Pollutants

Airborne Particles

from diesel, exhaust, dust, smoke and other sources

Indoor Formaldehyde

from building materials, furniture, cooking, and smoking

Household Odors & Gases

from activities such as painting, cooking, and smoking

Ozone

from outdoor air (ground level ozone is harmful to breathe)

Carbon Dioxide

from people exhaling and cooking

DRJOCKERS.COM
SUPERCHARGE YOUR HEALTH

Indoor Environmental Quality

❖ Present challenges

➤ Indoor Air Quality Often Ignored

- ❑ Sick Building Syndrome

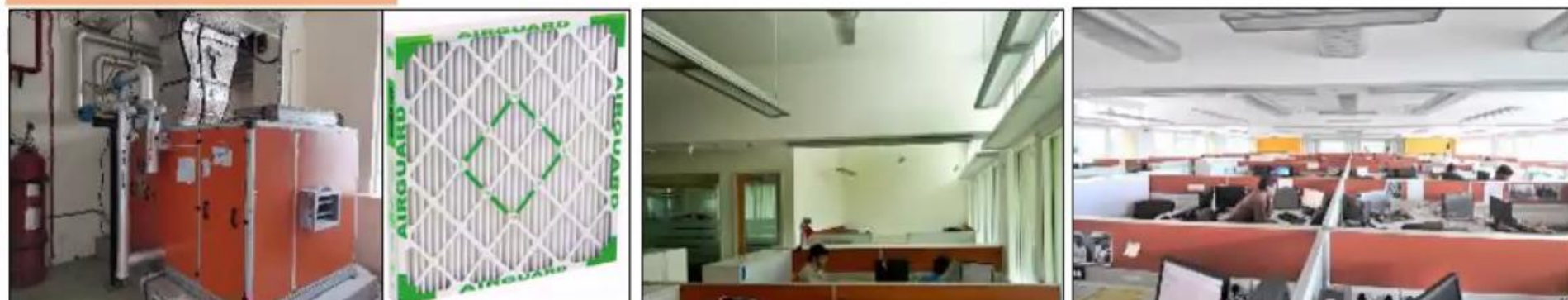
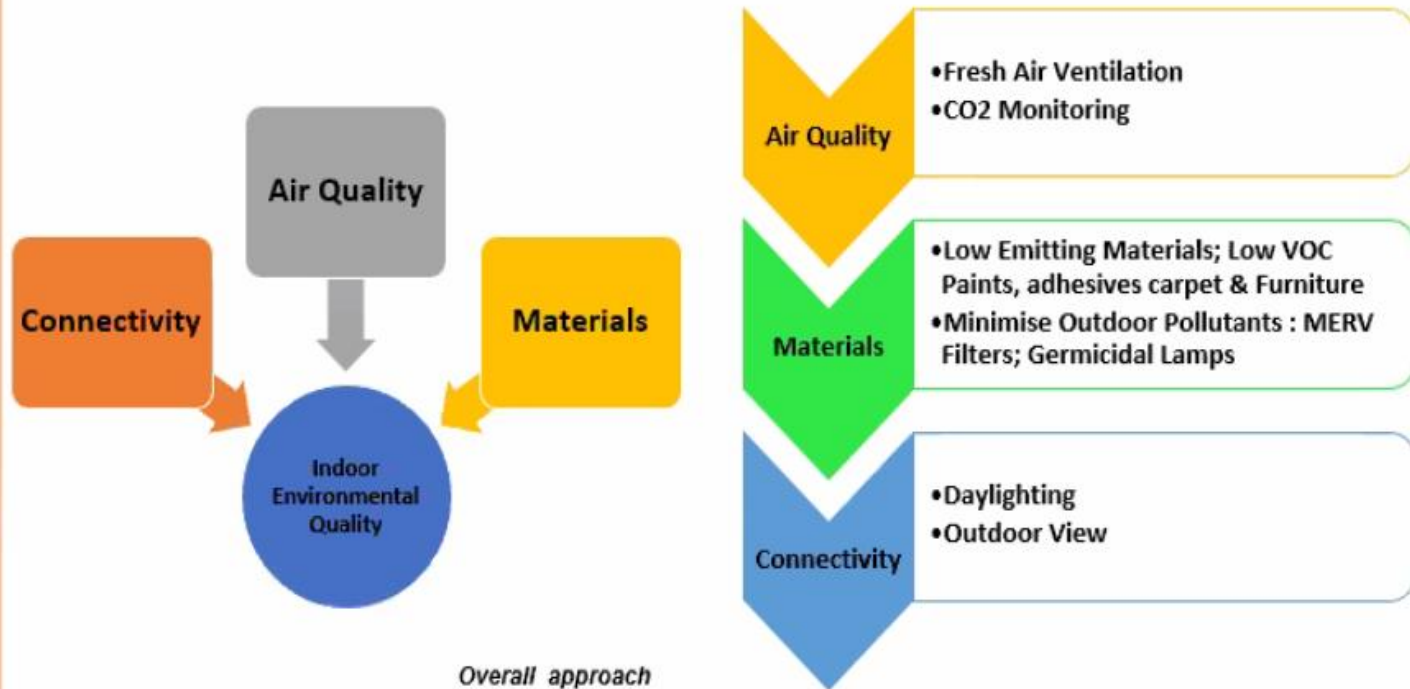
➤ Many commercial buildings usually lack

- ❑ Daylighting
- ❑ Ventilation
- ❑ View to the exteriors

➤ Type of Materials used indoor are not given importance

- ❑ They emit harmful VOCs
- ❑ Impact the health and Wellbeing of the occupants

Efforts to address the challenges through the IGBC rating systems



Improving Indoor Air Quality through Plants – Air Purifiers

Areca Palm



**Best air purifying plants
for general air cleanliness**

**Snake
Plant**



**Removes Nitrogen Oxides
& absorbs formaldehydes**

**Money
Plant**



Best Air Purifier







‘A Green building makes you

Happy, Healthy and More Productive

- Provides highest quality of indoor environment

- Optimizes Resources, , Reduces Waste,

- Reduces Carbon Footprints

*- makes building operations cost effective and
energy efficient*

- ‘Natural Capitalism’





Indian Green Building Council
Greening India since 2001



IGBC Green Hill Habitat (For New & Existing Cities)

Pilot Version

Abridged Reference Guide
October 2018

IGBC GREEN HILL HABITAT

(FOR NEW & EXISTING CITIES)

First of its kind Rating for
Greening of Hill Cities

The Rating can be used as a good reference document on 'Green Hill Architectural practices' prevailing in Different Hilly Regions of India

Tangible Benefits

- ❖ Reduction in power demand due to higher share of alternate sources of energy : 15-20%
- ❖ Reduction in the lighting consumption of the city : upto 25-30%
- ❖ Reduction in energy & water consumption through metering : upto 15-20%
- ❖ Increased use of public transport to the extent of 8-10%
- ❖ Better Handling of municipal solid waste : 100% Segregation
- ❖ Increase in use of treated wastewater for city application

Green power



Sustainable Transport



Rain Water Harvesting



Intangible Benefits

- ❖ Restoration of Forest Biodiversity
- ❖ Increase in the City landscape cover
- ❖ Conservation of Watershed Areas
- ❖ Increase in Ground water table
- ❖ Preparedness for climate disasters
- ❖ Management of Overburdened Infrastructure
- ❖ Optimization of Alternative Sources of Energy
- ❖ Climate Adaptive Design & Construction
- ❖ Provision for more public conveniences
- ❖ Citizen engagement through city e-portals
- ❖ Better parking management strategies
- ❖ Reduced resource consumption
- ❖ Enhanced Quality Of Life
- ❖ Attract environment conscious investors to city

Green Cover



Local Craftsmanship



Wood Availability

Natural ventilation / passive cooling



HILL AREAS DEVELOPMENT- CONCLUSION

UN 17 Sustainable Development Goals (SDGs)
Transforming the health of our world by 2030



HILL AREAS- OPTIONS- PLANNED DEVELOPMENT

Limited Options -- for promoting rational Hill area development /protecting,/preserving --ecology, environment and resources

- Planned development -- best option for Hill area development -- based on sustainability.**
- Government - to create a empowered unified machinery for—**
- -- preparing developmental framework for state for**
- --planning of healthy cities**
- -- designing of buildings /**
- -- ensure Capacity building of Architecture /Town Planning Departments/ULBs**
- --Make state a role model of planned development by--**
- --Promoting Synergies between Architecture / Town Planning/Engineering Departments**
- Make human settlements – safe, productive, efficient sustainable, livable, providers of assured quality of life.**
- -- bringing Town planning/ULB/Development Authorities under unified command**
- -- Make optimum use of local expertise/ knowledge/experience/ understanding of premier institutes --- to assist/advise/guide/evolve / implement the Planning/development/management framework of state**

Thank You!

