Revival of the sustainable courtyard dwellings

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Midterm Review
**Problem Statement:**

Instead of following the popular trend of western living in the name of globalization, how can the built form of Kathmandu benefit from it while preserving the local culture?

**Claim:**

The built environment of the Kathmandu should embrace modern sustainable technology to meet its current and future needs while respecting the social and cultural patterns of the city.

**Premises:**

Modern sustainable technologies are capable of creating an impact in the Kathmandu world where resources are scarce.

Influence of Colonization in India in the past and globalization at present has enabled the transfer western ideas to the developing world.

The built environment of Kathmandu face the challenge to adapt to the modern world and is losing its ‘sense of place,’ It should be able to preserve its identity since response to shelter is closely affiliated with cultural, social, climatic and economic factors.

**Conclusion:**

Globalization has many pros and cons. It has made technology transfer possible which Kathmandu can use in it’s built environment to meet it’s current and future needs. Furthermore, the built environment should respect its long established cultural and social norms.

**Project Justification:**

It is important to have modern thinking in this global world, but people should be able to preserve their identity. There are great problems in the developing world that needs to be addressed at present and they cannot be solved by simple cultural imitation. Globalization could be used for the betterment of the society rather than just using it to fulfill the gross materialistic wants.
Inspiration

‘For thousands of years, human dwellings have developed in an incredibly rich diversity, reflecting man’s ability to respond to the environment—topography and climate and to create social norms and physical standards for his habitat. Until fairly recently, this habitat has always been in harmony with nature.

Our western world has become accustomed to a standard of living that is not only unsustainable in the long run, but lags behind previous achievements which are in danger of becoming forgotten. We have limited our choices to two equally unsatisfying and extreme dwelling alternatives: the highrise apartment blocks and the free standing single family house that have become the epitomes of contemporary American and European city. Both are extremely uneconomical in terms of infrastructure and maintenance. Nevertheless and almost incomprehensively, each alternative is being copied universally.

The Eastern world, a world that developed its own predominantly inward orientation as opposed to the purely outward orientation of its Western counterpart has been especially affected. Unfortunately, the societies for whom the typically introverted oriental urban houses were commonplace for several millennia are now abandoning this house type to adopt occidental schemes.’

Carl Pruscha
Vernacular Architecture
The rate of urbanization in Nepal was 6.6% per annum, which was the highest among the Asia Pacific region followed by Cambodia (6.2%), Bangladesh (5.3%), Pakistan (4.4%), India (2.9%) and Srilanka (2.2%).

Population growth rate: 4.71% per year, one of the highest in the world today.

Modern developments started in the Nepal only after 1950s after the downfall of Rana Regime.

Consistent power, proper sanitation and clean drinking water supply hasn’t been proportional to rate of urbanization.
Proposal
Typology Determination

- Stand alone Housing
- Condos

30 ppl total
19 female
11 male

Bar chart:
- Male
- Female

Pie chart:
- Stand alone Housing
- Condos
Bagmati valley area 58.2 sq.miles
Population approx. 1 million
1. Southern view toward Modern Indian School

2. Built features on the East

3. Chobar on the West

4. Panoramic View on the North

5. Sunrise Homes in the North Eastern view
Concept

The concept of the thesis began with an exploration of the vernacular architecture section and developing the idea of forming a courtyard community gathering space within the larger courtyard housing.
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27° 43' 0" N = latitude
Mean Tilt angle- 26.9

http://www.alternate-energy.net/sun_insol_mps04.html
Solar Study

Solar Solstice  Winter Solstice  Spring Equinox  Fall Equinox

12:00PM

3:00 PM

6:00 PM
Steps for sizing PV:

1. Energy used per day = 3590WH

2. Adjusted load to account for system losses
   = (WH/day) x 1.5 = 5385WH

3. Number of sun hours = 6

4. Required peak watts (Wp) = Adjusted load/ sun
   hours = 897.5 Wp

5.
   a. Divide Wp by 12 for single crystal silicon cells
      = 74.79 sq. ft
   b. Divide Wp by 8 for amorphous silicon cells
      = 112 sq. ft

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Total Watt = 3590W
Summer sun (84°)

Winter sun (38°)
Local Materials

- Pre-Cast Concrete
- Brick
- Terra Cotta
- Membrane protection
- Roof membrane
- Drainage, aeration, Weep strips
- Insulation

Summer: Sun (84°)
Winter: Sun (38°)
Passive design:
Concrete Post & Beam + Slab (RCC)

Seismic Design: Reinforced Concrete columns, slabs & beams.

Reinforced concrete columns.

Reinforced concrete Beams.

Reinforced Slab.
Sustainable strategies/Active systems

Rainwater Harvesting

INVERTER DC TO AC

Net Meter

Grid

AC Load

Grey water recycling from tub/shower/sink/compost
Community space

- Bus stop canopy
- Offices
- Community rent-able space
- Farmers Market
Special thanks to Dr. Doug Schulz

Bibliography