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Sustainable Habitat

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Sustainable Habitat

- ▶ A **sustainable habitat** is an ecosystem that produces food and shelter for people and other organisms, without resource depletion and in such a way that no external waste is produced. Thus the **habitat** can continue into future time without external infusions of resource.
- ▶ India has launched its ‘Sustainable Habitat Mission 2020’ - the focus is on reducing energy consumption pattern & subsequent GHG emissions from waste, **transport and construction within 2020.**

What should we do

- ▶ Promote Energy Efficiency
- ▶ Promote the use of eco friendly fuels
- ▶ Better management of municipal wastes
- ▶ Better management of sewage disposals
- ▶ Promote public transport

COMPONENTS OF HABITAT

1. Space
2. Food
3. Water
4. Shelter

SPACE

How much space needed?

Varies widely from species to species

A carpenter ant needs tens of cm^2

Mountain lion needs 500km^2

Plants too need space!

For human's need??

FOOD

Crucial part of sustainable arrangement

Eg: Gharials (fish eating crocodile) dying in want of fresh fish



Human's food..
SUSTAINABLE??

FOOD

Food system contributes 20-30% of human generated GHG emissions, land & soil degradation and biodiversity loss

Healthy sustainable diet is a basic right but the production should not degrade the nature

- **Agricultural methods**
- **Food miles**
- **Packaging**

FOOD MILES:



AIRPLANES USE THE EQUIVALENT OF 165 GALS. OF GAS PER TON MOVED PER 1000 MILES



AIRPLANES EMIT ABOUT 4056 LBS. OF CARBON PER TON MOVED 1000 MILES

WHAT ARE THEY?



TRAINS USE THE EQUIVALENT OF 7 GALS. OF GAS PER TON MOVED 1000 MILES



TRAINS EMIT ABOUT 132 LBS. OF CARBON PER TON MOVED 1000 MILES



BOATS USE THE EQUIVALENT OF 4 GALS. OF GAS PER TON MOVED 1000 MILES



BOATS EMIT ABOUT 97 LBS. OF CARBON PER TON MOVED 1000 MILES

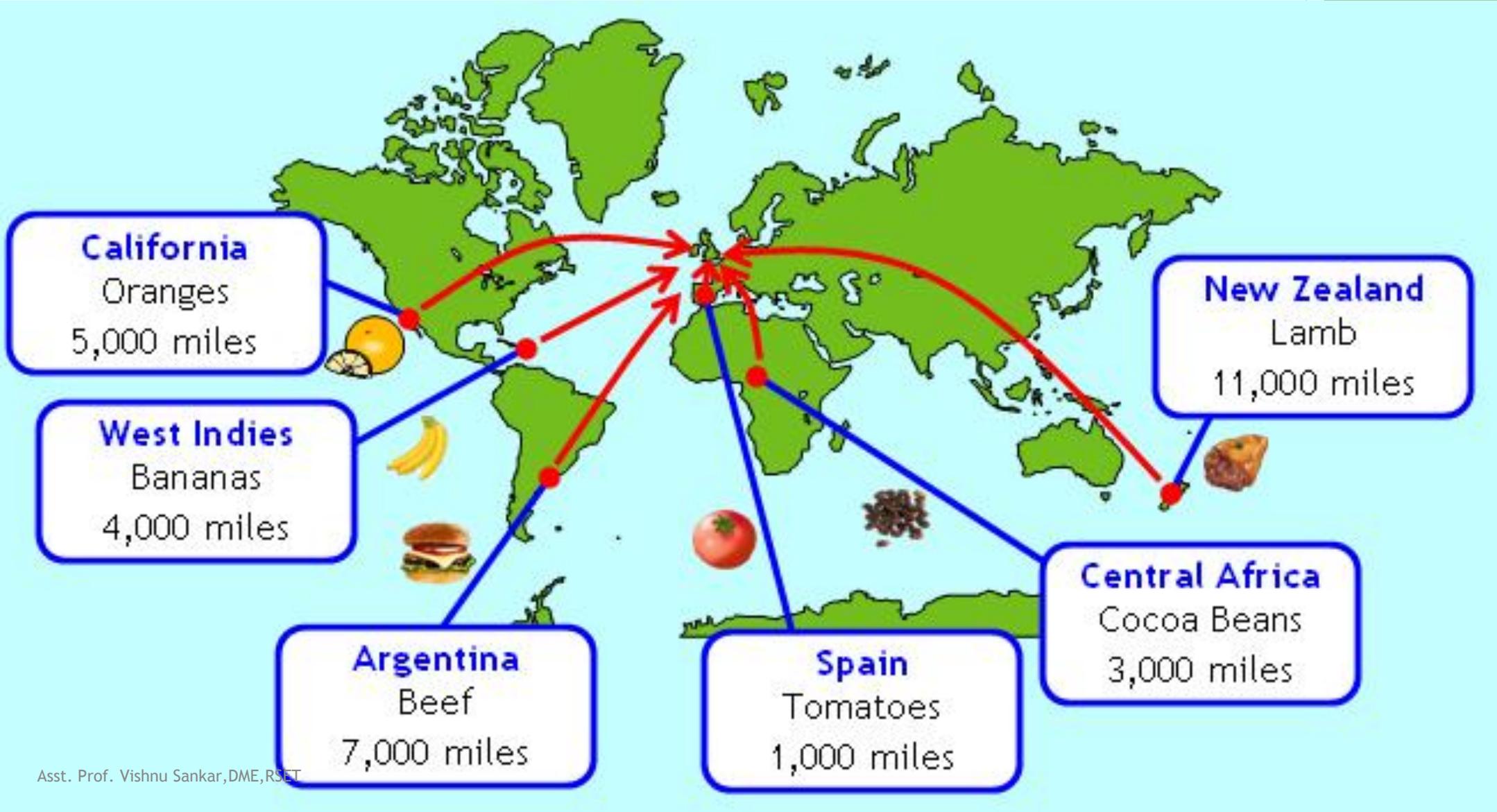


TRUCKS USE THE EQUIVALENT OF 30 GALS. OF GAS PER TON MOVED 1000 MILES



TRUCKS EMIT ABOUT 666 LBS. OF CARBON PER TON MOVED 1000 MILES

This poster indicates roughly how much energy each form of transportation uses and how much carbon dioxide it produces. As any car driver knows, these figures depend a great deal on how the vehicle is driven, the vehicle's condition and technology, and the weather. These are some of our best guesses of industry-wide averages based upon the existing literature.



DOES IT MAKE SENSE

TO CUT DOWN
50 MILLION TREES
AND USE 33 BILLION
GALLONS OF WATER
TO PRODUCE THE AMOUNT
OF DISPOSABLE COFFEE CUPS
USED IN NORTH AMERICA
EACH YEAR, WHEN EACH CUP IS
TRASHED IN AROUND 15 MINUTES,
AMOUNTING TO 10 KILOGRAMS
OF GARBAGE PER PERSON, PER YEAR,
...WHEN YOU CAN JUST BRING
YOUR OWN MUG AND AVOID ALL
THAT WASTE IN THE FIRST PLACE?



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sfu.ca/zerowaste

WATER

Access to water – essential element of sustainable development & poverty reduction

Recent study- by 2040 there will be no drinking water if consumption of water continues at the present pace

By 2020 there will be water scarcity



SHELTER



Protects from weather and predators

Provides space for eating, sleeping, hunting, etc.

A single tree can provide sheltered habitats for many different organisms.

GREEN BUILDING



A building can be said to be 'green' or sustainable when conscious steps are taken during its construction and operation to keep natural resource depletion minimal.

CONCEPT

It is an approach to create a built environment on the principles of sustainability that use local or recycled materials in its construction, use less water, less dependence on grid energy, less waste generation but provide healthy living conditions for the occupants in harmony with the environment



The Greening of the White House



Energy demand:

Use of natural ventilation and solar passive heating

Water demand:

Use of water efficient products and services



Low energy building materials

Reuse or recycled building materials, use of locally available, non toxic recyclable building materials

Waste reduction

Reduction in waste during construction, renovation & demolition

Indoor air Quality

Proper ventilation & preventing dampness- prevents growth of fungi & algae

Harmony with the environment

Cause minimum alteration to the environment

Benefits of green buildings

Environmental benefits:

- Reduced indoor pollution
- Reduced water consumption resulting in water conservation
- Reduced energy consumption, reducing carbon footprint of the building
- Low alteration of the environment during the siting of the building adding to aesthetics
- Limited waste generation during construction, occupation and demolition of the building

Benefits of green buildings

Economic benefits:

- **Cost savings from reduced water and grid energy use**
- **Enhanced image and marketability of the building**
- **Cost saving from the selection of low – energy building materials**

Benefits of green buildings

Social benefits:

- Increased health and productivity of occupants because of improved indoor air quality
- Reduced strain on local infrastructure because of less water and energy demand and less waste generation

Green building

- ▶ <http://www.thehindu.com/todays-paper/tp-features/tp-metroplus/green-building/article7283666.ece>



Winner of the 2009-2010 Gold Leaf Award for architectural excellence: state level in the public and semi public category instituted by the Indian Institute of Architects Kerala Chapter, the V-Guard office in Vennala is a 12 storied green spectacle. Plants spill out from every floor turning the structure into a vertical garden.

Green Materials for Building Construction

- ▶ Green materials for building construction are the ones that do not have any health risk, have low ecological impacts, made from recycled materials, themselves recyclable and with low embodied energy
- ▶ Embodied energy is the total energy needed for the manufacture, transportation and disposal of such building materials.

contd

- ▶ **E.g.:** for the common brick that we use in the construction, a large quantity of energy is used for the mining and processing of the clay, for heating it in kilns and energy used in transportation. Adding all these together is the embodied energy of the brick.

Green Materials

Bricks:

- Flyash Bricks are considered as the Green material of construction.
- So in this case it is used in the Green Construction.

Cement:

- If PPC (Portland Pozzolana Cement) is used in construction, it will be green Material Because PPC contains the flyash as the main ingredients.

Green Building Certification

- ▶ Green building certification is a system in which a building is certified that it has achieved certain requirements of environmental performance by assessing them with a rating system called green building rating system.
- ▶ The green building rating system consists of a set of criteria which covers various parameters related to design, construction and operation of a green building

Green Building Rating Programs

- ▶ BREEAM (Building Research Establishment's Environmental Assessment Method)
- ▶ GBTool
- ▶ LEED (Leadership in Energy and Environmental Design)
- ▶ CASBEE (Comprehensive Assessment System for Building Environmental Efficiency)

BREEAM

- ▶ Developed in UK in 1990.
- ▶ Covers building types including Offices, Homes, Industrial Units, Retail Units and Schools
- ▶ Overall building performance is rated as Pass, Good, Very Good, Excellent based on the score.

GBTool

- ▶ Developed by International Framework Committee for the Green Building Challenge.
- ▶ More than 25 countries are involved in it
- ▶ Major criteria's are Site Selection, Project planning and development, Environmental loadings, Energy and resource consumption, Indoor Environmental quality, Functionality, Long term performance and social and economic aspects
- ▶ Score are given from -1(below typical practice) to +5 (good to very high performance)

LEED



- ▶ **Leadership in Energy and Environmental Design**
Developed in US in 1998.
- ▶ **Indian Green Building council has adapted the LEED system and launched LEED India version for the rating of new construction.**



LEED rated buildings in India

▶ 1. Platinum rated buildings

ITC green center (Gurgaon)

CII - Shorabji Godrej Business Center (Hyderabad)

▶ 2. Gold Rated buildings

American Embassy School, Delhi

Anna Centenary Library Building, Chennai

▶ 3. Silver Rated Building

Rajiv Gandhi International Airport, Hyderabad

CASBEE

- ▶ Developed in Japan in 2001.
- ▶ Based in building's life cycle: pre-design, new construction, existing buildings and renovation.

GRIHA - Indian Building Rating System

- ▶ GRIHA - Green Rating for Integrated Habitat Assessment
- ▶ National green building rating system developed in 2005, by Center for Research on Sustainable Building Science, CRSBS in The Energy and Resources Institute, (TERI)
- ▶ GRIHA was developed as an indigenous rating system.
- ▶ It rates and assess non air conditioned or partially air conditioned commercial, institutional and residential buildings in India
- ▶ GRIHA has been adopted as a national rating system by the Ministry of New and Renewable energy in November 2007.

Basic Features of GRIHA

- ▶ A building is rated based on its predicted performance in different stages
- ▶ Pre construction
- ▶ Building Design and construction
- ▶ Building Operation and Maintenance of its entire life cycle.

Different stages

- ▶ **Pre-Construction stage:** Intra and inter site issues like location of property, soil type bio diversity before activity, nearness to public transport etc are addressed in this stage.
- ▶ **Building Planning and Construction stage:** Different aspects of resources like its conservation, utilization efficiency, recovery and reuse and aspects of health and well being of occupants are considered in this stage.
- ▶ **Building Operation and Maintenance stage:** Issues of operation and maintenance of building system processes, monitoring and recording of consumption, issues that affect global and local environment are dealt at this stage.

GRIHA rated buildings in India

- ▶ The Energy and Resources Institute Buildings (Gurgaon, Bangalore and Mukteshwar)
- ▶ Commonwealth Village, Delhi
- ▶ Centre for Environmental Science and Engineering Building, Pune
- ▶ Fortis Hospital, Delhi

Other Green building certification in India

- ▶ Indian Green Building Council (IGBC) - in 2007. Similar to LEED under license from USGBC
- ▶ Bureau of Energy Efficiency (BEE) - unit of **kilowatt hours per square meter per year** is considered for rating the building and especially targets air conditioned and non air conditioned buildings. RBI Delhi and Bhuvaneshwar has 5 star rating

Methods for increasing energy efficiency of Buildings

- ▶ Planning and Optimizing the orientation of buildings

Sustainable Cities

- ▶ <http://www.sustainablecitiescollective.com/david-thorpe/229316/words-most-successful-model-sustainable-urban-development>