

SIGUS – Special Interest Group in Urban Settlement

ON-GOING RESEARCH

CONTEXT OF RESEARCH

It is now universally accepted that the Third World urban population will double by 2020, and cities are projected to triple in area. To be more dramatic, all of the urban housing of the past 6,000 years needs to be built again, but this time in only 20 years! And now the issues of environment and climate add to the challenges.

Data shows that 30% to 70% of housing in Third World cities is built informally, illegally, often in high-risk areas and without an understanding of basic construction knowledge. Do they dictate city development and form?

How will architects and planners as the spatial professionals participate in these challenges?



• Research focused in three areas

Three main areas: 1-Incremental Housing; 2-'eeSMART' innovative building approach for steep slope construction with '*power atrium*' energy self-sufficiency, and 3- Development of community-action planning methods for non-customary challenges.

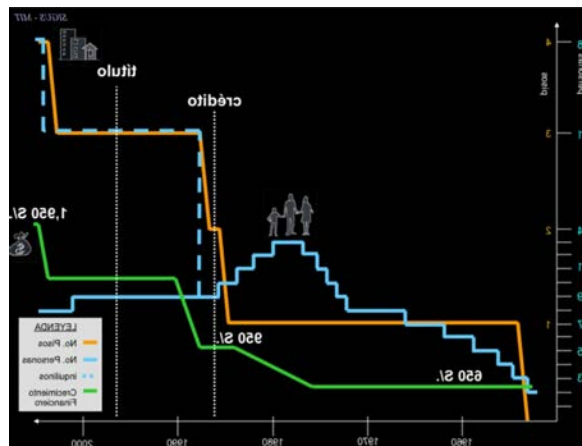
1 - INCREMENTAL HOUSING

The goal is to develop effective proactive housing strategies and models to meet the urban population growth challenge. It is argued that provision of simple, affordable core units to be expanded by users is one of the few feasible ways to direct and support growth for both city and user benefit. In addition to the design of an effective 'starter' core, a spatial frame organizing land development, infrastructure and supporting government policies are being explored.



• Development of a methodology for documenting the informal incremental development process.

Out of field surveys of existing informal areas came an innovative diagrammatic documentation approach to capture change. The approach – developed after several years of field trials in surveying squatter settlements – has been used by the InterAmerican Development Bank and was used in their understanding of their incremental housing programs in El Salvador.



• Exchange of incremental information with universities globally.

A Consortium of Universities has been established as a forum for research exchange and awareness of incremental housing, with SIGUS as HomeBase. A website has been setup, and the first meeting of consortium members was at the biannual UN World Urban Forum in Rio, 2010 with a 4-pronged program for members and other interested groups. The Consortium again participated at the UN World Urban Forum in 2012 in Naples, with two training sessions on incremental housing. <http://web.mit.edu/incrementalhousing/>



- **A cell-phone APP for owner-builders to develop awareness of tradeoffs and safety concerns when expanding their units.**

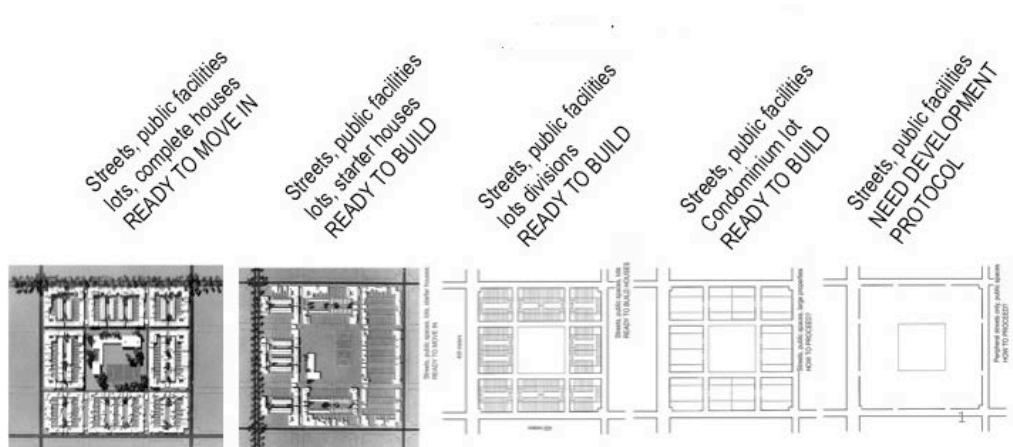
A working 'logic model' has been developed, and in the next stage detailed refinements and field-testing will be undertaken. The development team was composed of 3 researchers funded by UROP and a M.Arch student advisor. Christopher Malcolm is the lead researcher from the Architecture Department. The APP is proposed to be tested by the Ministry of Local Government in Fiji, as a prelude to use by other development groups in supporting incremental construction.



- **Incremental Land Development Frames for Rapidly Expanding Cities.**

Research targets development of an 'autonomous' spatial frame that organizes informal development but also addresses city concerns of infrastructure provision and directed, controlled growth in appropriate locations.

Initial research was carried out in Bangkok fringes and Singapore (2008 – 2009) and comparative studies were made with Cairo fringe informal expansion. There was limited World Bank support for the study, along with a presentation at the World Bank of findings.



2 – MOUNTAINS, BIG BUILDINGS, SOLAR CHIMNEYS, AND CITIES: THE "eeSMART" APPROACH

How to deal with rapidly exploding cities, continued urban sprawl, the ever more serious environmental issues, and the competition for buildable land?

SIGUS has teamed with the Eco-City Group at Nanjing University to draw on and expand an innovative concept for building on steep-slope areas developed earlier at MIT. The research focuses on an ecology-oriented, sustainable model for urban growth, which draws on the potential energy inherent to valley terrain and mitigates risks of mudslides. The research intends to 'bring to

life' the concept through design-oriented studies in steep slope constrained cities in China. It explores the issues: what would be the resultant environmentally sensitive urban form and energy independent building?

The base is the MIT report '*Building On Slopes: An Approach*' (March 1970; Prof. Waclaw Zalewski, Reinhard Goethert and Robert Kirby) which presented an innovative, rational design linking structural, circulation, and construction for building on steep slope areas. The expanded focus in the continuing research brings in environmental issues and results in a powerful model for urban development on steep slope areas, freeing the flat land for agriculture and other terrain-dependent uses.

The city of Trongren, China, which exhibits slope-constraints, earthquakes and mudslides, a growing population, and the potential for concept realization, has partnered with the research team to explore the approach in their city expansion. Funding is through the MISTI program, with supported the exchange of researchers, first to China and then to Cambridge. Background research by students is underway in both schools: MIT is exploring the basic parameters of energy and environmental parameters, and Nanjing is researching the city parameters in China.

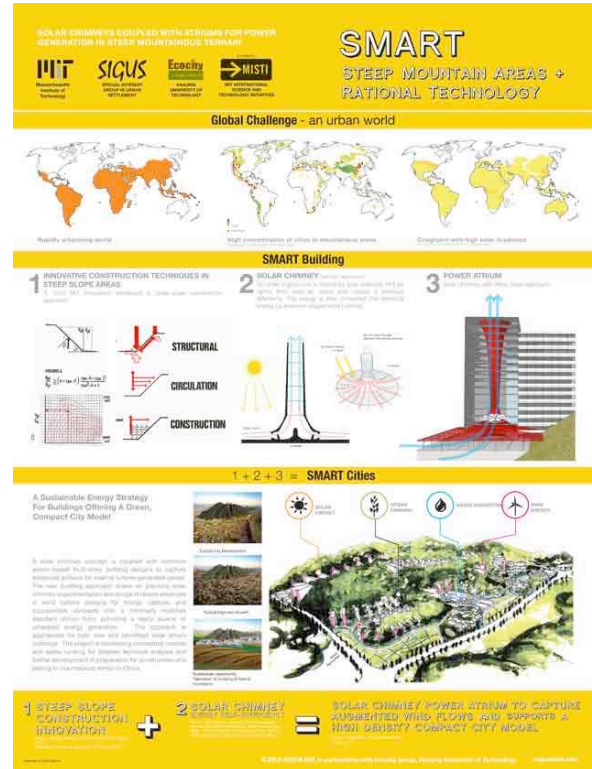
The 'slope-smart, smart-city' approach coupled with the 'solar atrium' innovation was exhibited at the MIT Energy Night, and was selected as the second place winner for outstanding exhibit.

The research was later invited to exhibit of the Harvard Business School Energy Symposium, and the MIT Energy Conference 2013.

- **PowerAtrium:** An outgrowth of the environmental review was the addition of a solar chimney concept which is coupled with common atrium multi-story building designs to capture enhanced airflows for internal turbine-generated power. This 'power atrium' approach draws on proven solar chimney experimentation and brings in recent advances in wind turbine designs. It incorporates solar chimney concepts into a minimally modified standard atrium form, providing a ready source of untapped energy generation. The approach is appropriate for both new and retrofit of large atrium buildings, and is not limited to the slop-smart building innovation.

The project is developing power-atrium forms and seeks funding for detailed technical analysis in preparation for construction and testing in mountainous terrain in China. Further exchange of researchers in currently underway, funded by the Trongren Planning Bureau.

- **New life for abandoned factory chimneys:** As a result of the solar chimney research, the team is exploring the modification of abandoned chimney into turbine power sources using a solar chimney approach. MIT has two abandoned chimneys, which could serve as prototypes.



3 - PARTICIPATORY COMMUNITY ACTION-PLANNING

Action-planning methodology is continually being developed and tested for a variety of challenges where participation is not customarily applied.

Three challenges have been explored with a community action-planning approach:

(details at: <http://web.mit.edu/urbanupgrading/upgrading/issues-tools/tools/Interac-Comm-Plan.html>)

- **Participatory Management.** Developed in a planning workshop with fishing villages in Lombok, Indonesia. An initial workshop was followed 1 year later with another workshop to evaluate and replan further activities.
- **Participatory Rebuilding Strategies after Disasters.** Replanning of destroyed villages after the Tsunami in Banda Aceh, Indonesia. The approach was developed through three difference disaster situations, related to degree and context of destruction.
- **Participatory Sustainable Heritage and Development Programs.** An innovative approach where the community defined sustainable conservation measures in a historic city, Yanzhou, China. Recently recognized by the Financial Times as outstanding example of conservation of old cities.

CAP RESIDENTS AS DEVELOPMENT PARTNERS COMMUNITY ACTION PLANNING gtz

FROM EMERGENCY TO SUSTAINABILITY
What would you bring back to life?

Three pilot CAP workshops were carried out in June and July of 2005 in Banda Aceh and surrounding areas, to tackle the complex issues of rebuilding tsunami destroyed communities. The goals were to develop a tsunami-specific CAP approach, to establish and train a CAP team for the expansion of the workshops to other destroyed communities, and to initiate construction by linking to a KRM rebuilding project focused on re-constructing 10,000 houses. The community was considered the basic unit on which all development initiatives are based and which represents stability within the ever-changing political and strategic framework.

The pilot workshops demonstrated the effectiveness of the approach and provided a 'kick-start' in mobilizing rebuilding. The communities emerged from a small fishing village on the East Coast, a fishing community on the outskirts of Banda Aceh, and a large urban city community in Banda Aceh itself. The three sites offered a variety of challenges, and a variety of approaches were tested, along with a broad range of planning strategies.

The structure and goals of the CAP workshops were heavily influenced by the generally rebuilding situation, 7 months after the tsunami wreaked havoc on December 26. Assistance had been offered by reportedly more than 272 international NGOs, more than 150 national NGOs, 18 UN agencies, and an untold number of bilateral agencies. Families undertook the CAP with high expectations and not surprisingly a sense of urgency in rebuilding houses dominated.



THE TSUNAMI CAP IN BANDA ACEH, INDONESIA

CAP RESIDENTS AS DEVELOPMENT PARTNERS COMMUNITY ACTION PLANNING gtz

PARTICIPATORY MANAGEMENT
How can you improve your neighborhood?

Rondek Parasi is one of many traditional fishing villages located on an idyllic beachfront north of the Ampanan port. In recent years the traditional fishing industry has been economically sidelined by rampant and uncontrolled exploitation of the Lombok Straits by foreign trawler fleets. Despite this the community are growing, with a resultant increase in demands for housing, basic services and above all the need for employment.

Recognizing the dire economic situation in all the fishing villages, the City of Mataram has formed a partnership with GTZ's Urban Quality team. The partnership explores various options for sustainable development of the traditional fishing villages in Ampanan, and strengthen local decision-making structures of its urban management.

The participatory approach was adopted, bringing together a cross-section of community members for intensive sessions. The Urban Quality team believes that the participation of stakeholders in each phase of the projects development will assist in building trust and confidence between the affected community and the local government authority and will encourage community participation during future phases of the project.

The processes provide valuable learning opportunities for young public servants through sensitizing them to the aspirations of a poor community as well as demonstrating the principle of equality where all members of the community have equal access to opportunities to better their socioeconomic situations.



URBAN QUALITY WORKSHOPS IN MATARAM, INDONESIA

CAP RESIDENTS AS DEVELOPMENT PARTNERS COMMUNITY ACTION PLANNING gtz

HERITAGE AND DEVELOPMENT
What would you be proud to show your visitors?

In July 2006, the Old City Office of the Municipal Government and GTZ agreed on a subsidy standard for house renovations. House owners received technical support and subsidies as incentive and catalyst to participate in the programme. The Yangzhou Farnuo City Company as the implementing agency of the government, improved infrastructure facilities in the pilot area.

In Yangzhou, Community Action Planning (CAP) was introduced:

- To raise awareness of historical elements of lanes and buildings in the old city among the residents, with the objective to integrate these elements into the rehabilitation plan.
- To conduct a publicly supported field survey and assessment of existing infrastructure supplies, the quality of public spaces, surface and furnishings of lanes, the condition of houses, roofs and sanitary equipment in public houses.
- To prepare a detailed inventory and list for improvement measures in a pilot block.
- To define priorities, estimate of rehabilitation costs and seek terms for financial and technical contributions by residents and the municipal government for the implementation of upgrading and improvement measures.
- To analyse improvement measures from the point of view of all stakeholders.



SUSTAINABLE URBAN CONSERVATION IN THE OLD CITY OF YANGZHOU, PR CHINA

• 'Community action-planning' focused on incremental development of site and house

An earthquake-destroyed village was planned with MIT students through development and testing of a community action-planning approach in a workshop in 2004. The jointly designed plan was implemented and is now a functioning community.

In a second workshop students from MIT partnered with Berkeley and El Salvadorian students to research incremental expansion of core units built in 2004. A participatory workshop evaluated

changes and proposed modifications of the designs, as well as explored appropriate supporting policies for the community.

