Resilient and sustainable planning: strategies and key concepts in urban planning and buildings

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Natural disasters “Increasing in recent years” And impact on human lives

(SOURCE: CENTRE FOR RESEARCH ON THE EPIDEMIOLOGY OF DISASTERS)
Impact of Disaster and Climate Change on Built Environment

Climate Hazards

- Increase in Temperature
- Increase in Precipitation
- Increase in Sea Level & sea surface temperature
- Pandemic: Covid 19

Extreme events & Impact on Built Environment

- Heat waves, Drought, wildfires
- Floods, intense rain fall
- Storm surges, cyclones, floods
- Shutdown of economic activities; social distancing, restricted movement
Developing Resilience Plan to address the risks and hazards.

- Developing and maintaining stormwater management infrastructure
- Early warning systems for flood
- Fundamental Emergency planning and preparedness – provision of food, water, medical facilities, etc
QUESTION 19 - LIST 5 PRIORITIES THAT YOU WISH TO SEE INCLUDED IN A NEW DISASTER RISK REDUCTION FRAMEWORK.
Accessible

Diverse uses, community facilities, green spaces
Compact and Connected Communities that are walkable or bikeable can reduce dependence on motorable transportation and provide access to diverse uses.
Sustainable services: Sustainable urban drainage
Hurricane Harvey in Texas, Louisiana and Alabama in 2017

Cyclone Fani in Orissa, India in 2019
Sustainable Urban drainage

Rainwater collected in planted box then channelled into rain garden - Boulder, CO

Irrigation by disconnected downspout - Denver, CO

Green cover – Salt Lake City, UT

Vegetative swale – Fort Carson, CO

Pervious pavement sidewalk - Sioux City, SD

Retention Pond – Fargo, ND
Beijing Daxing Airport Economic Zone, China

- Air Speed rises about 1 m/s
- City Temperature reduces 2°C
- Ecological Service Value rises 1.06

Vision: The economic zone aims to build a smart, ecological, and livable city.
MAHE Campus: Jaipur : LEED Platinum
Shelter: Homes and Work places
Defining Climate Resilient Housing

Climate Resilient Design Features make homes resilient to climate vulnerabilities, such that they maintain an acceptable level of functioning and structure.
Design Features for Climate Resilient Affordable Communities and Housing

Constructing on high ground, raised plinth, non linear tree plantations, Green infrastructure development
• Net - Zero Energy building
• EPI = 24.13 kWh/sqm/annum
• Renewable Energy installed = 930 kWp
• Water – Zero discharge site
About LEED for residential: LEED-certified homes reap the benefits of energy and resource efficiency, which is good for homeowners’ pocketbooks as well as the environment. Certified homes are also valued higher than traditional homes built to code.

Clean, fresh air: Indoor air quality can be improved with the use of nontoxic carpets, cleaning supplies, paints and finishes. Also, efficient HVAC systems that bring filtered outdoor air inside can further protect a home’s occupants.
Climate responsive architecture to reduce consumption

- Residence at Panchkula, Ar Siddharth Wig
- Private residence, New Delhi
- Retreat building, Gualpahari, Ar Sanjay Prakash
- Hostel in Jodhpur, Ar Vinod Gupta
HIGHER QUALITY LIVING ENVIRONMENT

Built to be healthy
Provide clean indoor air
Incorporate safe building materials
Ensure a comfortable home
Use less energy & water
Lower utility bills
Sell quicker & for more money
CASE STUDIES
Park Mozaik A Block, Ankara, Turkey

"A project that reduced the adverse effects on the environment, empowered human health and equality, as well as affordability”

Park Mozaik A Block is a multi-family residential building housing 40 residential units with a total gross floor area of 95,572 sf.

FEATURES:

• High-performing building envelope, energy-efficient mechanical systems and lighting systems
• Over 40% reduction in water use
• Sustainable material selection
• Reduction in environmental footprint during construction activities by construction pollution control, reduction of construction waste,
• Outstanding waste recycling rate (over 96%): The money earned from the sale of recyclable waste was distributed to construction workers
• Direct measures for protecting occupant health: eliminating the organic, inorganic and toxic contaminants from the indoor air through sufficient ventilation, filtration, source separation, and selection of healthy and non-emitting indoor building materials.
• Indirect measures for protecting occupant health: increasing occupant comfort and wellbeing through adequate daylighting, access to quality views, thermal comfort and acoustic comfort.
The Arroyo | Santa Monica, CA

“an urban housing typology that does as much for its neighborhood as it does for its residents”

100% affordable housing project for families
64 dwelling units, 2 community rooms, on-site laundry, an outdoor homework patio, and an elongated central open courtyard with a half-court basketball area.

FEATURES:
• Located within an active urban center, close to train station, bus lines, beach.
• Open-ended courtyard for prevailing ocean breezes, providing daylight.
• A visually dynamic circulation system makes the elevator a less attractive option and encourage an active lifestyle
• Leveraging real earth below the courtyard to plant large shade trees and bringing a moment of native California landscape to the street.
• Brightly colored undersides sunshades reduce solar gain and reduce interior lighting demands.
• The bridges serve to make the life of the building visually accessible to the neighborhood and create moments of encounter between residents and the neighborhood.
"Gut-rehabilitation of a historic 1897 farmhouse, re-using most of the existing structure while expanding it harmoniously in New England vernacular style"

HERS score of 19 and earn ENERGY STAR® and DOE Zero Energy Ready Home certifications, EPA Indoor airPLUS certification.

FEATURES:

- Over 94% of all demo and construction waste material was diverted from landfill, including over 13 tons of interior fixtures, appliances, and building materials salvaged for building re-use.
- The lawns are a locally-produced hybrid grass which requires minimal water and no chemicals.
- Unique technology package: apps to control and monitor individual electrical loads, check indoor air quality (including CO2 and VOCs), detect plumbing leaks and high sump levels, and track the performance of the solar PV array besides controlling common functions.
- above-code insulation package, detailed air sealing, efficient appliances, heat pump water heaters and clothes dryers, and a 14.7 kW solar PV array.
- Extensive use of low-VOC and low-formaldehyde materials throughout the home’s interior, three separate Energy Recovery Ventilator systems with high-efficiency filters, and meticulous installation and commissioning of a 10-zone air source heat pump system.
In conclusion...