sustainable building design book

サステナブルビルディングデザインブック

SUSTAINABLE BUILDING DESIGN BOOK

The 2005 World Sustainable Building Conference in Tokyo, Student Session
23-29 September 2005, Tokyo, Japan

Edited and Published by:

SB05Tokyo
Student Session
building a sustainable future

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2005

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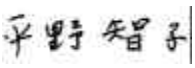
ii FOREWORD

On behalf of the SB05Tokyo Student Session Organising Committee, I would like to welcome you all to Tokyo and to the first attempt of a student session in the series of Sustainable Building Conferences. We initiated this event based on the brief that it could create networks between young architects and researchers in the field of Sustainable Building, and that the networks could act as an essential catalyst for forming a better, less unsustainable future.

Under the slogan of "building a sustainable future", the SB05Tokyo Student Session has attracted more than 120 participants with no fewer than 34 nationalities. With the help of quite a few experts and fellow Student Session participants, the SB05 Student Session Organising Committee, a group of 29 students from 9 Japanese universities and 11 countries, has prepared this event with a range of activities such as Plenary Session on SB International Comparison, Design Workshop, Discussion-based Workshops, Activity-based Workshops, Poster Session and Walking Tours.

Along with the preparation for these activities, the Organisers for the Plenary Session on SB International Comparison and the Design Workshop have dreamed up the idea of publishing a Design Book with works of fellow international participants and some of the best examples of Sustainable Building in Japan. Accordingly, the Committee decided to publish this book to distribute to the participants of the SB05Tokyo Student Session and the SB05Tokyo main conference.

Lastly I would like to show my sincere appreciation for the architects and students from all over the world who have kindly provided us such a wonderful work of theirs. I truly hope this book could help inspire our fellow young architects and researchers, and could contribute to build a sustainable future.



HIRANO Tomoko
Chair of SB05Tokyo Student Session Organising Committee
PhD Candidate, Department of Architecture, The University of Tokyo

iii PREFACE

The “heat island” phenomenon in the urban areas is worsening in a high speed. Tough there are few possible causes for this, the many artificial materials covering the surface and the reduction of the latent heat flux, which is caused by the increase of the thermal storage and the decrease of the water-holding capacity, are thought to be the major causes.

For building sustainable city, the recovery of the green, such as farming land and timberland, and a creation of a comfortable environment is the most important factor. Different from the past age when architecture required an environmental sacrifice, in this century of the environment, an architectural design which lessens the burden on the environment by using natural energy and can also be sustainable to time is required.

The idea of this design book is to present those sustainable buildings such as, zero-emission refined building, passively designed energy-saving building and green building that contributes to the protection of the organisms' diversity and the recovery of the nature, which the Japanese architects have been introducing to the world. These buildings exist as, and will remain as the place of recreation and relaxation. I wish this book will serve as a useful reference for many students who will learn design from now on.

橋田祥子
Shoko Hashida
Editor
PhD Candidate, Department of Landscape Engineering
Meiji University

Bio-climatic Design, Environmental Architecture, Urban Regeneration, Ecology, Technology, Building Renovation... concepts that are now important part of the XXI century's lexicon. Global new vocabularies can be found from vernacular houses to large scale urban developments, in local communities or even in ecumenopoleis.

"Sustainability" must be a part of our daily life. Its magical attraction forms a part of the homogeneous elements of the quintessential characteristics in any place on earth... crossing across immerse in hidden dimensions... floating around trying to let us discover its undeniable benefits.

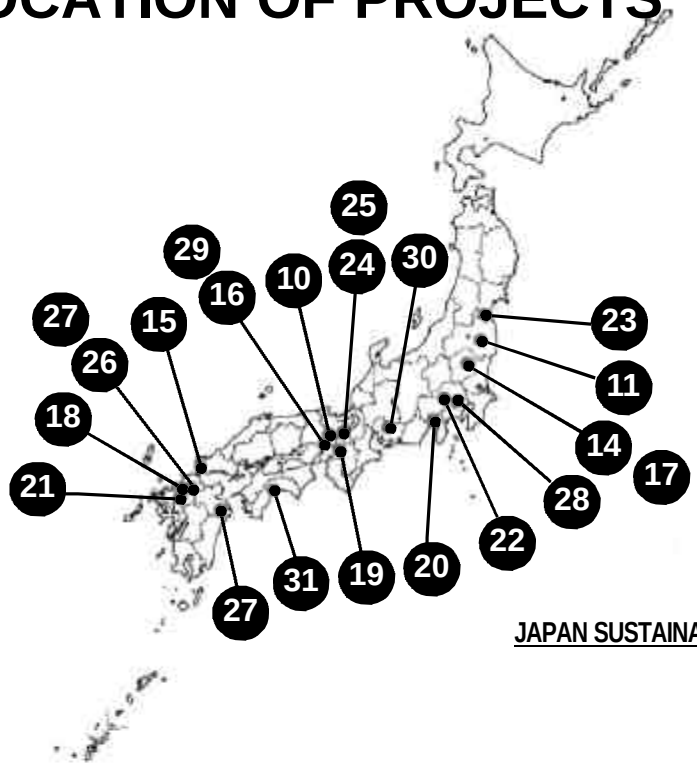
This year, Japan was selected to be the host of "The 2005 World Sustainable Building Conference". We considered it important to share Japan's sustainable new architectures but also to show examples from all over the globe.

Together with the 22 examples of sustainable buildings of japanese architects, we decided to publish in this booklet the works and researches about sustainability of the Student Session's participants. Among the works, 32 entries were received from 17 different countries of the 5 continents.

We are proud to present this "SUSTAINABLE BUILDING DESIGN BOOK" and we hope you can learn from the examples showed on it.

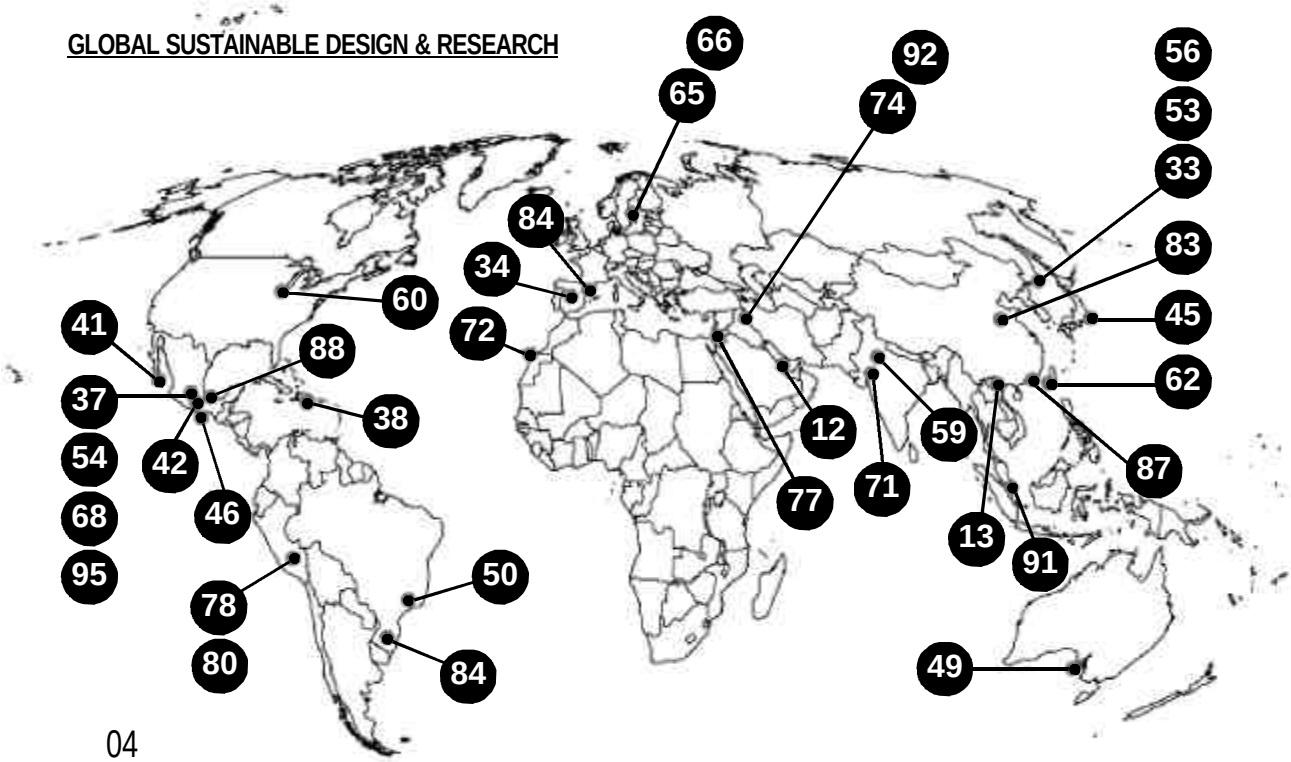
Jose Martin Gomez Tagle Morales
Editor
PhD Candidate, Department of Architecture
The University of Tokyo

iv LOCATION OF PROJECTS



JAPAN SUSTAINABLE ARCHITECTURES

GLOBAL SUSTAINABLE DESIGN & RESEARCH



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PHOTOGRAPHERS

Pavilion of the 21st Century Construction	IWAMURA Atelier Co Ltd.
Bridge, Arts & Science College	C+A(Kazuhiro Kojima)
Space Block Hanoi Model	C+A(Kazuhiro Kojima)
Ando Hiroshige Museum	Kengo Kuma& Associates
Adobe Repository for Buddha Statue	Kengo Kuma& Associates
Chouchikukyo	Takenaka Corporation(Yukio Yoshimura, Taizou Hurukawa)
Morihana Memorial House	Shoko Hashida
Iwamura Kazuo Ehon-no-Oka Art Museum	Masamitsu Nozawa Building Workshop
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Katta Hospital	Katta Hospital
3projects of "Refine Architecture"	Shigeru Aoki Architect & Associates Inc.
The International Library of Children's Literature	Chie Suga
Awaji Yumebutai	Shoko Hashida
TONO INAX Pavilion	TONO INAX(Ken Oguri)
Nakajima Garden	Matsunaga Laboratory (Kagoshima University)
A Riverine House in Kochi	Kodama Laboratory (Kobe Design University)

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National Museum of Emerging Science and Innovation, Miraikan. Tokyo Academic Park, Odaiba, Tokyo, Japan
Photograph by Jose Martin Gomez Tagle Morales

GLOBAL SUSTAINABLE DESIGN & RESEARCH, interior cover
Illustration of the 2005 Diploma projects of Far Eastern State Technical University, Vladivostok, Russia. Tutor: Pavel A. Kazantsev

All the images, texts and photograps of the *JAPAN SUSTAINABLE ARCHITECTURES* and the *GLOBAL SUSTAINABLE DESIGN & RESEARCH* were received from each participant and are showing in this booklet under the knowledge and permission of the authors of each article.

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Jose Martin Gomez Tagle Morales. Editor.

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SB05Tokyo Student Session
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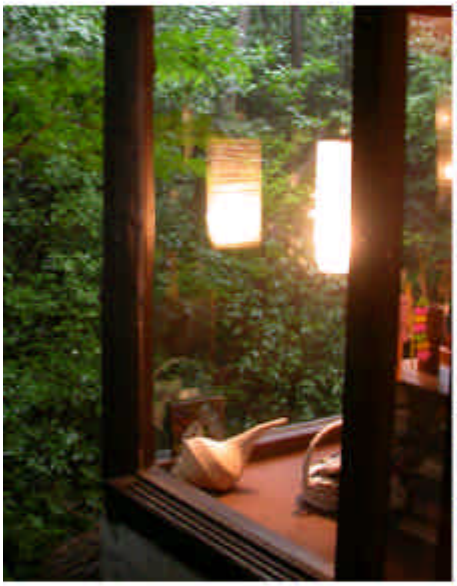
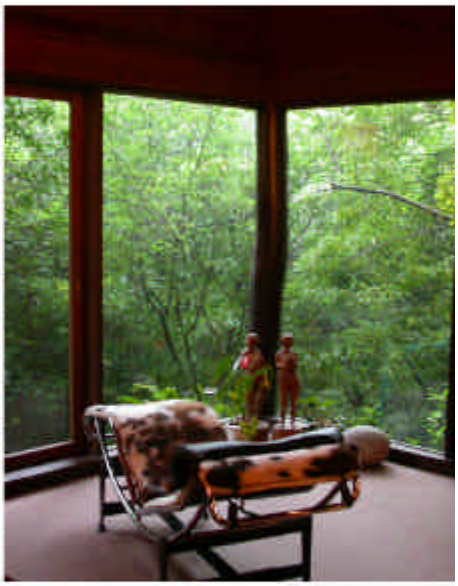
House in Megamiyama

1976
Osamu Ishii
Sainomiya-city Hyogo-prefecture

The houses in Megamiyama is soil covered green buildings which has a high potential in recovering the nature and is a important element needed in design a sustainable city. The building is designed to melt in the forest. The trees and the plants and the land form are left as it used to be, and the surface of the building is greened. The architect planted grass on the roof to make it look continuous from the garden. A building built in a forest should efface itself and this architecture which has violets and lilies in its grass and ivy and woodbine on its wall will not outstand from its surroundings.





To overcome the Japanese hot and humid climate, the big openings connect the indoor to create an open environment. The poles and the walls are all made by Japan cedar and the open windows on all four sides of wall brings in the fresh green air cooled by the forest.

The architects Osamu Ishii and his family have fun at the picnic under the cherry blossims in spring. They live together with nature.

Pavillion of the 21st Century Construction

2001

Kazuo Iwamura

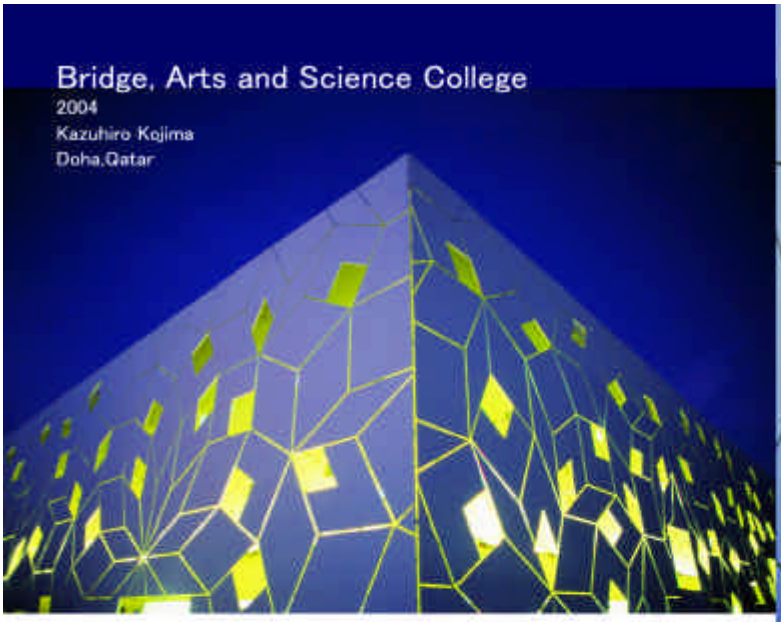
Sukagawa-city Hukushima Prefecture

This is a temporary pavilion for "Utsukushima Future Expo" in Fukushima. A lot of panels and models introducing the idea of "future cities in forests" were displayed in this pavilion.

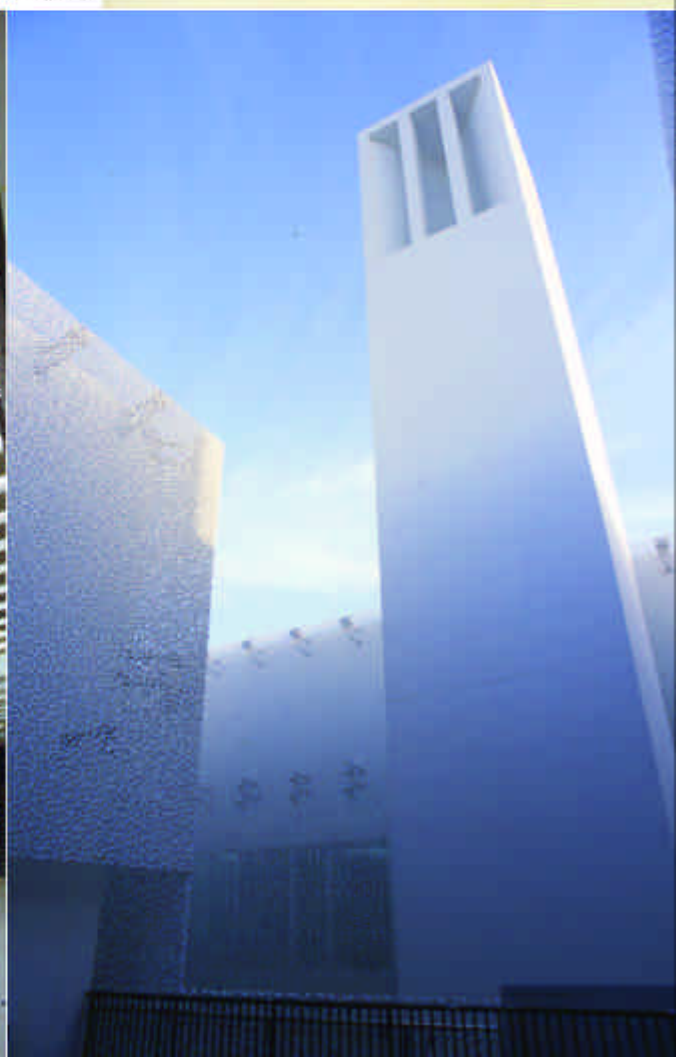
Formerly, mulberry field used to spread along the slope at this site. The architect, Kazuo Iwamura, designed this pavilion remaining the landform as it was. The roof of it is covered with many colorful flowers not just to entertain the people' s eyes but to improve thermal environment of the facility and also to hold the water briefly. The shape of the roof' s structure is made like branches of a huge tree. The post pole branches in to four direction and again divides it self in to smaller branches. This makes the visitors feel as they are walking in a forest. The indoor and the outdoor environment are harmonious. The (real) building and the (virtual) exhibition fuse together in the building and creates a world. The structure of the building, except the foundation, can be easily subdivided and reconstructed, so, it is low emission though it is made for temporary usage.

Bridge, Arts and Science College

2004
Kazuhiro Kojima
Doha,Qatar



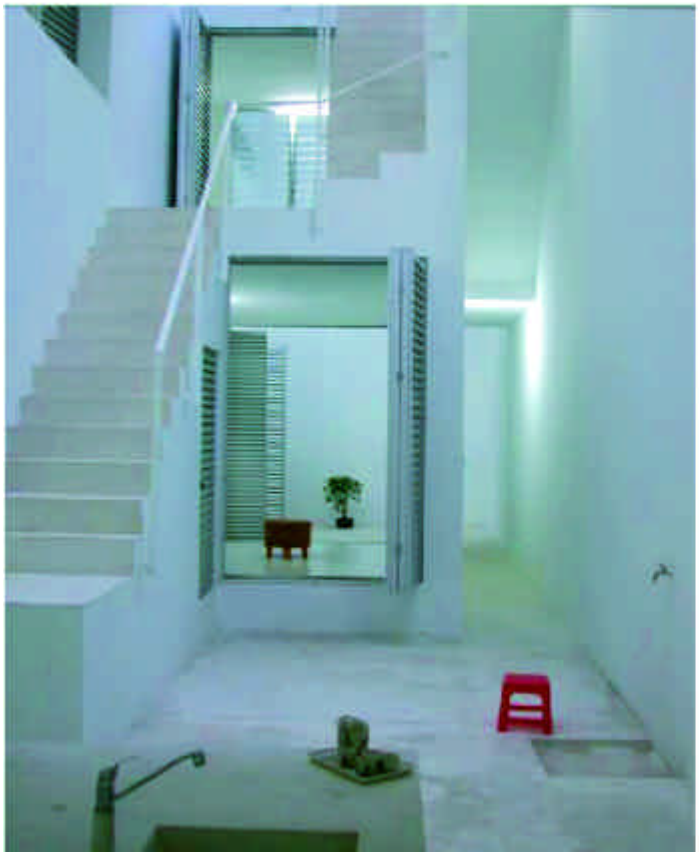
Approaching The issue of creating a sustainable architecture within the westren part of the world, is different from that of the middle east or monsoon Asia. In the case of arts and science Building in (Qatar,Doha) we managed the strong sunlight using reflected in the buildings expression.

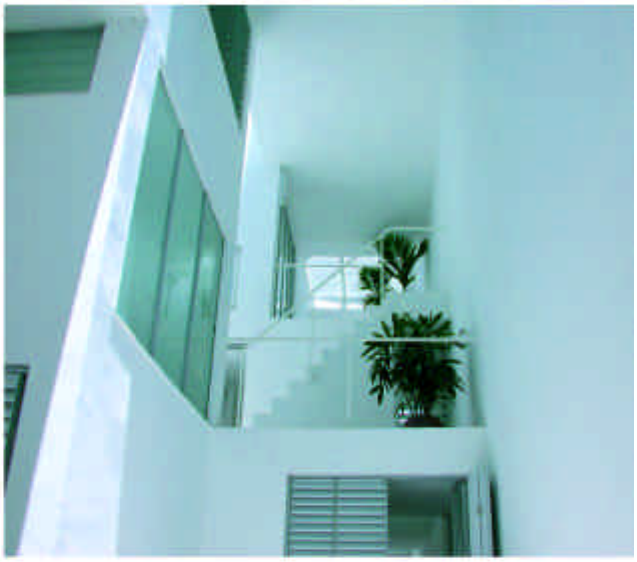


Space Block Hanoi Model

2003
Kazuhiro Kojima +
Kojima Lab.(Tokyo University of Science) +
MaganbuchiLab.(Tokyo University of Science)
Hanoi, Vietnum

While in Hanoi (Vietnam) dealing with high temperature and high humidity, we managed the flow of wind by using the "Space block" method in order to create a comfortable living zone although densely populated.





Ando Hiroshige Museum

2000

Kengo Kuma& Associates

Nasu-country Tochigi-prefecture

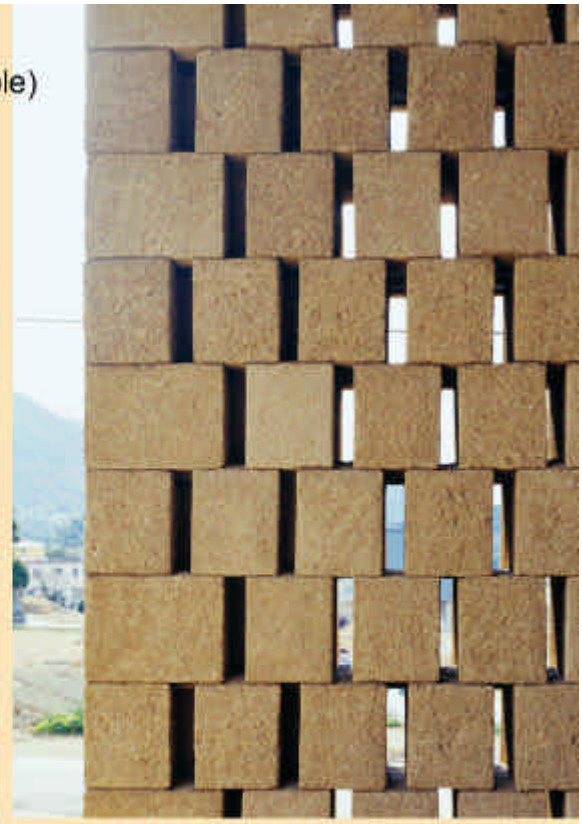
With its gabled roof, the roomy, single-story building merges into Bato's rich, natural surroundings. The whole museum is wrapped in latticework made of local Yamizo cedar, so that the lighting in the museum continually expresses itself in different ways, depending on the time of day. This Latticework also buffers the direct sunlight to the metal board and is effective in air-conditioning system. Local materials are also used in the interior; the walls covered with Karasuyama washi handcrafted paper, and the floors made of Ashino-ishi stone.

Adobe Repository for Buddha Statue (Anyoji Temple)

2002

Kengo Kuma& Associates

Toyoura Shimonoseki-city Yamaguchi-prefecture



The wooden Buddha in this warehouse is one of the National Designated Important Cultural Assets.

This warehouse enables us to see the Buddha through glass on one side, and other three sides are made of adobe from the local soil.

"Self-production and self-consumption" is a valuable factor for sustainable architecture.

It is both cost and energy efficient.

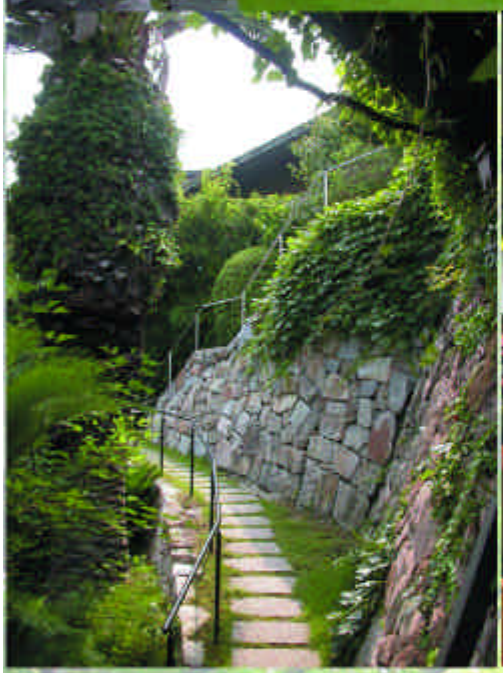
Also, this burned brick wall controls temperature and humidity of the property, so air-conditioning units aren't necessary in this facility.

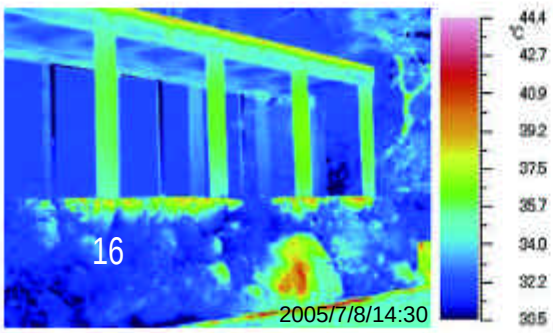
Morihana Memorial House

1962

Kiyoshi Seike

Kobe-city Hyogo-prefecture

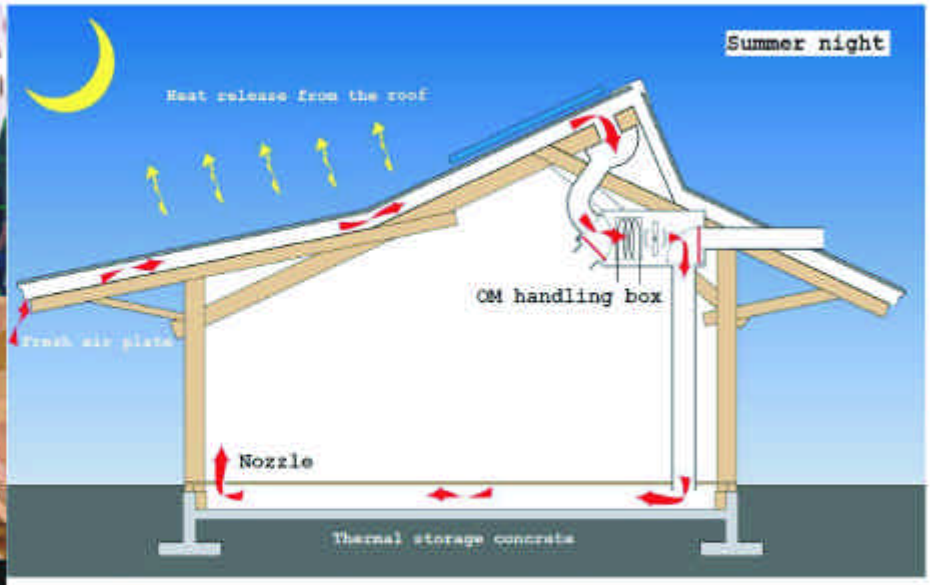




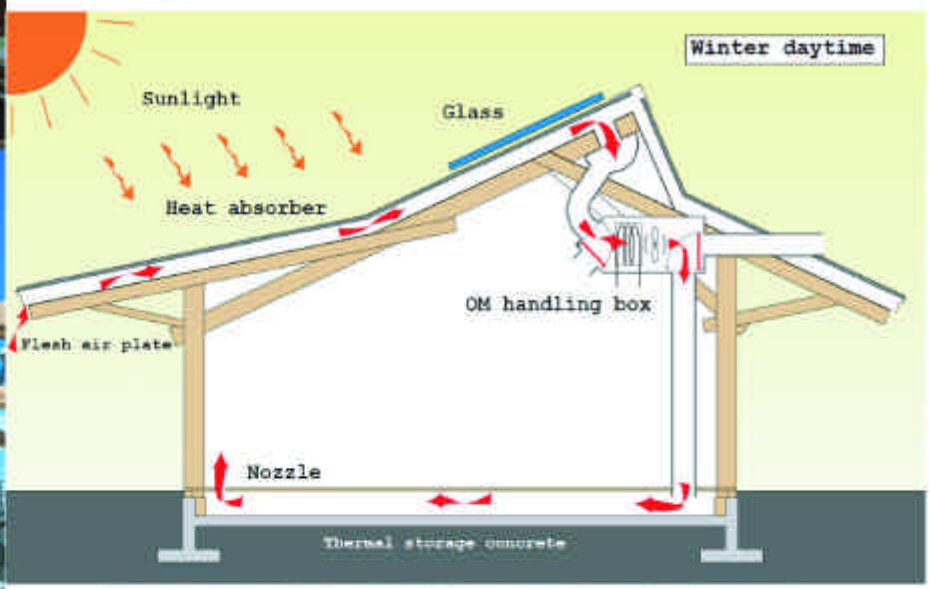
As you can see from the picture, the greeneries covering the building and the eaves restrains the increase of the surface temperature and produces cool and comfortable climate even in a boiling hot day. The solid and strong design of the structure made by natural stones deepens its beauty as time passes.

Iwamura Kazuo Ehon-no-Oka Art Museum

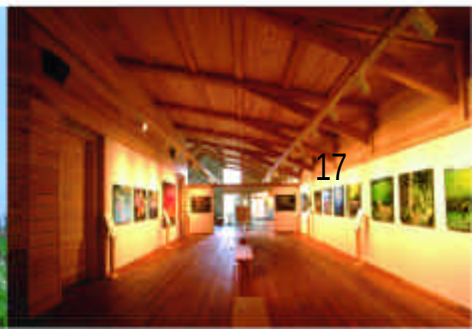
1998
Masamitsu Nozawa Building Workshop
Nasu-country Tochigi-prefecture



After sunset, the roof releases the inner heat and draws in dry air from out side in to the house. The sensing system senses the room air temperature and the outdoor temperature, and automatically takes in only the cold air under the floor. Here the concrete functions as a cool storage.



During the winter daytime, the OM Solar system brings down the warm air heated by the roof under the floor, and the concrete absorbs the heat from the air and functions as a floor heater. As the fresh air is always pumped in the room, the room environment will be kept in a good condition.
Also in summer, the heat will be ventilated outdoor immediately.



Acros Fukuoka

1995

Nihon Sekkei Inc. + Takenaka Corporation + Plamtago(landscape)

Hukuoka-city Hukuoka-prefecture

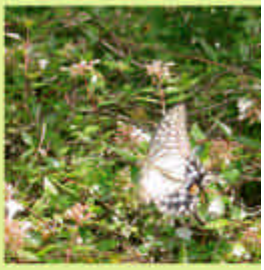
Acros Fukuoka was built after the government office building of the Fukuoka prefecture as a future style of a commercial complex in March 1993.

Commercial establishments and cultural facilities such as symphony hall and international conference hall are neatly and compactly built in the building. Acros Fukuoka, which name came from the catchword "Fukuoka, the cross road of Asia", is now carrying out function as a cultural intersection.

On the main street side, the building is designed in office building style by using glass curtain wall.

On the other hand, the north side of the building adopted the step garden style in other to merge with the park.

It has established combining a different concept and style of design in one building.

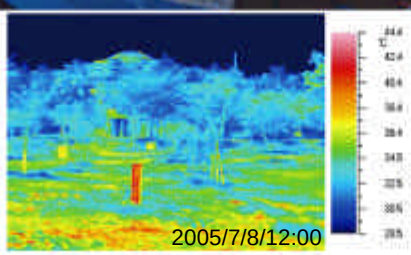


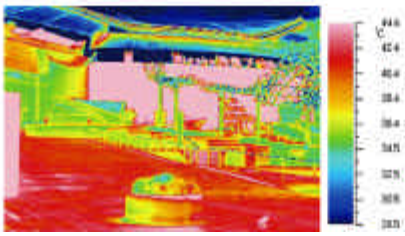
OSAKA Central Gym

1996

Nikken Sekkei

Osaka city, Osaka



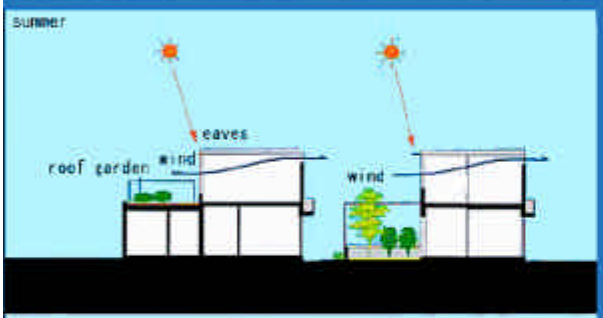


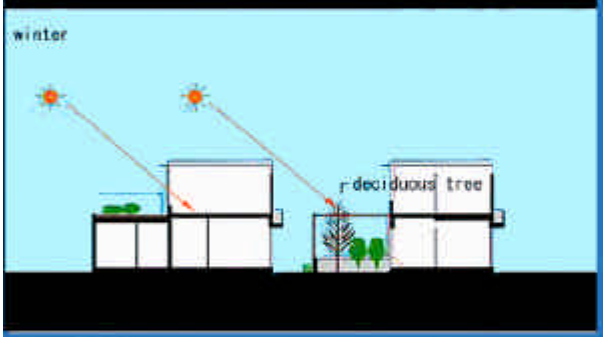
The Osaka central gymnasium has Kendo ashram, training room, Judo ashram, and a sub arena other than the huge main arena which has 10,000 seating capacity. The building half built in the underground has its roof all covered by plants, vines and trees which creates the green landscape merging with the park. You can walk around in the roof garden of the gymnasium and it is used as a place of relaxation and amusement by the local residences. The picture shows the temperature difference of the gymnasium surrounding areas covered by green and the concrete area next to the gymnasium. It is clearly shown in the picture that in the surrounding area of the gymnasium, the plants blocks the sunlight and creates a cool spot and at the same time creates a cool island as a extensive green park.

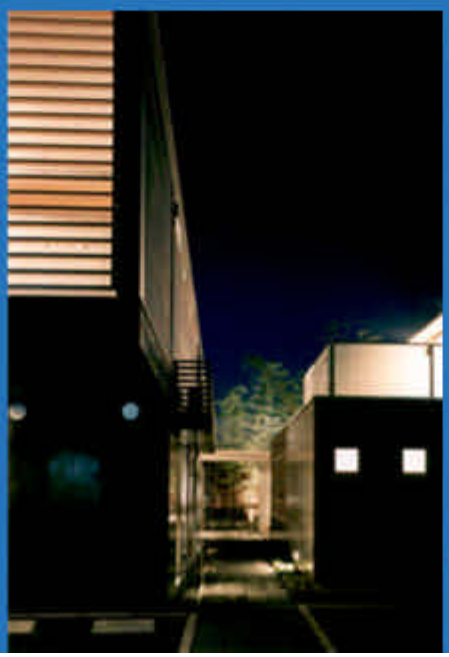
Nakajima Garden Housing Project

Yasumitu matunaga
1999
kuzi-city shizuoka-prefecture

This housing project is a prototype which realize the good condition in the urban life. Several alleys partition off the 12 houses into 6 brocks and each unit is just 2 storied house. Pedestrian mall, water way, ponds, spaces of alley becomes the habit for many kinds of livings, and protects the diversity of organisms. The design of the roof garden, the flow of the wind, and the eaves and the openings were considered on the movement of the sun through out the year.







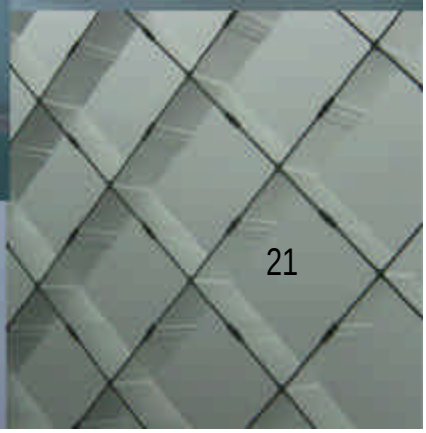
ecoms house

2004

Riken Yamamoto & Field Shop

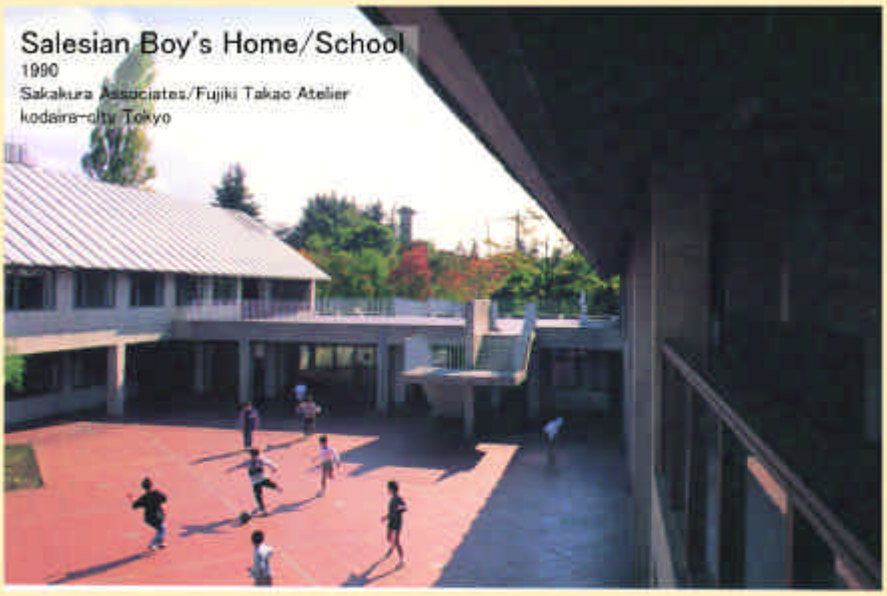
Tosu-city Saga Prefecture

This is a new mass-production residence design that uses aluminum as the main structural material. The aim of the design is to search for the expression of an aluminum structure. As the intention is mass-production, it used the prefab system assembled only with using the panel of the factory production as a structural wall and tightening a bolt on the site, in order to shorten the construction time on the site and to decrease the cost.Because it is possible to expand and contract freely in size by 1,200mm module, it is possible not to form itself not only as a house but to apply it to various usages and scales such as offices and stores. It is also possible to correspond to extension and rebuilding. After dismantling, the 1200mm lattice panels can be re-used in another building without modification. As they can be used many times over, user has to lease only the number of wall and floor panels they need. This system is aiming a new type of exchange flow in making houses and shops.



Salesian Boy's Home/School

1990
Sakakura Associates/Fujiki Takao Atelier
kodaira-city Tokyo



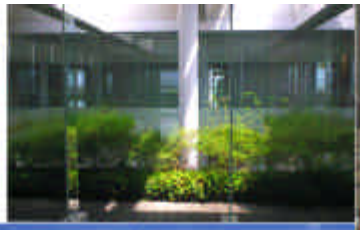
Roof, Pavement, Green Landscape

Sloped roofs always guarding this architecture from the rainy Japanese climate, the warmth of natural materials used for pavement providing a firm basis for the children's daily life.
The ever changing and growing green landscape is another element which suffices sustainability.

Katta Public General Hospital

2002

Taro Ashihara Architects +
Koh Kitayama & architecture WORKSHOP +
Hideto Horiike + Associates
Shiroishi-city, Miyagi-prefecture



The Katta public general hospital has many sustainable factors such as passive energy saving, cogeneration system, natural lightings and ventilation by natural draft. It is also functional even if the elevator stops due to the earthquake because this is low layer construction. The healing garden designed based on the advice from the hospital workers function as a part of the treatment program for the patients.

Man exists in space and space influences man. So if man can be healed or can be kept healthy, the space should sustain. A space which gives good influence to mankind is a sustainable space.

Chouchikukyo
1928
Kōji Hujii
Otokuni-country Kyoto-prefecture

plan

The architect, Koji Hujii has built 5 environmental house tentatively in Ohyamazaki. Chouchikukyo is the corpus of them and famouse as the house adapted to the Japanese climate and lifestyle of the day. He showed the method of design based on environmental technology.

After he researched the climate of western countries and cities, he compared it with japanese climate. Then, he declared the best confortable thermal environment for human.

Combination of Zashiki(Japanese style of sitting, which people sits on the floors) and western style of sitting on chairs.

All made by natural materials. House built in the style of a tea-ceremony house and in the international style of design.

A mixture of two different cultures.

He suggested these 3 points for Japanese house.

1. passive architectural plan and design approached with science
2. use of natural materials
3. mixing European style int Japanese style

Cool tube is an airway carrying the air from west side of the building to the living room. The heated air cools down by the earth temprature. The gateway of the tube is inplanted in the step of the Tatami.

a vent establishedon the ceiling

Engawa is a sunroom. This room has nice view and full filling natural lighting, because it replaced the 3 of walls into windows. This room become the buffer, defences the heat in summer, and gains the direct sunshine in winter.

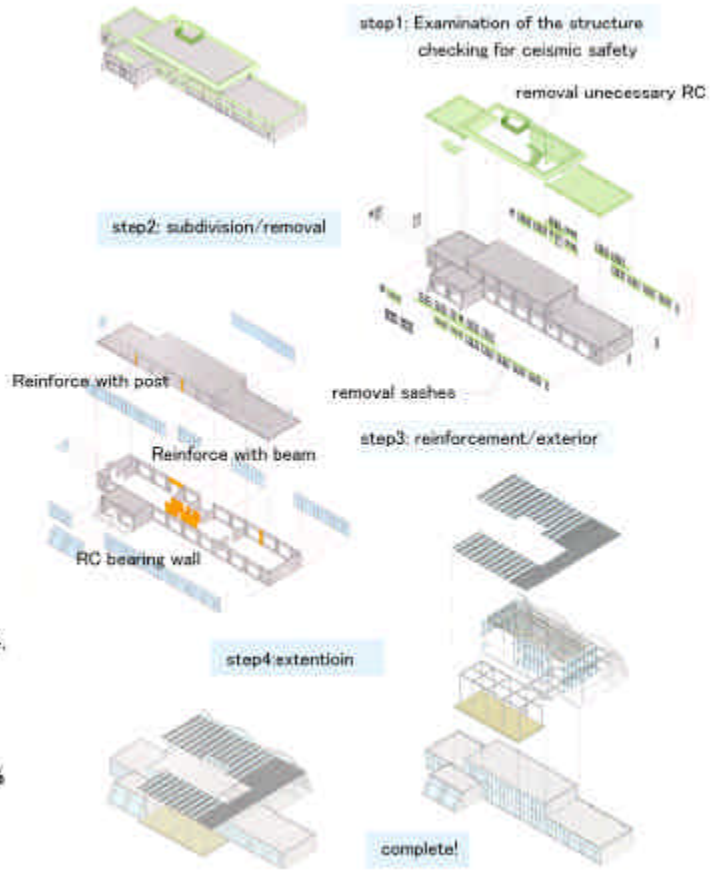
Air in the house flows out to the attic through the vent established on the ceiling or RANMA (transom windou).

Airway connecting underground and the attic also assembles the air to the attic. These faculties supply good ventilation of the indoor spaces.

3 projects of "REFINE ARCHITRECTURE"

Shigeru Aoki

We have already had enough space to live in and a lot of space has started being surplus. We are conscious of ecology problem and that we have to stop this rash scrap & build. "Refine Architecture" is one of the answers for the problems. It is a way to revive a building with a fresh design but using its existing structure. It also tends to be financially preferable for the client. The architect Shigeru Aoki is the advocator of "REFINE ARCHITECTURE" and has succeeded this method in many projects.
The second project, gymnastics of the Yame public junior high school was built in Yame city of Fukuoka prefecture in 1961, and was refined in February 2004. The building was achieved zero-emission under the influence of Kyoto Protocol. The double structured walls made by galbarium steel reflects more than 70% of the heat, is with high water proofing property, and is well served to insulate the building.



Yame city Multi generation center 2001/5 Yame-city Fukuoka-prefecture

Sea Museum in Kamae 2005/3 Kamae-town Ohita-perefecture

Yame city Multi generation center 2001/5 Yame-city Fukuoka-prefecture

Yame city Fukushima junior high school Gym 2004/2 Yame-city Fukuoka-prefecture

Sea Museum in Kamae 2005/3 Kamae-town Ohita-perefecture

The International Library of Children' s Literature

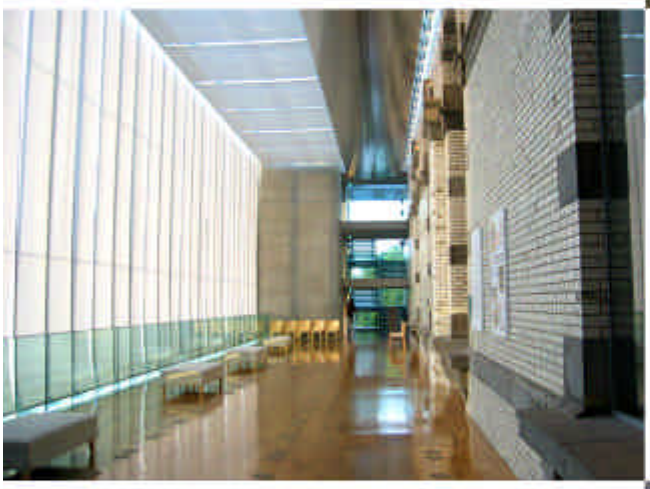
2000

Tadao Ando Architect & Associates + Nikken Sekkei

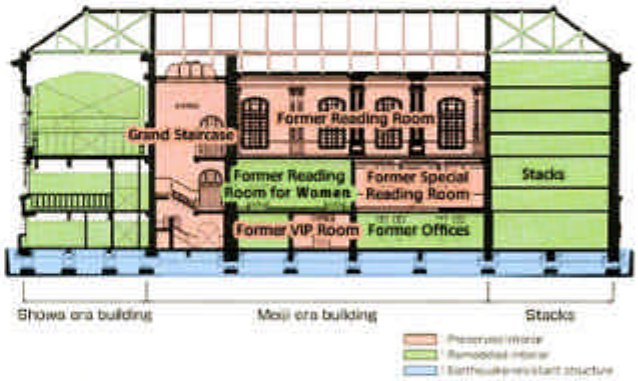
Uenopark Taitou-ward Tokyo

ILCL was founded on January 1, 2000. The original building dates from 1906 and was expanded in 1929. As a typical example of Western, Renaissance-style architecture built in the Meiji era, it has been designated as a metropolitan historic building by the Tokyo Metropolitan Government. While preserving the original form, it has been remodeled for its function as a children's library by Tadao Ando. The design and structure of the interior and exterior of the valuable architectural heritage has been preserved as much as possible. The building has also been made earthquake-resistant to protect it from major earthquakes. The architectures of three different eras (Meiji, Showa and Heisei) are united and renovated as a children' s library, which preserves its value as architectural heritage as well as developing a new function and providing a new environment for the public.

A glass box, which is the entrance of the building, is built-in across the building.



The left side is the new glass wall added by Tadao Ando. The right side is the outer wall of the original building.



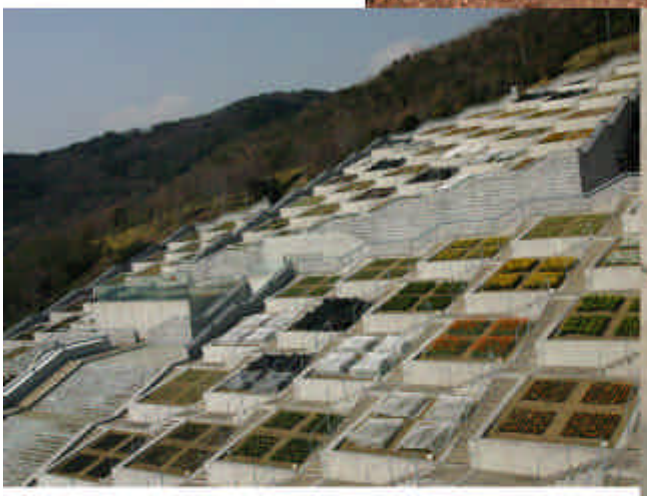
Plan of the building: Preservation planning (Plan by Nikken Sekkei Co. Ltd.)

Cafeteria in the glass box faces the garden.

The antique lamp top of the staircase is maintained since the Meiji era and still alights beautifully. The handrail is also preserved and covered by glass case which shows the change of the regulation from 1906. Also, this building is completely divided from the ground by the earthquake-resistant device.

AWAJIYUMEBUTAI

2000
Tadao Ando Architect & Associates
Tsuna-country Hyogo-prefecture

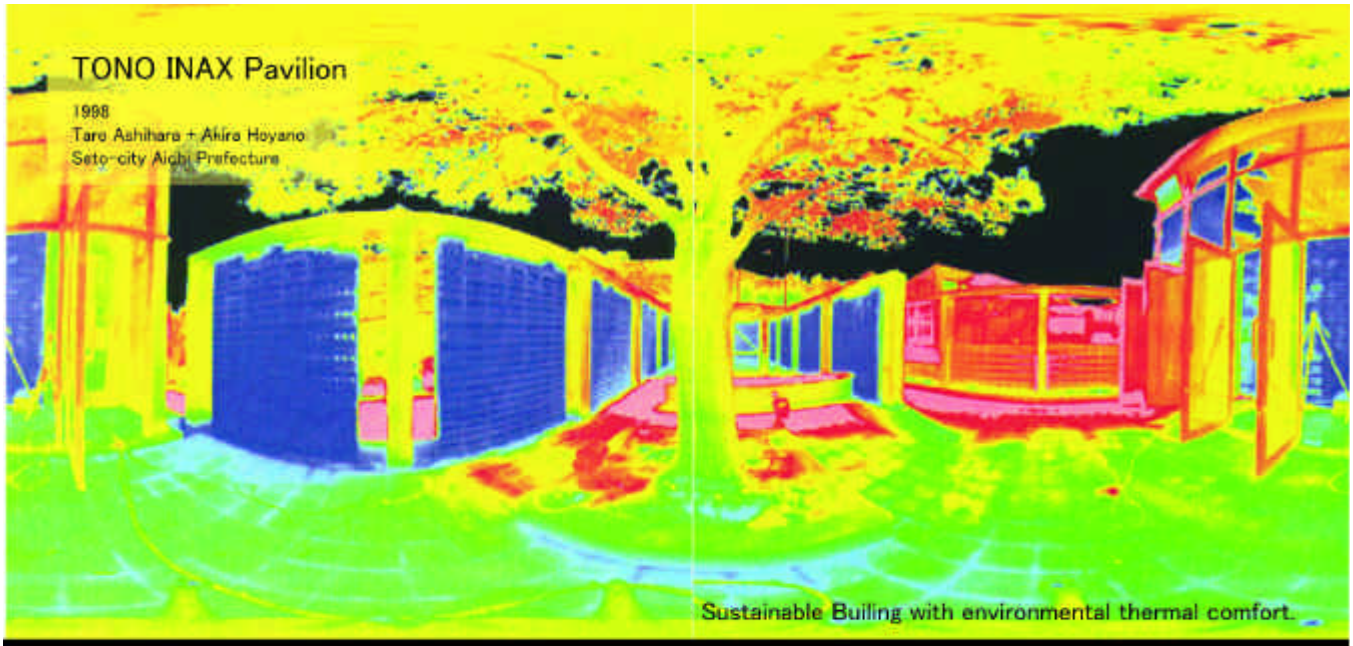


It was the main facility for the [JAPAN FLORA 2000] (Floral Expo in Awaji Island). It is composed of 5 areas, which are 'conference room', 'westin hotel', 'restaurants and shops' and 'botanical garden in greenhouse'. The architecture attracts the visitors to Ando's world and there is daring space making the most of nature and water.

Time increase beauty. ***Nature*** produces happiness. The sunlight of the positive shines. The sound of water is BGM. The color of the shadow moves. The monument is of the mind. It is enriched with air four seasons occasional. Feeling of wind. Rest in tree crown shadow.

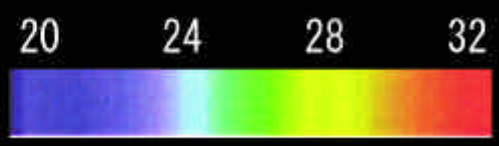
TONO INAX Pavilion

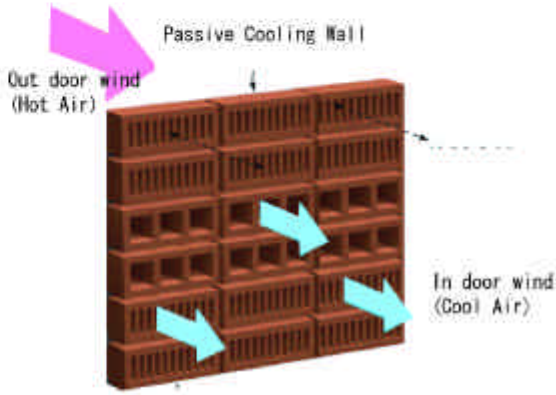
1998
Taro Ashihara + Akira Hoyano
Seto-city Aichi Prefecture



Sustainable Builing with environmental thermal comfort.

The cooling load and the emission of the heat is the cause of the heat island phenomenon. This nursing home is made by plants and perforated concrete which retains water and modifies the microclimate of the surroundings. Bricks and plants sprinkled by water lets in the wind and cool the air passively. This is a sustainable building that will function without using fossil energy.





A RIVERINE HOUSE IN KOCHI

2002
Yuichiro Kodama + Estec Desugn Co Ltd.
Nagaoka-country Kouchi-prefecture

The house is located at the riverbank of the Yoshino river, crossing steep mountain valleys in Shikoku island. The site is sloping down to the south and covered with chestnuts woods.
How to be responsive to the rich natural surroundings is a wish of the client family who hope to live close to the nature and a theme of passive design of this house that utilize the environmental potentials given to this region in the relatively temperate climate.
The main floor is rose up for minimizing the earth work with less foot prints to the original landscape and is accessed by the slender bridge from north side. This is for avoiding the risk of river flood as well.
A direct gain solar system for passive heating and a night-time ventilation system for passive cooling, the two simple passive techniques in this house work well and succeed to reduce the heating- and cooling load drastically. This design is carefully proceeded with an interactive computer design tool which was developed by the authors and results in good thermal performance. An important advantage of passive design allows the life style to be responsive to the environment as well as to contribute for the reduction of environment impacts.
This is a case study as one of prototypes for eco-conscious passive and sustainable design in temperate climate.

Facade
The area of the sun
3D model
The conceptual sketches
Photo of awarding cardboard model
Facade at evening illumination
The circuit of solar heating and aeration of a building
Cross section scale 1:200

SUSTAINABLE DESIGN COURSE

Pavel A. Kazantsev
Far East State Technical University, Vladivostok, Russia

SUSTAINABLE DESIGN COURSE FOR FUTURE ARCHITECTS

Students design passive architectural forms after learning the theoretical course in Architectural institute of FESTU last five years. Theoretical course of ARHITECTURAL CLIMATOLOGY (third year students, 60-75 people every spring) describe the main principles of Sustainable design (with the exception of natural constructions and plasters). I give more attention in my lections of modification the microclimatic conditions of open and closed space using previously architectural forms (Interaction of architectural and landscape forms with wind and sun).

One group of students (20-25 people) will be learning green design principles in practice during next three years.

GREEN DESIGN STEPS FROM SIMPLE FORMS TO DIPLOMA DROUGHT INCLUDE:

1. Direct gain of south facade only. First project with passive solar design - Settlement center (third year student projects, autumn). Passive solar design not compulsory, only for advanced students.

2.Simple architectural form with wind-break and solar heating possibility (A). Covers for kindergarten for 10-12 children (third year student projects, spring). Compulsory practice in framework of theoretical course.

3.Direct gain and natural ventilation of atrium space only. School for 250 pupils (four year student projects, autumn). Passive solar design not compulsory, only for advanced students.

4.Passive heating and cooling, hot water and space heating by solar water collectors; wind-break design of building and site (B). Low store dwelling or Single family house (four year student projects, spring). Compulsory use all methods of passive and active solar design. May be natural constructions and plasters.

5.Green design from passive and active solar heating to bionic exterior and interior imagine and "green" graphic style of documents. Public building - urban complex (five year student projects, autumn - spring). Green design not compulsory, only for advanced students.

After learning all green stages, advanced students will be ready for "Green diploma projects" (C), and future Green practice. The main part of diploma project besides draughts is the essay about Sustainable design principles.

There are three "green" graduate groups for the last five years: 2001, 2003, 2005 (June) - almost 60 students. And one group of 20 students will be in future - 2007, June.

All projects design for local climatic conditions of south Primorye, Russian Far East

Winter: November - March, north-north-west wind 7-12 m/s, up to 15 - 18 m/s; temperature -12 -20 C in January ; November and March approximately - 8 +8 C; all season sunny weather. Cold summer: April - June, south-east wind 5-7 m/s, up to 10 - 15 m/s; temperature +10 +16 C in June, up to +20 +22 C some sunny days; humidity 100%, usually cloudy. Summer: July - August, south-east wind 5-10 m/s, up to 15 - 20 m/s; temperature +20 +25 C, humidity 100%, usually rainy.

Deviation direction of wind by hills (50 -150 m, up to 200 meters) may be 45 degrees.

ECOBOX

ANGEL DE DIEGO RICA
MADRID, SPAIN. 2003

The Fundacion Metropoli building was conceived as an experimental building which integrates two fundamental criteria:
-The creation of a place of, and for the development of, innovation and creativity
-A commitment to bioclimatic processes

BIOCLIMATIC COMPONENTS
Sun Scoops-In addition to capturing solar energy for the building, the sun scoops also act as skylights permitting the passage of heat throughout the winter months and reflecting light in the summer.
Thermal Energy Storage-The building enclosures are composed of materials which maximize its energy efficiency and saving. The thick outer walls act as thermal energy stores that regulate the temperature within the building
Ventilation and Geothermal Energy-Underground geothermal energy is transmitted and stored in the thermal energy storage (a two-meter deep gravel pit) located underneath the building. Air from the exterior is allowed to heat up or cool, depending on the season, by passing through this energy storage. The heated/cooled air is then introduced into the interior spaces and building enclosure.
The Atrium and Motorised Windows-The building is maintained in positive pressure outward due air that is introduced from the exterior through the ventilation system.

Louvers -The automatic louvers that are fitted around the structure allow personalized control of luminosity and direct solar radiation into the building. Photovoltaic Panels integrated with the Facade Solar Panels-Production of heat and cold.

Vapour Absorption Chiller-In the summer, the vapour absorption chiller uses the hot water produced by the solar panels for the production of cold water for the radiant floors
Radiant Floors and Ceilings-The radiant heating and cooling system circulates hot and cold water through underfloor tubing. During the winter, the hot water comes from the solar panels, while in the summer; the system uses the same water that has been cooled by the vapour absorption chiller.

Intelligent Regulation Systems -In general, the electrical systems monitor and regulate building temperature depending on the needs of the different interior spaces, the external thermal conditions and the energy accumulated from the solar panel and photovoltaic cells.

Obtained Results
Energy Savings of 70 %

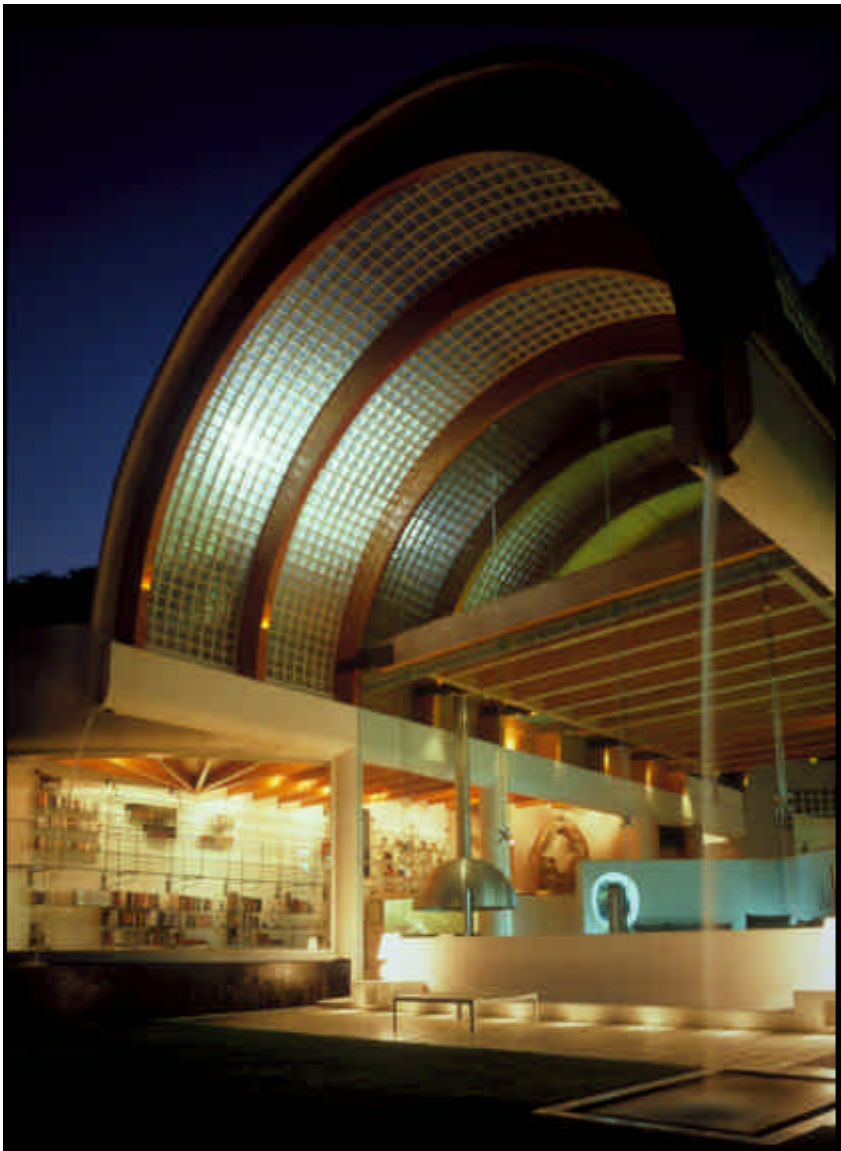
A Model of Bioclimatic Architecture

EcoBOX

The **Fundación Metropoli** building is an experimental building built using bioclimatic technologies. The building incorporates both passive and active bio-climatic elements.

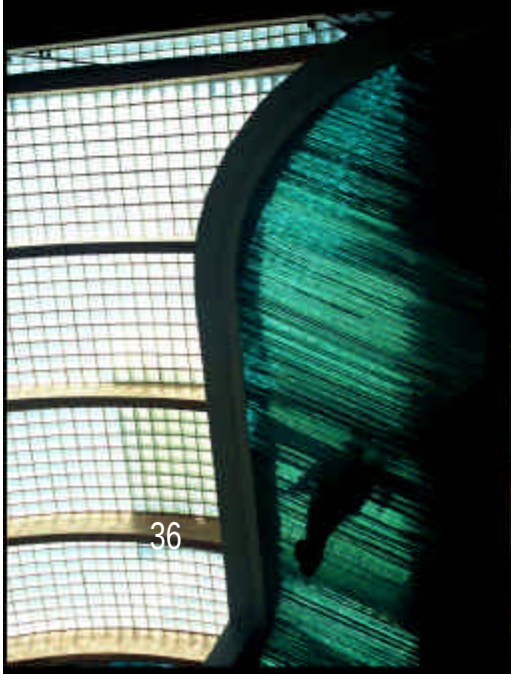
The building is specially designed to house activities of the Fundación Metropoli. The building will have collaborative work space for planning teams, personalized office spaces for visiting academics and experts, an information resource center, a fully equipped auditorium and meeting rooms, as well as exhibition and gallery spaces

Annual energy saving (70%)	104.010	kWh/year
Annual saving of emissions	[illegible]	Kg CO_2/year
Reduction of emissions in equivalent Cars (1)	[illegible]	[illegible]
Reduction of emissions in equivalent km of new Cars (0.12 kg/km for 15 years) (1)	[illegible]	Thousands of km of new cars
Equivalent trees (CO2 absorbed in 20 years) (2)	270.312	Trees
Equivalent forests (CO2 absorbed in 20 years) (2)	49,5	Forest hectares



NATURE, LIGHT and SPACE

are concepts integrated in this home of unsuspected shapes, with an architecture of pure lines mixing curves and diagonals in integrated and integral spaces.



SIERRA VENTANA PROJECT

CARLOS GARCIA VELEZ Y CORTAZAR
MEXICO CITY, MEXICO. 2000

Space, Light and nature are three concepts architect Carlos Garcia Velez y Cortazar has integrated in this home of unsuspected shapes, with an architecture of pure lines, mixing curves and diagonals in integrated in integral spaces. Down to the last detail, the project is imbued with a sense of privacy and communion with nature.

The facade was realized as a curtain of mystery that, on being opened, allows one to see first a lengthy corridor covered by a pergola formed by a ribs of glass, an element that creates a play of images and light that changes with the position of the sun. This play of light, an incomparable property of the material, projects different effects on the white limestone wall that envelop the corridor until it opens out on a central courtyard covered with a vault made of glass blocks, supported by a series of laminated wood arches that continue until they are lost in a porch, also covered with glass prisms that open the way for the guest of honor: mother nature. Thus, the tendency toward openness in the complex focuses on our encounter with the jungle; the great guest that makes it presence felt though the wide-open spaces to the rear of the house.

The roof of the structure is in concrete coated with polystyrene, with solar panels facing south, both to provide hot water for domestic use and for the pool. The floors, on the other hand, have radiant heating, which adds to the comfort required for the living room. The lights at the front and rear of the house are powered by photoelectric cells on the rooftop, giving the building an air of ecological intelligence.

We have, then, an ecological sensibility that is also expressed in recycling of rainwater trapped on the roof, to then be concentrated in two large gargoyles that channel it into two pools, which, when they overflow, fill an ample cistern used to water the gardens during the dry season, taking the opportunity to create a natural fountain out of recinto negro, which serves as a great mirror reflecting the jungle.

The concept of openness is expressed, on the other hand, in integrated, open spaces that broaden our perspectives, breaking the borderline between inside out, but at the same time achieving total or partial privacy by means of walls that do not touch the vaulted ceilings, beams and frosted glass partitions that rotate, creating segmented and absolute openings.

Every last detail of the house was thought out and designed with painstaking care, especially the glass washbasins, the countertops, the bookshelves, also in glass and stainless steel, the stainless steel staircases and granite jalousies that act as filters, changing with both natural and electric lighting. This added to the realization of an architectural project that goes beyond the ordinary design of a home, with a palpable, singular creativity, enriched with new and ludic ideas.

MERCEDES-SUAREZ HOUSE

CLAUDIA MERCEDES SUAREZ
SANTO DOMINGO, DOMINICAN REPUBLIC. 2002

Geographic Conditions-This project is located in Santo Domingo city, Dominican Republic, where weather is mainly hot and humid, with a season of cyclonic activity from June until November. Santo Domingo city is located in the southeast coast of the island, where the average wind direction flows during the day in a SE direction and within the night NE. The average relative humidity is over 85% becoming quite frequently to saturation limits. .

The project-This project began as a result of family reduction as their children got their own houses, therefore, there was the need of a comfortable, cousy but well distributed new house, mainly for two adults. Owners requested a one-store house with enough spaces for their movement.

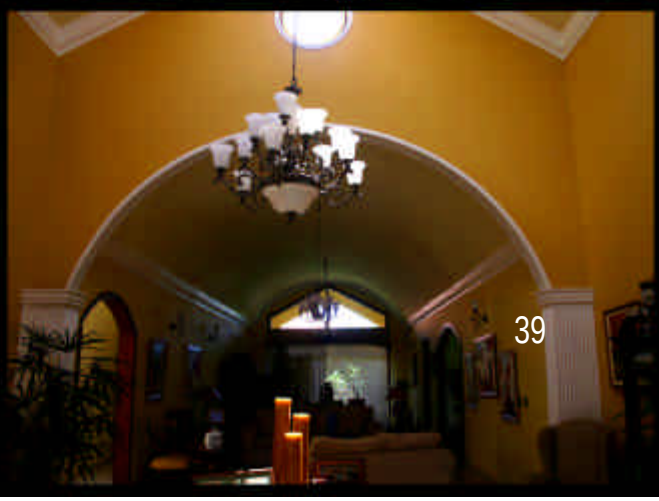
The suggested bio-climatic concept begins with spaces orientation: daytime areas are located in south direction, nighttime ones to the north, as a consequence of winds predominant direction. Services areas and parking places were located toward west side projecting a shadow over the house on evenings when sunshine is more intense.

Inside, roofs have been built with significant height having an average approximately of 6.00 to 7.50 meters, specially on social areas; this in conjunction with slanting and vaulted forms, allows the house to maintain a well stable condition of flowing air which it is a great opportunity to enjoy the different areas of the house without having the inconveniences of hot air blowing inside of it. Windows located on the higher side also contribute for the above-mentioned purpose. Furthermore, cross ventilation is improved all over the house basically on social areas which tend to have the most frequent use with high concentration of people.

The house has been built with conventional materials (cement blocks) but also others were included to emphasize the concept of designing, as well as, enriching the natural lighting effects. Reinforced acrylic skylights with curved forms were used in order to concentrate solar radiation just as a straight line. The same concept was applied in all others vaulted roofs.

Concerning to windows, they are set back from the facade limits that helps the control of solar radiation that comes in contact with facades as louvers. These areas were completed with dense low and medium high vegetation that makes interior spaces more comfortable. In rainy situations this kind of windows could also being kept opened. Exterior areas include a transition zone between the house and gazebo area with a wood pergola that accommodates a leafy plant that becomes as a natural roof.

Finally, and as a decoration accessory of the house, roofs were provided with water collection channels for recycling and also for irrigating exterior areas.



HOTEL MARQUIS LOS CABOS, MEXICO

A 250 room luxury Hotel located in Los Cabos, Mexico.
This hotel takes care of several sustainability issues that includes: high conservation of energy, garbage recycling, integration to the nature, shading coolers, water recycling and environmental comfort.

HOTEL MARQUIS LOS CABOS

SCAP & ARCHITECTONIC
LOS CABOS, BAJA CALIFORNIA SUR, MEXICO. 2003

A 250 room luxury Hotel located in Los Cabos, Mexico.

This hotel takes care of several sustainability issues that include: high conservation of energy, trash recycling, integration to nature, water recycling and environmental comfort.

The hotel is surrounded by desert vegetation, and all the landscape architecture is used to preserve this nature's image. The facilities take advantage of the hotel's orientation to acquire more energy and to avoid air conditioned consumption. The service areas are completely hidden from the view of the visitors, obtaining a climate of high comfort. The hotel also includes environmental sound, signaling for handicapped and security. The large pools are oriented towards the sea, obtaining a climate of total relaxation while they fuse with the deep blue from the sea. In the low area there are four small houses that reproduce a small town, offering privacy to the users.

Team's Name:	SCAP & ARCHETONIC
Country:	Mexico
University:	Universidad La Salle, Mexico
Title of the Project:	Hotel Marquis Los Cabos
Description:	A Mexican Sustainable Hotel
Author	Juan Carlos Alvear Homero Hernandez Victor Marquez Jacobo Micha
Location	Los Cabos, BCS, Mexico
Year of Constr.	2001-2003
Sust. Concepts	High conservation of energy, trash recycling, integration to nature, water recycling and environmental comfort.

CASAS 11 & 12

JOSE MARTIN GOMEZ TAGLE MORALES
CUERNAVACA, MORELOS, MEXICO. 2002

Cuernavaca is located almost one hour by car from Mexico City. Due to the hot weather of the region many citizens have in this area a “second house” to stay on weekends.

When I was part of the Creative Design Team of one of the biggest housing companies in Mexico, a 2,200 house unit complex was developed as a low-income housing projet, and this very complex was enriched with wide open-urban spaces and community services. Also some optional modifications to the prototypes were built in order to customize each of them.

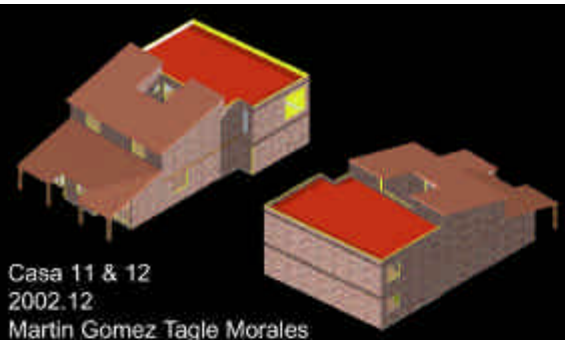
Even the original design of the house had very good points, the owner needs to extend the house from one to two floors, joint two houses to create a bigger interior area, create communal spaces near-by the house, built upper-floor extra rooms and create a microclimate ambience by plants in the interior and exterior of the house.

The goal was to transform a typology of a vernacular house giving several solutions of bio-climatic design transforming a 60 square meters 2-rooms preliminary construction into a 220 square meters energy-saving house.

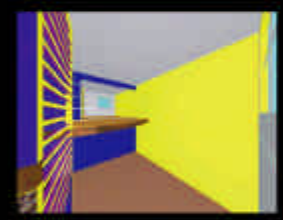
For this design we use solar passive systems protecting the interior of the house from the sunrays simply by the orientation of the house. Regarding to the high humidity of the zone the position of the open-windows and open spaced conducing naturally the air coming from the north passing through a garden that refresh this air and make a continuous traveling from the first floor, by a void space in the rear part of the house where an interior garden is, to the second floor upper window openings to let the air continue his movement out the house. The shade of the greenery and their natural changes in the different seasons, treat the interior always to fresh and we avoided with this the use of heater or cooler air conditioner.

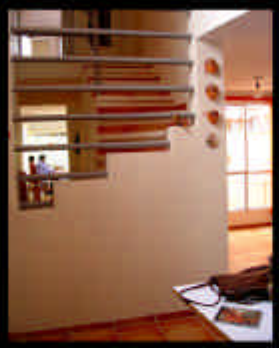
Regarding to the electric system, the area is plenty of sun almost all the year, so, it use solar con - ductivity to avoid up to 50 percent the use of electricity. Also the water-heating is not necessary due that the warm water conductors form a series of curves in the roof catching the sun by dark colors and mirror boxes and heat the hot water pipe lines.

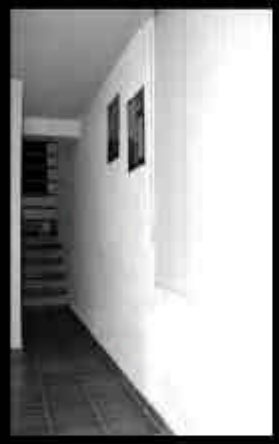
The main area of the house is the interior two-floors open space that creates a microclimate by its interior gardening and also joints both houses into one. Thanks of computer aided design graphic studies, the position of a 2 X 2 meter window makes the sun rays filtered by a exterior screen that depending on the position of the sun make changes of the color of the interior wall (that is white) into a wide palette of colors and controling manually the temperature of the interior of the house where also the material of the walls play an important roll to mantein it stable.

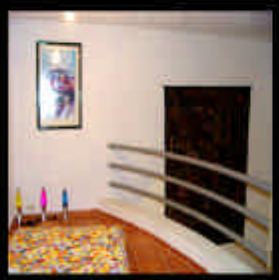


Casa 11 & 12
2002.12
Martin Gomez Tagle Morales
Cuernacava, Morelos, MEXICO

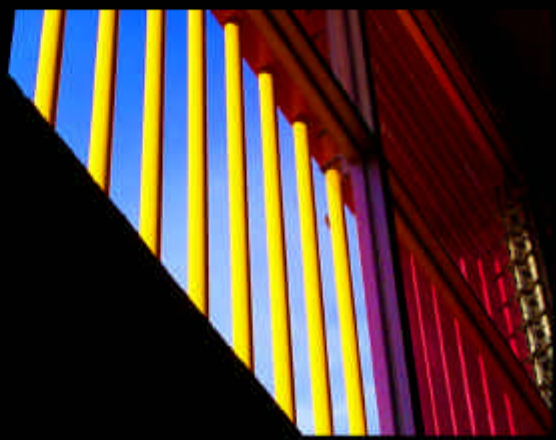


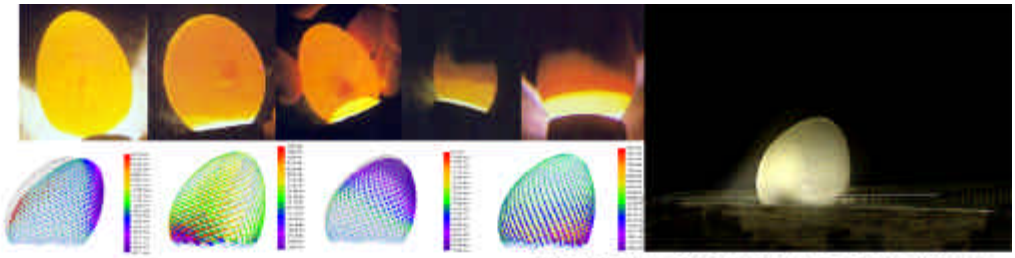




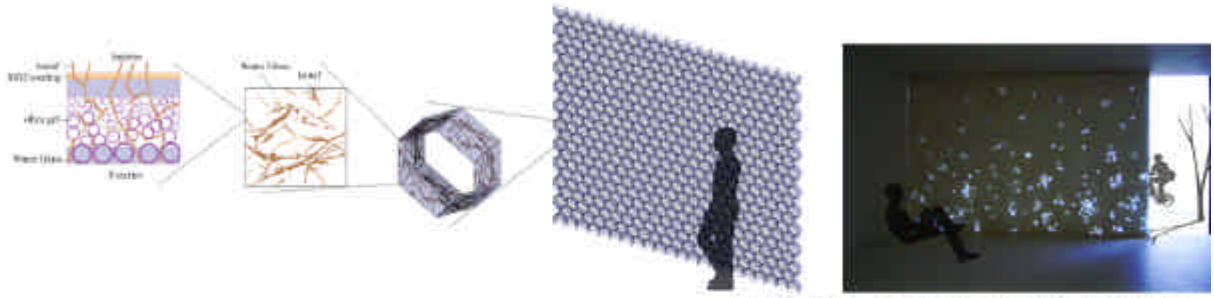


vernacular housing re-generation





PHYSICAL ORGANIC INORGANICISM



CHEMICAL ORGANIC INORGANICISM

BIOLOGICAL ORGANIC INORGANICISM

FIRST ECOLOGICAL TYPOLOGY
ORGANIC INORGANICISM

ORGANIC INORGANISM

KEVIN YIM
TOKYO, JAPAN. 2004

FIRST ECOLOGICAL TYPOLOGY - INORGANIC ORGANICISM

ECOLOGICAL ARCHITECTURE in TRANSITION-Building is not an organism; it is an inorganic artifact, constructed for human use. The conventional building materials, steel and glass, are inorganic materials. Those inorganic materials do not bring any ecological benefits to the environment. There are architects such as Shigeru Ban and Kengo Kuma who have been experimenting with materials that have certain amount of ecological value. For example, in the paper dome in Hannover, Germany, Shigeru Ban used a combination of paper, wood and steel as structural materials, in which recycled paper tubes are organic materials.

PHYSICAL ORGANIC INORGANICISM-There could be a new trend in ecological design that the inorganic nature of a building can be totally integrated with organic elements, an Organic - Inorganic Fusion by introducing physical form of natural things, biological ecosystems and organic-inorganic composite building materials to Architecture. Such ecological typology could be referred as Organic - Inorganicism.

In my competition design Paper Egg, a finalist in an 8 million US dollars Chicago Environmental Centre Open Competition, the Inorganic-organism fusion is demonstrated. As a symbol of revitalizing a marshland that used to the homes of various kind of birds, a bird's egg is used as the physical form of the architecture - a Physical Organic-Inorganism.It is a symbol of rebirth of the once flourished marshland. Natural evolution has given us the inherently strong shape of the egg, easily resisting the elements through its aerodynamic shape.

CHEMICAL ORGANIC INORGANICISM-Regarding the chemistry of a new building materials "Kenaf Glass", the goal is to combine the benefit of organic and inorganic materials. Sick Buildings occur when there are enormous accumulation of allergens in the building interior, which grow with high humidity and insufficient sunlight. The new environmentally friendly composite material, with the synthesis of kenaf fibres and water glass, would be able to absorb moisture from the interior of a building, facilitates indoor/outdoor air flow and eliminates allergens/toxins. Kenaf is recognized as an environmentally friendly plant, since it absorbs the most CO2 and releases O2 among all plants. Its fibres are strong, the porous nature facilitates interior/exterior air flow and resolve toxins. The new research of water glass resulted in the rigid, light, incombustible, transparent solid, while its inherent ability to absorb moisture is enhanced.

BIOLOGICAL ORGANIC INORGANICISM-Can architecture design for all species: humans, plants and animals? Ecological Box, Ruang Kapal (2004), suggests the integration of human space and green/bird breeding spaces in one building. Architecture should mean more than just taking resources, land, water from nature, but giving back to the environment. Ecological Architecture should have positive impact on the land, improving the bio-diversity of the surrounding. In my project Ecological Boxes, a unit housing for single person, two boxes are piled up together. The concept is that these boxes are self-sufficient as the wastewater reuse systems are proposed. Wastewater will be purified to become drinking water, and natural lighting would be collected by solar panels to generate electricity needed for everyday use. Consequently, any electric, water or sewer pipelines are unnecessary. The exterior outdoor space is for planters and animal species. The planters would spread their seeds onto the neighboring land, enhancing the bio-diversity of the area. Although the original idea of the project was not realized due to the minimal budget, this housing serves as a prototype for future ecological architecture.

PLACIDO DOMINGO CITY

CASAS GEO
LA VENTA, ACAPULCO, GUERRERO, MEXICO. 2002

The Placido Domingo's Village was donated to the affected people for Pauline's hurricane, developing 650 housing units, a church, a kinder-garden, a primary and junior high school, cistern and elevate water tank and a hospital.

For the project, regional materials were used and the architectural houses were designed depending of the hand-made and popular jobs of the people affected of those communities, that means, each housing unit was designed based on the resident's use, and, even the housing prototype deals with several interior variations, in essence it is a typical house of the coast of the Guerrero State.

The main objectives for this development were:

-a sustainable community for poor people that lost their homes due to the hurricane
-services of drinking water for the surrounded communities
-sanitary drainage, streets, schools and other urban facilities
-the design was based on the tradition of the region
-the use of elements integrated into the natural environment and local context
-start a new node of urban projects in Acapulco city
-generation of different services that can be used for the entire population of the zone

Regarding to architectonic issues we used different kind of housing solutions to satisfy the needs of the inhabitants.

Due to this project was given to the affected people of the Pauline's hurricane, people without financial resources, the national and state's government gave the land, where the Anahuac University and some private corporations gave the money for the development and strategies. Casas GEO donated the design and the world famous tenor Placido Domingo pursue a series of concerts to donate the total ammount of the construction of 150 houses.

The principal obstacle was to make agreed the private corporations and the govermental entities, thing difficult to solve and kind of first time to really succeed in Mexico, where this project was very unusual combination for the economics as well for the organization.

Even the community is located in a very hot an humid place, the vernacular knowledge were used to provide a comfortable house with any use of expensive technological equipements, only using the local materials, the nature, the environment and the human intelligence and experience to create a sustainable country community.

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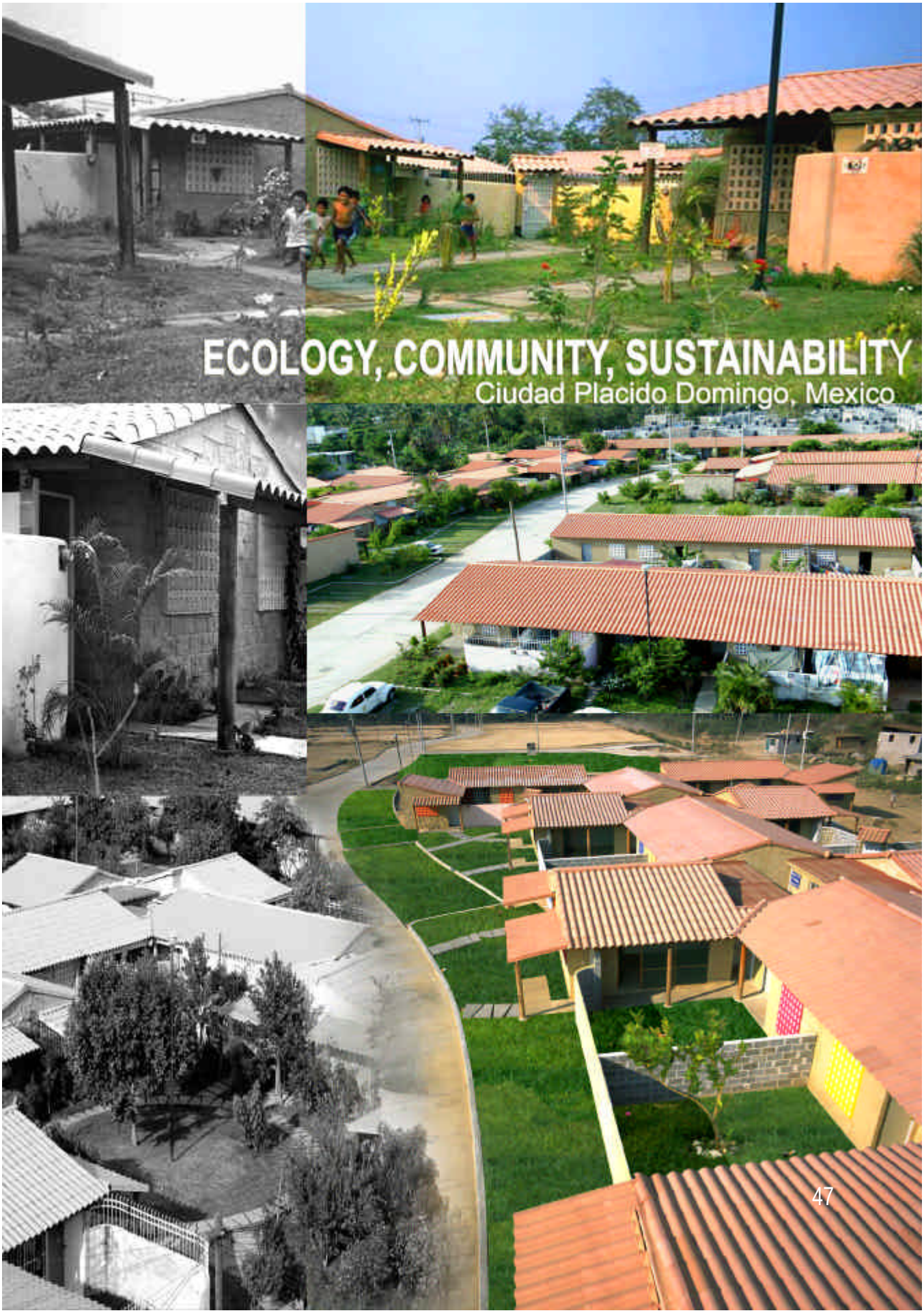
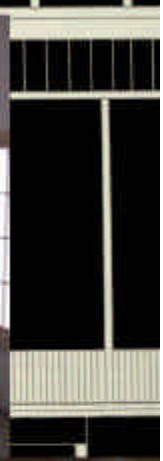

ECOLOGY, COMMUNITY, SUSTAINABILITY
Ciudad Placido Domingo, Mexico

Sustainable Education Centre

This is a Japanese style classroom for Japanese language lessons, built in an Australian Rudolf Steiner School. It is a combination of Japanese and Australian traditional techniques, materials and style. It represents the gift of education and the international relationship between Australia and Japan.



NADESHIKO

KYRA CLAIRE WOOD
MOUNT BARKER, AUSTRALIA. 2003

In December 2002 (just before my final year of a Design Studies degree at Adelaide University) I was offered the opportunity to design a traditional Japanese Style Building for the Mount Barker Waldorf School in South Australia. I used to attend the school and had taken lessons with the Japanese teacher, Midori, at the school. Toshiko, a Japanese Home Economics teacher from Nagoya, went to the Mount Barker Waldorf School to assist Midori for a term. She loved the school and its students, but was saddened by the lack of an allocated space for teaching Japanese. She offered to give Midori her "nest egg" in order to have a classroom built which would give students an impression of Japan, Japanese customs and provide them with a peaceful and fruitful learning atmosphere.

Despite the small budget, the spirit of generosity, which gave birth to the idea of Nadeshiko, has carried on throughout its design and construction, and has helped us to realise Toshiko's dream.

Midori wished for Nadeshiko to be built in a traditional Japanese style, however in the design and construction of this building many compromises had to be made due to climatic differences, budget restrictions, local regulations, social appropriateness and material availability. The combination of Japanese and Australian vernacular, make this building a very unique expression of sustainable design. The orientation of the building for passive solar heating and cooling purposes, it's relationship to the landscape and views to significant landmarks such as Mountains and trees were vital elements in its design. The use of local, low embodied energy materials and local labour was combined with the expertise of a traditional Japanese carpenter who volunteered to help design and construct specific Japanese details for the building such as shoji for the windows and doors.

The children from the school also participated in the building process and learned traditional Japanese indigo dyeing techniques for the classrooms cushions. Their participation inspired them to take interest in the building itself and now they care for it and maintain it as part of their Japanese lesson curriculum. The building is an opportunity for them to learn about the kind of respect, which is shown to the building and the landscape in traditional Japanese culture. The building itself is teaching the people who use it, at the same time that it provides a space for them to learn about Japanese language and culture. The building has a very small footprint on the landscape, but a very large impact on the culture of the school.

With a small budget, with lots of support from the local and international community and with environmentally sound design, this building is an extra small yet special example of sustainable design in Australia. Ultimately, the continuing relationship between Nadeshiko and the people who funded, designed, constructed and now use the space is the most unique and sustainable element of the entire project.

ECO-EFFICIENCY SYSTEM CENPES II

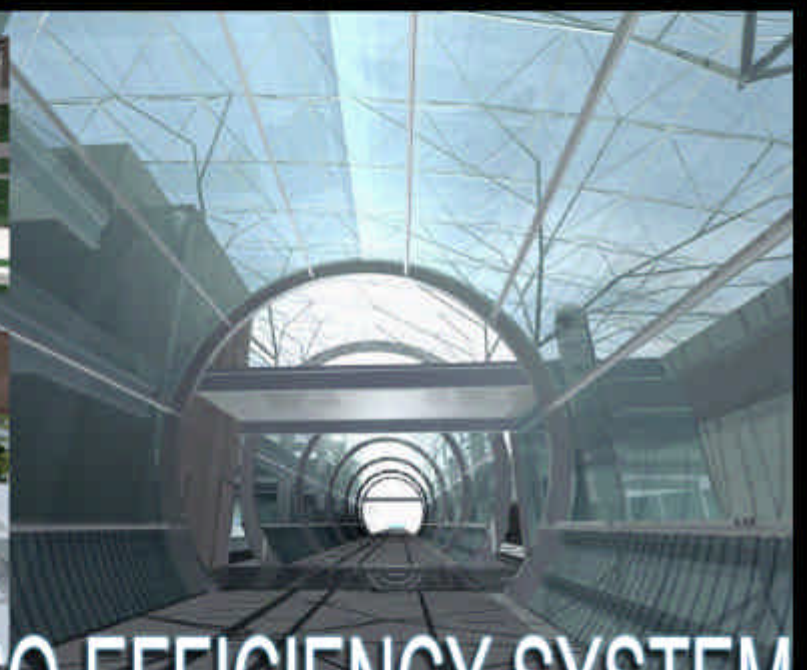
JOSE WAGNER GARCIA & SIEGBERT ZANETTINI
RIO DE JANEIRO, BRAZIL

Petrobras launched a national contest for the elaboration of the architectural project of its new Research Center to be built in Rio de Janeiro, Brazil.
This project was the winner for meeting the challenge of the eco-efficiency in the architecture, creating external and internal ambients that seek ambient comfort for the occupants, the operational energy efficiency of the buildings, the possibility of clean energy generation and the use of the landscape and natural elements, such as topography, climate, winds and vegetation in the composition of the spaces, added to the privileged view of Guanabara Bay.
Defined by a predominantly horizontal concept, the implantation proposes a fully constructed complex, the buildings, interspersed with open spaces, integrated by means of the great central covering, the covered and uncovered areas environmentally enriched by the landscape treatment and by the consequent formation of shaded spaces.
The adopted concept also reflects an "open construction" condition that understands the use of space relative to time in function of the evolution of future necessities, outlining solutions of great flexibility for enlargements and reforms, according to new uses.
The axis of the complex is defined by the central circulation that interconnects the orthogonal buildings, destined to be laboratories, as well as the supply axis ("pipe-rack").
The great shade covering of perforated metal plate mounted on a space-framed structure performs a lung function to enable the covered gardens to breath and preserve the transparency of the space, allowing natural illumination, maintaining the use of the ventilation.
The systems were all conceived for the best use and maximum prevention of aggression to the environment.
-Appropriate use of solar energy within cost / benefit parameters.
-Use of the rain and the recycling treatment of water.
-Use of seawater intended as an appropriate solution for cooling equipment, avoiding the use of treated or pre treated water with evaporation
The use of natural light is featured in the architectural proposal in two ways: filtering the direct light (the sun) by the coverings and vegetation and by the wide incorporation of diffuse light.
With respect to the interior of the buildings, the proposal of mediation of the climatic conditions is marked by two main objectives. Firstly, the maximum use of passive strategies for the acclimatization, in the periods of favorable external conditions. In the same way, during the occupational periods corresponding to the need of active acclimatization systems - air conditioning, the protection given to the buildings achieves the function of minimizing the consumption of energy.

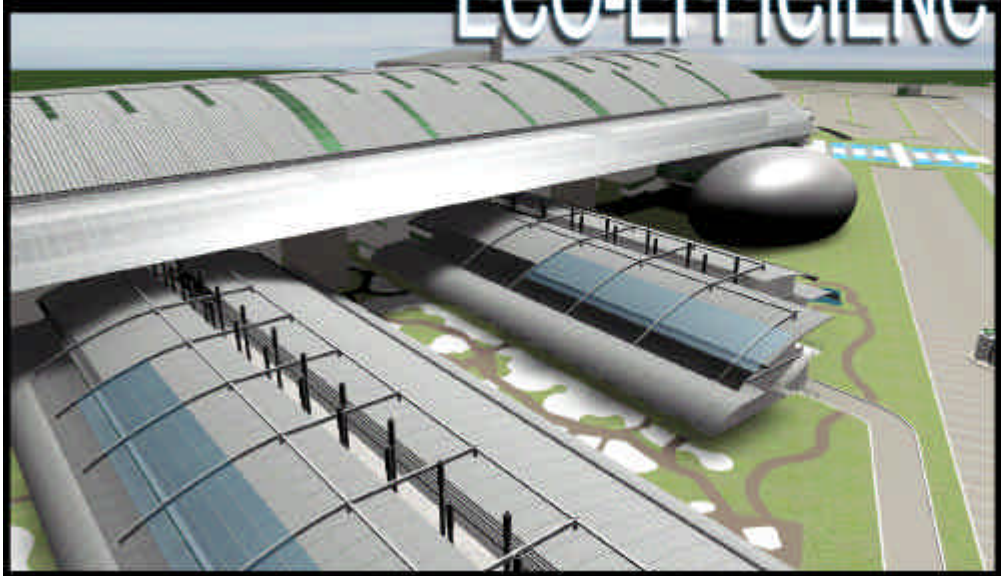
CENPES II - RIO DE JANEIRO
Text by: Fukunaga Sati & Gabriela W. Tagomori / University of Sao Paulo, Brasil
Computer images by: Aleksander Marcelo Braz, Fernando Casado & Jair Oliveira, Kenji Maquete

CENPES II

RIO DE JANEIRO, BRASIL



ECO-EFFICIENCY SYSTEM



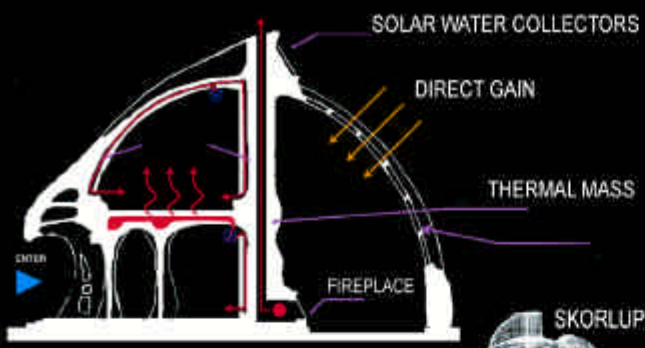
Principal eco-efficiency strategies for the implantation of the architecture for: shade, ventilation and natural light

DIPLOMA PROJECT

CENTER OF ECOLOGICAL TOURISM OF FAR EASTERN MARITIME PRESERVE

SECTION

NORTH FACADE



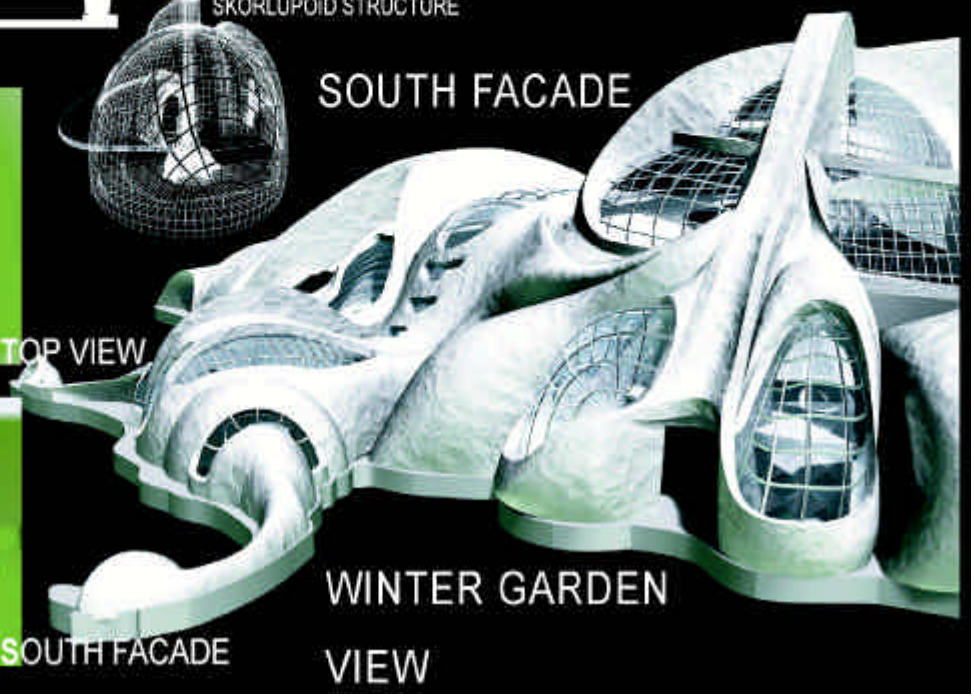
NORTH-SOUTH SECTION

SKORLUPOID STRUCTURE

SOUTH FACADE

TOP VIEW

SOUTH FACADE



WINTER GARDEN VIEW

CENTER OF ECOLOGICAL TOURISM

Julia V. Korkina
Far East State Technical University, Vladivostok, Russia

The caressing sun is warming the half-moon curved bay with white sand. Covering the northern skyline white rock supports tenderly leaning to it white creature which is looking as a dozen shining eyes after its young ones playing on the seashore.

This creature by joining in itself the expressive bionics of sea flora and fauna, creates the impression of some space comer which cannot be described by earth painter. It look likes the white sand. White rock and caressing bay surrounded by picturesque landscape has attracted some naive kind white space visitor. That is the concept of multipurpose, informative cognitive and amusing center of ecological tourism and rest.

This thought of the common idea which presents the creative work of the architect at the cross of the main point of nature (the constant) and the universal urbanization and modernization of mankind (the constantly changeable) runs through the whole diploma work.

The implant of an architectural object into the environment. It is instillation and the whole absorption. The adjustment of alien element into the alive - that is a new approach to the problem of XXI century. In order to decrease resonance between picturesque natural landscape and modern architecture, to unite in one artificial and natural, the object is fulfilled in style of architectural bionics, where natural forms and functional relations of vital organisms are used.

The implant is fully undependable in its power supply and is carried out of natural ecological materials with using new technological approaches to construction. The main building and tourists block passive solar heating system based on principles Direct and Indirect gain. Also ESTEC VR 12 CPC solar heating system applies for domestic hot water.

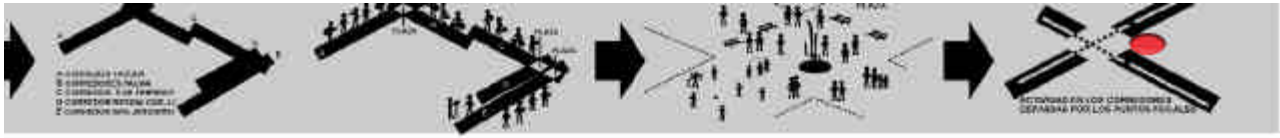
As the object is located on the territory of National Park and is near to the Far Eastern Maritime Preserve it is very actual for attraction of large tourist streams not only the inhabitants of Russia but also people from abroad to the beautiful Primorsky region. Also, the role of object as reserves buffer is obviously.

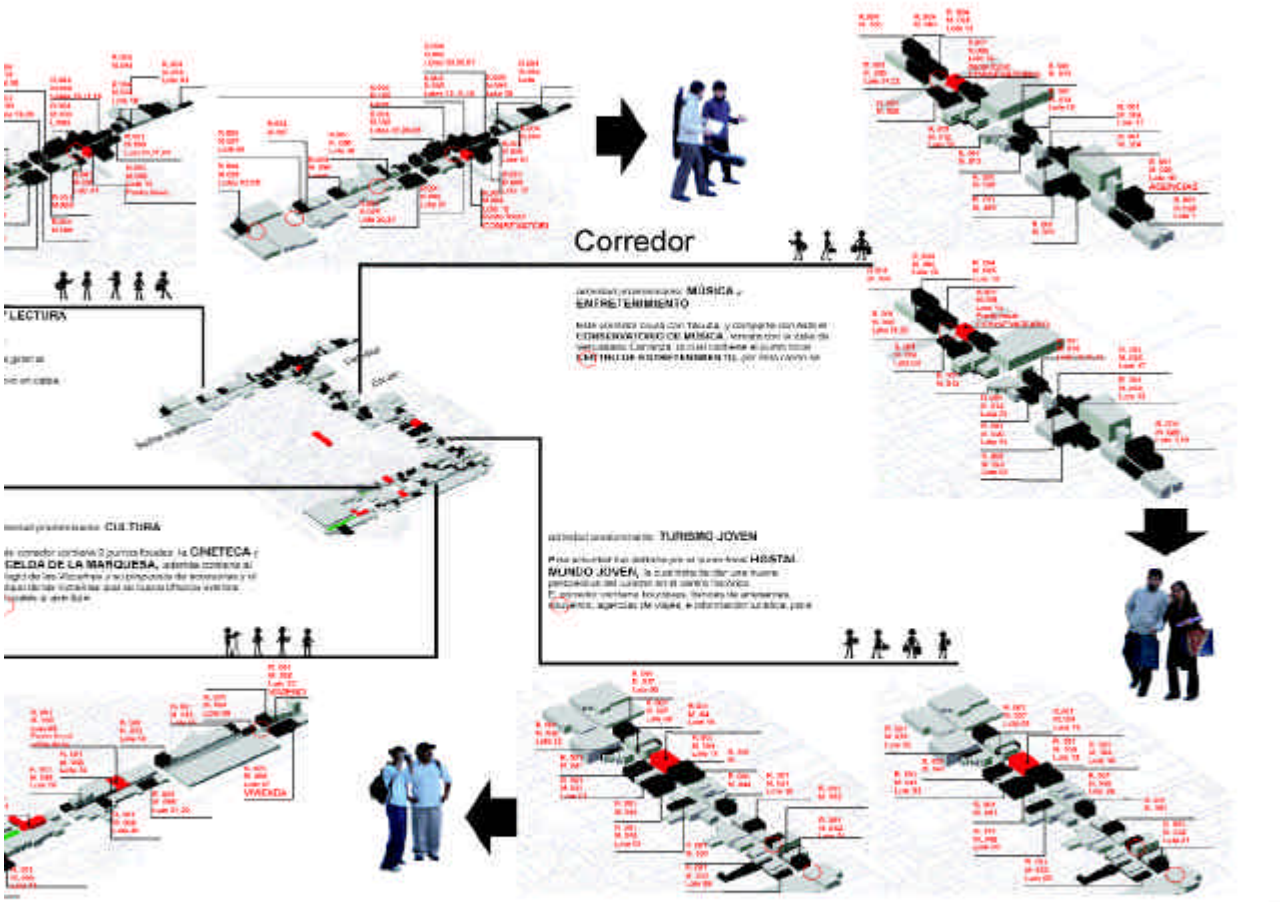
This mean that approaching the problem which appeared at the cross of two opposite directions - the alive nature and modern architecture - is probably the way out of an incorrect situation in which a human being and nature exist.

MEET D.F. (DOWNTOWN)

Merediz, Godoy, Rabel Rocha, Martinez Camarillo, Cano Velasco
The La Salle University, Mexico City, Mexico

The proposal is based on locating 5 strategically detonators points of a social-cultural interest that impels the inhabitants of Mexico City to live in the historical center. The location of these points arises from the definition of 8 sectors that work and rescue the system of districts of the historical center. These 8 sectors will have a defined economic activity that is caused by each one of the points detonators and interact the point as well detonator with the sector and each sector to each other.
Of this form we raised that the North area (Donceles (N), 16 of September (S), Central Axis (W), and Academy (E)), that presents/displays tourist activity mainly, supports to and one leans of the South area of study (16 of September (N), Izazaga (S), Central Axis (W), and 20 of November (E)).
Once defined sectors, it should be achieved the next objective, that is the implementation of pedestrian roads that allow the local vehicular transit, to be understood like a norm. It is proposed the increase of 44% of the roads of the perimeter of study of the center as pedestrian's. The joints of the pedestrian roads,the crossing, become relaxation spaces.
DETONATOR POINTS
The program of each point is defined by the estate in which it is going to be located and the existing context in its zone of influence, this way we will have to the southwest of the perimeter the remodelation of the Vizcainas Theater turning it into an alternative cinema, that can work like a theater of multiple uses, which is going to be supported with the activities that are developed by means of the use of the accessories of the School of the Vizcainas and the park.
The second detonator point located in the Cell of the Marquesa de Selva Nevada and the Claustro of the convent of Regina Coelli, it's considered like a culture house, where art factories exists, spaces to develop graduate of other institutions, galleries, restaurants, terrace-bar-lounge.
The third detonator point proposes the construction of an entertainment mini mall ocated on Venustiano Carranza, between Bolivar and Isabel la Catolica, where at the moment 2 parking lots exist, one as opposed to another one; starting off of which Venustiano Carranza will be a pedestrian road, the commercial center will lodge a commercial cinema, fast-food restaurants, bars (night life), casinos, boutiques, etc.. The project is like a building bridge connecting these two estates.
The fourth point located in the corner of Rep. Of Uruguay and 5 of February that is at the moment a left hotel will recover its original use, but as a hostel (Hostelling International) supported by commerce for young tourism throughout 5 of February that sets out like pedestrian road.
The fifth detonator point is generated from the crossing of Palma and Tacuba (relaxation place) where the old bookstores of Donceles are located and the tradition of the coffee in Mexico of 40• Ls is rescued, and it is proposed that this outdoors relaxation place supports the coffees and restaurants with cultural activities such as small scale concerts or exhibitions.
Name:Horacio Merediz, Omar Godoy Claudia Rabel Rocha, Jose Leopoldo Martinez Camarillo, Susana Cano Velasco
University: The La Salle University, Mexican School of Architecture and Design (EMAD), Mexico City
Subtitle: Proposal for the Regeneration of the Historical Center of Mexico City. 2004





ADOR

la cd. de México

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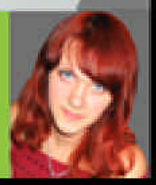
WARM ROOF DESIGNING

Korochkina, Kyalunziga, Kuznetsova, Nikitina Tatyana, Alekseenko, Tsitsarets
Far East State Technical University, Vladivostok, Russia

The “Warm Roof Designing & Construction of Penthouses with the Independent Heat Supply” is recognized, that one of perspective directions of reconstruction of building is the superstructure of mansard floors of existing buildings. Similar reconstruction is economic, as providing city an additional living and office space, does not require allotment of new sites under construction, engineering preparation of territory, lining of networks warmly and water supply, etc. The Superstructure of mansard floors can become even more effective in conditions of Vladivostok, by virtue of its original climatic conditions, unique for large cities of Russia. Differing enough in the severe winter, the city is literally filled with a solar heat. For a year in the south of Primary region 1681, 3 kw-h of solar radiation on square meter act, and its big part falls at the winter period.In long term introduction energy effective architecture of penthouses is capable to exclude completely additional loadings on city networks of a heat supply at condensation of fund of existing building. And in conditions of dense city building the roof of a building, as a rule being outside of a zone dark patch of the next houses, is perspective object of introduction of solar technologies. Using cities of technology already mastered by an architectural - building complex it is possible to solve the following problems: 1. To provide all-the-year-round independent hot water supply of built on penthouses on 80 %. (20 % electro heating under the night tariff in cloudy weathers). For hot water supply of family from 3-4 people it is necessary about 5 sq. meters of the roof occupied with collectors. Therefore pitches of the roof enough the big area at its orientation to the south can provide with hot water the year round not only new settlers, but also tenants of the top apartments. 2. To cover on 30 % (up to 50 %) requirements for heating penthouses, using the same solar collectors of a water heat supply located in a plane pitch of a roof. 3. Pawning in architecture of penthouses only a principle of direct solar heating of spaces through mansard windows and antiaircraft lanterns, in addition to provide from 30-50 % and more requirements for heat in the winter. The technology of direct solar heating is based on "hotbed" effect glass package with heat insulating a film. Saved up for a day a thermal file (a stone wall behind glass, a floor - ceramic granite on ferroconcrete plate - or a massive fireplace under an antiaircraft lantern) solar heat provides preservation of comfortable temperatures in a room at night. Efficiency of technology depends on the area, orientation and a corner of an inclination of apertures, a material and volume of a thermal file, planning decisions of a penthouse and heat insulation of a roofing pie. Practically this technology can be named technology of competent architectural designing. Basic elements of solar installations of a water heat supply - built in a plane of a roof the collectors providing warming up of the heat-carrier and a storage container of hot water. The "know-how", installation and operation of domestic installations are developed by Institute of Problems of Sea Technologies FEO the Russian Academy of Science since 1990.In the market of city since 2002 collectors of German firms ESTEC and SCHUCO - world leaders of solar technologies also are submitted. Ready system COMFORT on the basis of 6 flat collectors (a working surface about 9 esq.), Providing 80 % of expenses for hot water supply and up to 50 % of expenses for heating of family from 2-5 person, costs 9020 euros, more effective system on the basis of 5 vacuum collectors - 14000 euros.



KOROCHKINA IRINA

KYALUNZIGA ELENA

KUZNETSOVA MARINA

NIKITINA TATYANA

ALEKSEENKO ELENA

TSITSARETS ULIYA

Low store dwelling with passive solar heating
Four year student projects, 2005
Tutors: Ph.D. Pavel A. Kazantsev
Svetlana V. Artukhova
Vladimir E. Karpenko
ARCHITECTURAL INSTITUTE, Faculty of Design FESTU
690001 PUSHKIN Str. 10, Vladivostok, Russia

An attempt to create a building as a test model, which will demonstrate the conservation of Energy through Post Occupancy monitoring and further develop and perfect the system.
The design conveys a Dextrous interplay of natural elements with the builtform, which reduces energy demand at end-use.

ENERGY → CONSERVATION ← WATER

SUSTAINABILITY IN BUILDINGS

Prarthana M. Rao
School of Planning and Architecture, New Delhi, India

Bangalore, the IT hub of India, has Moderate Composite Climate. This project attempts at creating a built environment, which is totally a climate responsive structure. The building form, construction materials etc are all in response to the climatic conditions of Bangalore.

This project is designed to house an office with nearly 75 workstations and a small guesthouse attached to it. The site is a long and narrow strip of land located at Domlur, about 3km from Bangalore Airport with access roads on East and North. The huge open drain (9m wide) abutting the site from West dictates the design development as it is in the direction of wind.

DESIGN RESPONSE:A cavity wall using Caddapah stone(locally available material)facing the drain with no openings for air inlet prevents the entry of foul smell from the drain to the interiors of the building.

PASSIVE VENTILATION METHODS: The open nature of the built volume creates natural flow of air within the building. The inlet from the roof vents on the North being at a lower level, sucks in fresh cool air and the outlets towards the south roof expels the hot air. The cavity wall and the solar chimneys on the south enhance the natural ventilation of the building. The earth is raised towards the south (earth berm) to reduce the conduction of heat.

DAY LIGHTING DESIGN: By creating Atrium spaces with skylights the building gets ample amount of daylight resulting in minimal dependency on artificial lighting (compact fluorescent lamps CFLs) during daytime.

RENEWABLE ENERGY SYSTEMS: A 5-KW peak solar photo voltaic system, integrated with the roof skylight caters to the water heating requirements of kitchen and guest rooms as well as produces electricity to support the few CFLs installed.

RAIN WATER HARVESTING: The runoff water from the rooftops and the paved areas gets collected at various levels in small open tanks on the terraces and finally in an underground tank (sump tank) below the garden area in the front yard. This collected rainwater is used to water the plants on the rooftops as well as in the front yard.

ROOF GARDEN:The ground cover, which is disturbed due to building of this structure, is replaced on rooftop, in the form of terrace garden, giving insulation to the building & reducing solar radiation.

Thus the design addresses not only thermal comfort but also visual appeal and environmental issues. The five elements of nature, as described in Hindu mythology, have been well integrated in to the system of built form in this design.

AIR: Convection currents within the building through wind induced vents - use of Venturi effect

EARTH: Roof gardens and earth berms for insulation

SUN: Solar panels for water heating, electricity generation; creating stack effect through solar chimneys for effective ventilation.

SKY: Day lighting through skylights

WATER: Rainwater harvesting for water conservation; roof ponds and fountains for humidification.

Architects: Sanjay Mohe and V. Tushar, Bangalore, India, 1998

ECOLOGICAL SYSTEMS IN PAPER EGG

Kevin Yim, Alvaro Bonfiglio & Jin Taira
The University of Tokyo, Japan

In 2003 - 2004, we participated in an open international architectural competition for an Environmental Centre in Chicago, U.S. With the title "Paper Egg", we proposed to use paper as structural and cladding materials of an egg-shaped building. Our entity was selected as one of the five winners in 1st stage, but was not awarded as the winner due to the concern of constraints of budget and Chicago design guideline.

EGG AS HABITAT

Due to the needs of industrialization in Chicago, the original marshy landscape of the Calumet Park was slowly manipulated, and over the 20th-century, a new landscape was formed. Today, contamination from abandoned industrial sites, hazard waste dumps and landfills continue to threaten these natural areas. Aggressive non-native plants, such as the Purple Loosestrife, are disrupting the natural ecosystems that native animals depend upon. The perception of the Calumet Park is now one of a forgotten landscape.

Despite these changes, the land remains the home of a rare bird: the yellow-headed blackbird, although their population is declining dramatically.

The egg of the Yellow-headed Blackbird is employed as both a symbolic and generative force within the design. Ultimately the egg represents new life, bringing hope for the revitalization of the mistreated land.

Recycled paper has traditionally been considered as a physically weak and forgotten material, similar to how Calumet Park has been perceived as a wasteland. Through advanced technologies and ecosystem renewal, the "perceived weakness" of paper and the park becomes the strength of this project.

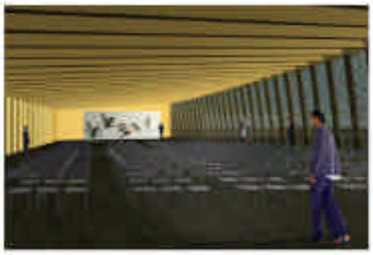
INNOVATIVE GREEN TECHNOLOGY - REUSED PAPER TECHNOLOGY

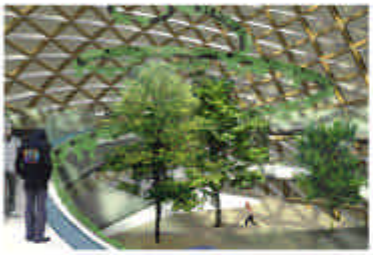
We propose to take advantage of the ecological value of reused paper: It is local, recyclable and inexpensive, and its production and treatment are not toxic. Advanced treatments also allows for a high fire resistance rating and structural stability.

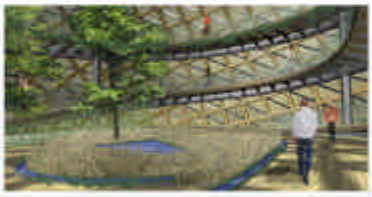
We have accumulated much expertise in the techniques of paper architecture, and would like to display the material qualities of paper tubing that have allowed us to design, detail and construct the Calumet Paper Egg.

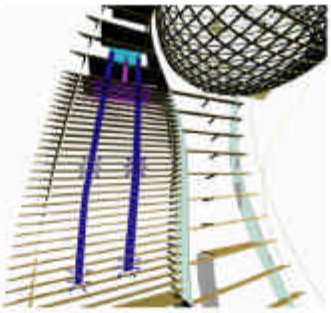
Natural evolution has given us the inherently strong shape of the egg, easily resisting the elements through its aerodynamic shape.

We have proposed the structure as a mesh-shell system. The mesh-shell system is comprised of paper tubular structural elements interlaced in a mesh and combined with steel rings to bind the structure together. The system is an independent shell structure that will support the outer skin, its own self-weight and additional structural live loads.

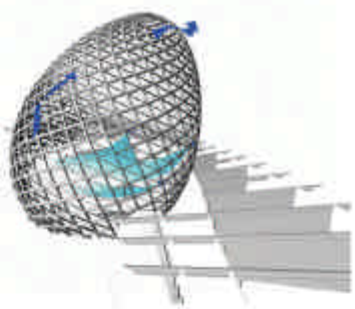




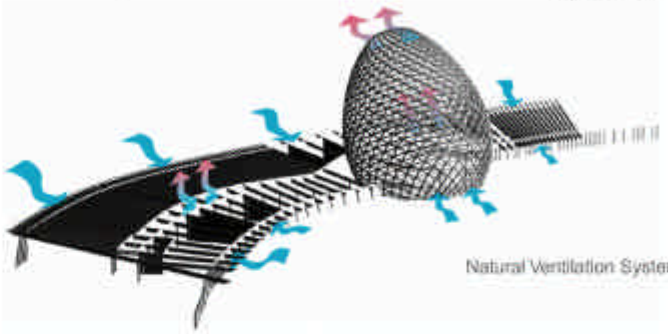




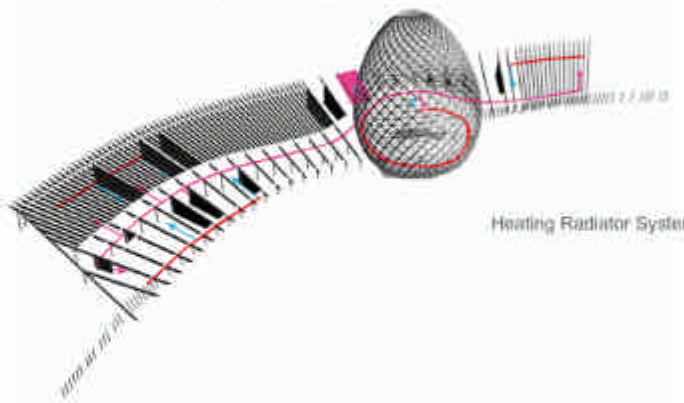
Auditorium AC System



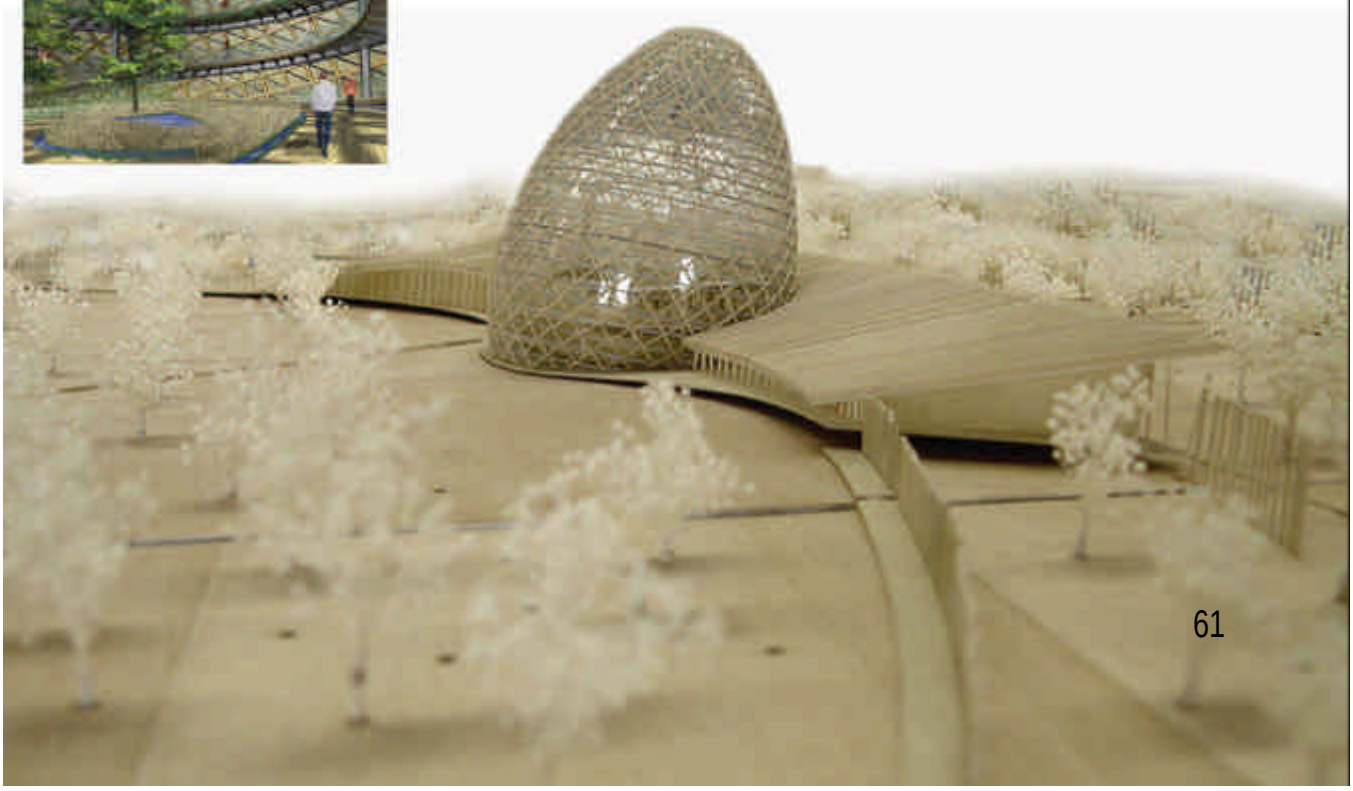
Fan Coil System



Natural Ventilation System



Heating Radiator System



BUILDING RENOVATION

Chang Kuei-Feng & Nien-Tsu Chen
National Cheng-Kung University, Tainan, R.O.C. Taiwan

Title of the project:
The Sustainable Approaches for the Building Renovation in the Subtropical Region

Description:
Taking some Practical Projects in Taiwan as the Demonstration on the Environment-sustainability and Occupant-healthy Benefits

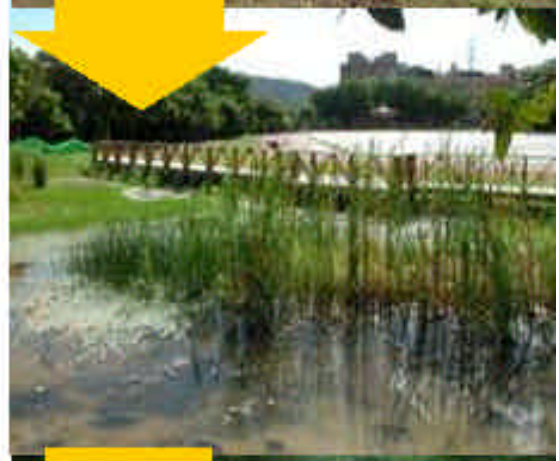
Abstract:
Sustainable Development is a worldwide trend that analyzed from the lately international conference. It is in search of a system that can provide comprehensive performance on the environment-oriented, energy-saving and occupant-healthy approaches.

Occupants in buildings which included the built-environment (illumination, acoustics, air quality, diet, thermal comfort, and social environment) reflect the situation which surrounds them by their physiological and mental sensations (sight, hearing, smell, taste, touch, and mentality).

Taiwan develops a system of sustainable healthy construction that can provide comprehensive performance assessments of buildings in the different environmental scales: global, regional, local, interior and individual.

This paper takes some practical projects as the demonstration to
illustrate the design and technology approaches, integrated environmental harmony and occupant-healthy, in the hot- wet tropical area.

Health, Energy, Ecology



The push-pull ventilation system was adopted for controlling the flow path, and a pressure difference sensor was installed in the room for deciding to push or pull. Moreover, the ultraviolet disinfect instruments were installed at the intakes of the air conditioner to decrease the concentration of microbes.

Blended into the surrounding nature, following the rock surface beneath, built of certified wood and interior materials, and powered by renewable energy Sånga Säby Course and Conference Mälarblick building defines sustainability for hotel facilities.

Green the Hotels

HOTEL'S GREEN INDUSTRY

Paulina Bohdanowicz
Royal Institute of Technology, Stockholm, Sweden

In the hotel industry the typically prevailing need for short-term economic profits makes it difficult to incorporate sustainability principles, which do bring profits but in a long-term. Sanga-Saby Kurs & Konferens centre, located on the island of Faringso in Lake Malaren in central Sweden, has a completely different approach. In the beginning of 1990s the decision was taken to make the environment the core of the business policy.

The basis of the environmental activity is the conscious objective of protecting the environment through the use of renewable resources within an eco-cycle that is sealed to the level possible, and the avoidance of environmentally destructive substances. The environmental policy and programme are based on the Natural Step concept.

One of the major objectives of the programme was to operate the facility using only renewable energy, and that was achieved in September 1996. Only green electricity is purchased, while the rock- and marine-based heat pump systems with propane as refrigerant ensure space conditioning for the facility. The entire facility can be provided with cooling from Lake Malaren during the warm summer months, and during the winter time rapeseed methyl ester oil is used for additional heating. Water for the pool and sauna is heated by means of heat pumps and solar panels.

The cold-rooms and refrigerators in the kitchen also utilise lake water as a cooling medium. Even the vehicle fleet and all gardening equipment operate on bio-fuels, apart from lawnmowers of which one is electric, one solar powered and the third - grass powered. Furthermore, a number of energy efficiency and saving solutions are in place.

The facility is equipped with its own water purification and sewage treatment plants as it relies on the water from Lake Malaren for its needs. Own sparkling water is produced on the premises to reduce the unnecessary transport. Waste is sorted to over 20 fractions and own compost plant has been created. The quantity of chemicals used in the facility has been significantly reduced and all products are eco-certified. All the raw materials, construction materials and consumer products are carefully selected and preferably eco-labelled, in order to offer the best service and achieve optimum environmental adaptation.

The holistic environmental approach is especially visible in the new addition to the complex - the 16-room Malarblick building. It was constructed in a way to blend in with the surrounding nature, rock blasting was minimised and no trees were cut during the construction. The building is made of certified wood and equipped with eco-labelled interior materials and furniture. It uses rock heat pumps with floor heating for space conditioning and solar panels for hot water production.

In general, all operations are designed to lead to continual improvement and to create the basis for preventive environmental programmes. This approach has lead to increased occupancy and higher profits.

The annual turnover was tripled in the last decade and the profits are at the level of 10-12%. This example clearly shows that environmental management does make a good business sense even in a highly competitive hotel market.

SUSTAINABILITY IN THE HOTEL INDUSTRY

Paulina Bohdanowicz
Royal Institute of Technology, Stockholm, Sweden

The World Tourism Organisation (WTO) describes tourism as one of the most important economic, social, cultural and political phenomena of the 20th century, while hotel buildings are outstanding landmarks at many destinations. The tourism industry has a dual relationship with the environment but has for many years claimed to be a "smokeless industry". In fact, accommodation facilities interact with their environments during every stage of their life cycle, often negatively. Resorts are frequently developed in pristine and fragile ecosystems with little or no consideration for the local natural or cultural environment. Many of the services offered by these establishments require the consumption of substantial quantities of energy, water and non-durable products. The resource-use efficiency of the many end-users in such facilities is frequently low, and the resulting environmental impacts are of significant magnitude.

The international awareness of the trade's substantial negative impacts on the environment has been increasing in recent years. While the average visitor may not yet be vocalizing clear-cut requirements for more sustainable practices in the tourism sector, the increasing environmental awareness among travellers is gradually translating into a growing environmental demand. In response, hotel companies begin to consider environmental issues in their business practices.

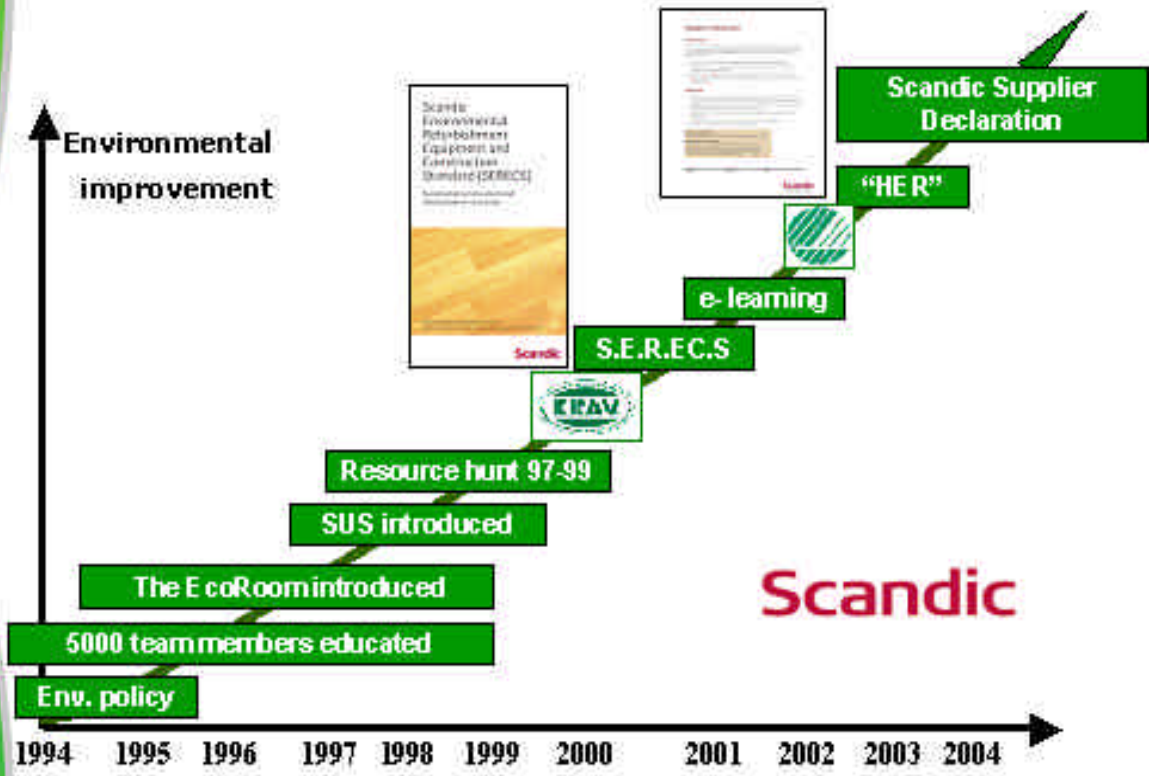
Hilton International is an example of a worldwide known company that has put Corporate Social Responsibility (CSR) and environmental sustainability high on their priority list. A comprehensive environmental programme has been developed and implemented chain-wide. It is based on five corner stones: Environmental Policy, environmental education (ecolearning), environmental reporting (Hilton Environmental Reporting), a creation of sustainable facilities (Sustainable Hotel Siting, Design and Construction Guidelines), and internal communication (Hiway).

Most of these initiatives are based on a 10-year experience of environmental work at Scandic (Scandinavian based hotel brand, and a part of Hilton since 2001). Scandic has introduced the concept of a 97% recyclable hotel room (eco-room), and developed its own Environmental Construction Standard (SERECS), listing materials that may not be used in their facilities, and specifying acceptable alternatives. Currently more than 10,000 rooms in the Scandic stock are 97% recyclable, while a number of hotels have been built or refurbished according to the eco-hotel standard. Between 1996 and 2003, energy consumption in the Swedish Scandic branch was reduced by approximately 19% on a kWh/m2 basis and 15% on a kWh/guestnight basis (with 1996 as a reference year). In the same period, water consumption was reduced by approximately 6% on a liter/guest-night basis, and the amount of unsorted waste decreased by approximately 48% on a kg/guest-night basis (NB: only properly reporting hotels are included in the analysis). Furthermore, 77 out of 123 eligible hotels (62.6%) have been eco-labelled with the Nordic Swan Eco-label, the most demanding ISO Type I label for the tourism accommodation. The results of the environmental program at the Hilton level will be more clearly visible in a couple of years, but the right direction has already been established.

This experience shows that the hotel industry can be an important partner in introducing sustainability into the built environment, and that responsible practice makes a good business sense.

Hotels, Corporations, Sustainability

Hilton International and Scandic is an example of a worldwide-known company that has put Corporate Social Responsibility (CSR) and environmental sustainability high on their priority list.
It has lead to significantly decreased environmental impacts, excellent economic performance, and a considerably upgraded environmental image.



97% recyclable room at Scandic

Eco-room at Scandic

Eco-hotel

Refillable soap and shampoo dispensers

Material efficiency

Waste sorting

PAVILLION VK40

BH/ Broissin y Hernandez de la Garza
The La Salle University, Mexico City, Mexico

Sustainability Concepts

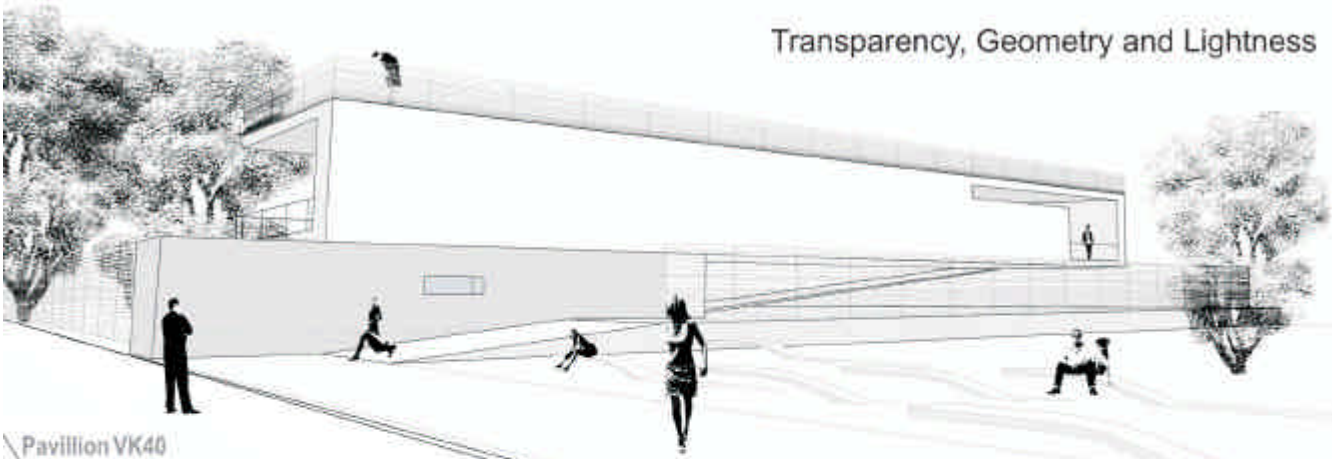
The essence of a pavilion in which the constructive form gives a sense of scale and precise space of timeless light and shadows, poses in the tranquility and simplicity derived by the destined use of the edifying materials, in which structural steel greater accomplishment of industrial revolution-, rein - forced concrete stone of the XXth century- the glass sand of perennial beauty that reconciles matter and spirit-, emphasizes the exterior aspects of an enveloped plain geometry and conformed by various levels, like a pedestal, body and culmination.

These are assembled by various punctual elements constituted by the evoked materials: a stony solid anchor to the ground the work of art that erects above it; the visible structure that gives the reason to be-, materializes itself in columns that for reasons of equilibrium and function express the strength of the edified object posing on the land.

Finally, the lightness and transparency of the wrap emphasizes the swelled crystal plane that marks pavilion main entrance and limits from the immediate environment. An exterior ramp which ascending sense avoids the eternal human wish to unravel the immemorial knowledge of life-, concludes in the last level where a delicate box of glass shelter the richness of the donated heritage by Vladimir Kaspe.

Architects
Gerardo Broissin Covarrubias
Gabriel Covarrubias Gonzalez
Jorge Hernandez de la Garza

Design team
Maria Teresa de la Torre Gorraez
Aaron Hevia
Jose Luis Gutierrez
Susana Cano

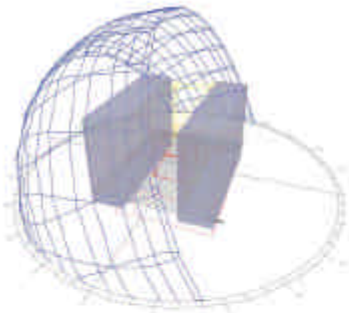


Pavillion VK40

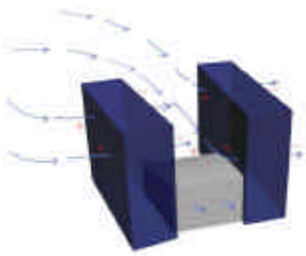
The essence of a pavilion in which the constructive form gives a sense of scale and precise space of timeless light and shadows, poses in the tranquility and simplicity derived by the destined use of the edifying materials, in which structural steel greater accomplishment of industrial revolution-, reinforced concrete stone of the XXth century- the glass sand of perennial beauty that reconciles matter and spirit. The lightness and transparency of the wrap emphasizes the swelled crystal plane that marks pavilion main entrance and limits from the immediate environment. An exterior ramp which ascending sense avoids the eternal human wish to unravel the immemorial knowledge of life-, concludes in the last level where a delicate box of glass shelter the richness of the donated heritage by Vladimir Kaspé.

Innovation, Efficiency, Ecology

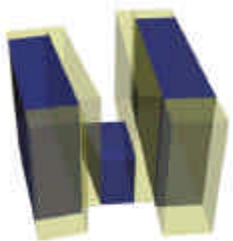
A strategy developed for sustainable design in a hot dry climate based on a three-tier approach of passive, mixed and active energy systems integrated into the design of the hotel. Innovative shading and natural ventilation systems have been used and optimised through scientific techniques and thermodynamic computer simulations. The goal is to reduce consumption of non-renewable resources in terms of material use and energy usage.



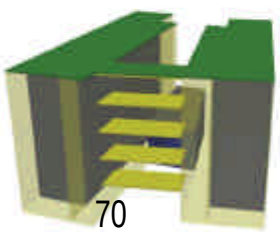
Form and orientation with respect to sun



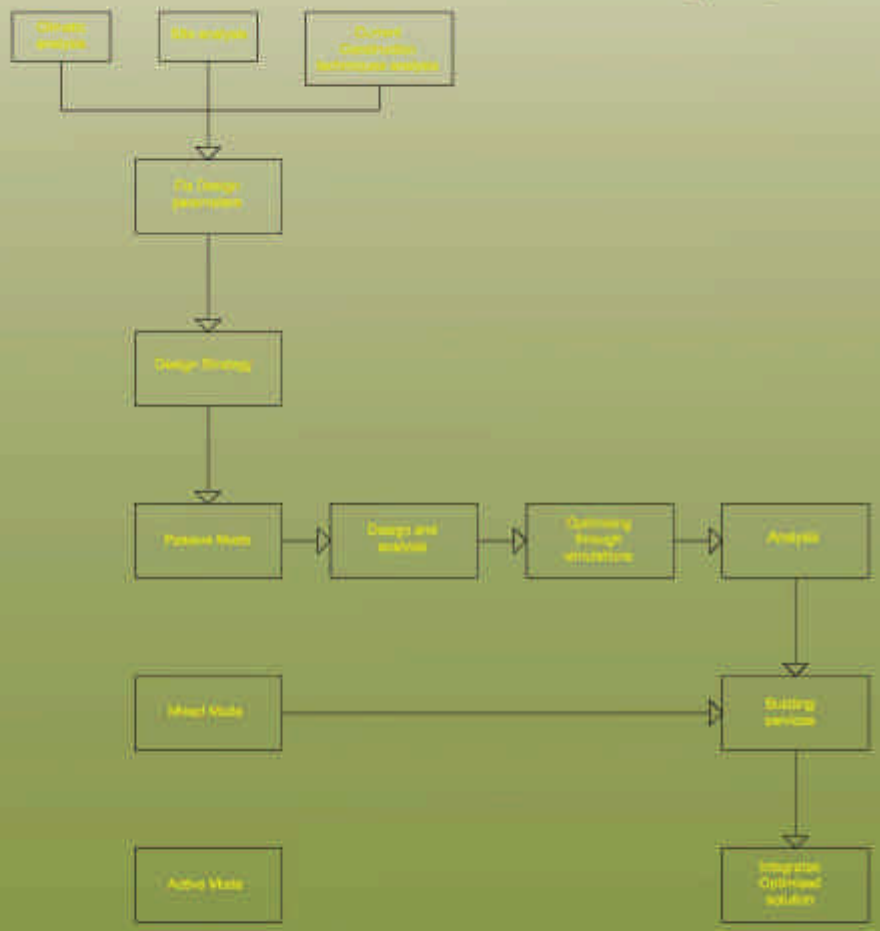
Form and orientation with respect to wind



Solar shading devices: Staircases and terraces on east and west



Green roofs as insulation from horizontal solar radiation



INNOVATION, EFFICIENCY, ECOLOGY

Ajay Harkishan Shah
The Swiss Federal Institute of Technology (ETH), Zurich, Switzerland

Description: Strategy for sustainable design in hot-dry climate
Sustainability concept: A design strategy and techniques
The collective wisdom of over 4500 years of civilisation in India, based on the basic concept of living in harmony with nature, coupled with common sense, has developed into a vernacular language of architecture responsive to the climate. Here, the recognition of the five natural elements, viz., sun, water, air, fire and earth, as the chief sources of energy and peaceful coexistence with them has always been the basis of life. An exhaustive research has been carried out to understand the traditional architecture in Ahmedabad.
Urban density, orientation and height of buildings, traditional forms and structures were studied in-depth. Through various adaptive measures like thick brick walls and courtyards in the hot-dry climate of Ahmedabad, inhabitants have managed to develop a distinctive architectural typology suited to its climate.
These adaptive measures have not just been restricted to individual houses but are also integrated in the urban planning of towns. The narrow streets of Ahmedabad is one such example that takes into account the harsh climate and passively responds to it, to create a close-knit urban fabric. It is this attitude of yesteryears that needs to be reinterpreted in today's energy-deficient countries like India to give the inhabitants, a living and working environment integrated with nature, to lead a more complete and stress free life.
Adapting traditional wisdom to create sustainable architecture solutions in present-day circumstances
A strategy has been evolved for sustainable construction in a hot dry climate based on traditional knowledge and has resulted in reduced consumption of non-renewable resources in terms of material use and energy usage. In the process user comfort is increase and not compromised. This attempt has been made through the design of a hotel in the city of Ahmedabad, India.
The design strategy is based on a three-tier strategy of passive mode, mixed mode and active mode systems to provide thermal, visual, hygienic and acoustic comfort. A careful daily and annual analysis of various climatic parameters has been undertaken. Design features such as form, orientation, shading devices in the building envelope have been applied. The building envelope is optimised with computer simulations to select appropriate building materials for walls and roofs. Glazing sizes has been studied and selected based on its thermal properties. These optimised building materials have been reintegrated into the simulation model and indoor conditions based on comfort and discomfort levels have been analysed. In spite of all the passive design features, it was noticed that more than 80% of the period in the summer months of April, May and June had high thermal stress.
An appropriate mixed mode system (Evaporative cooling system) was selected and implemented for the period. This installation was able to reduce the cooling load to as low as 21 KWh/m2.
A cost analysis showing the different advantages of the passive/mixed mode system against a full mode system has been analysed and concluded. 70% reduction in installation and running costs has been made possible by using the suggested system.

THE WIND HOUSE

Jin Taira
The University of Tokyo, Japan

Lanzarote's grape yards have develop a unique method. Farmers have dig thousands of holes of small hollows into the 11/2 metre thick layer of 'picon' (porous volcanic granules that trap moisture) and planted vines in the volcanic ash that lies beneath. In order to protect the Vines from the Trade Winds, they have then built small semi-circular walls around each of these hollows.

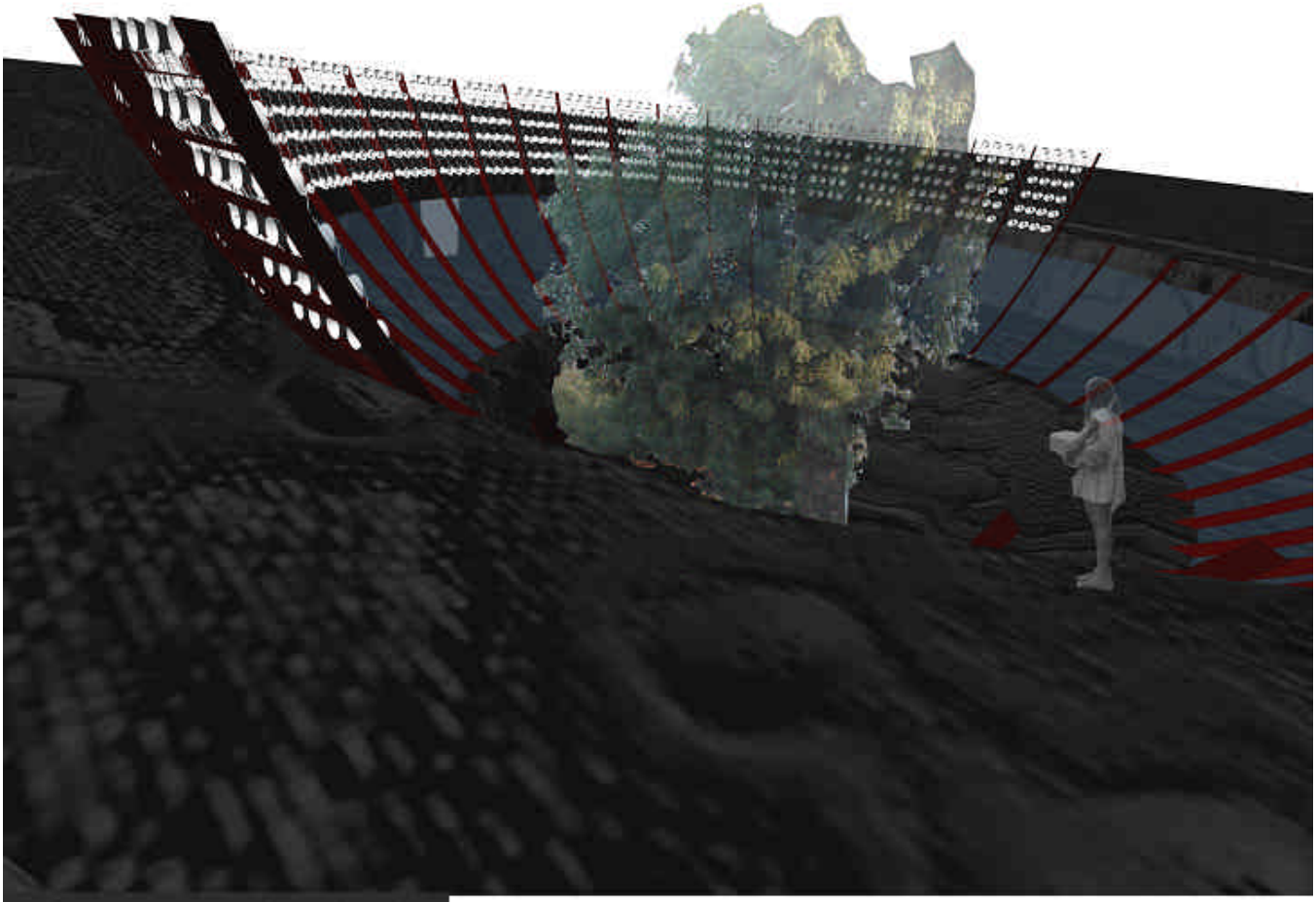
The house is located in a mild slope of a Vineyard. This house takes advantage of the sun and winds orientations providing a weekend shelter and a energy supply system for the house and the Vineyard requirements provided by a micro-wind turbines wall. The house is buried in the soil and has a dough-nut plan surrounding a interior garden. The two entrances are provided by two ramps. The floor follows the site inclination, creating a continuous dynamic space interrupted by the horizontality of normal usage. Kitchen-Dinning- Living areas have open views towards the landscape. Slope down, the house gain in intimacy for the rooms and wet-areas.

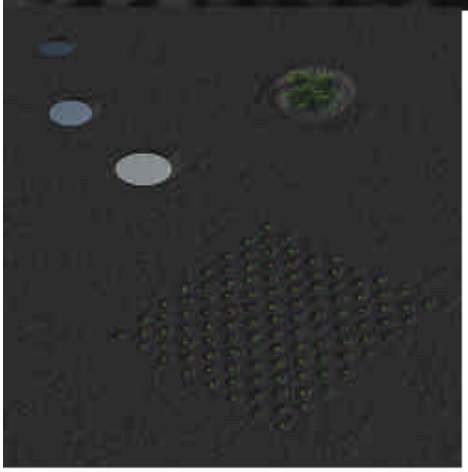
SUSTAINABLE FEATURES:

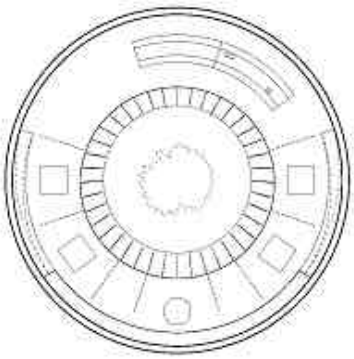
A- ENVIRONMENT ADAPTATION STRATEGY
The house is buried in a mild slope. Protected from the strong winds, as the grape yards of Lanzarote.
B- PASIVE THERMAL CONDITIONING
The buried house in a dry environment, is cool in summer and warm in winter. Lanzarote's temperature average is 20C.
C- ENVIRONMENTAL DESIGN
The house is built using lava stone, a common material in the volcanic island of Lanzarote.
D- REUSE WATER SYSTEM: AEROBIC LAGOONS
Three lagoons recycle the black and grey water for reuse in the grape yard, toilets and the house garden.
E- ENERGY SAFE: EOLIC TURBINES WALL
A wall of micro- wind turbines, provides the energy supply and reduce the visual impact of big propellers.
F- COMPOST GARDEN

LOCATION:	GRAPE YARD IN LANZAROTE/ CANARY ISLANDS/ SPAIN
CLIENT:	MR. CARLOS
PROGRAM:	WEEKEND HOUSE
DESIGN:	JIN TAIRA

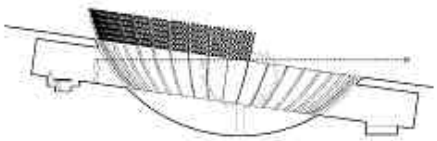
WIND EARTH FIRE







PLAN



SECTION

The **Wind House** stands **buried** in the of the volcanic soil of **Lanzarote Island**, (Spain), in order to protect itself from the sun and wind extreme conditions.
A **semicircle micro- turbine wall** is the only sign of the house, providing the necessary energy supply.The house has a **doughnut plan** surrounding a private garden.

THE ICEHOUSES OF IRAN

Mohammad Afshar & Mohammad Safari
Qazvin Azad University, Iran

Of course ,everyone knows that I have a certain weak point for Iranian architecture and have a lot of respect and bow down to any architect who shows the slightest sign of this style in his work.

My great friend ,Mr Mirmiran, is one of these architects for whom I have a lot of respect as an architect and a person.

I was very happy when it was decided that I should photograph his building in Rafsanjan City.
I had seen it before its completion and admired it very much.

It is known that he has taken the basic idea form the structure of natural fridges in Iran and it was evident that I should photograph some of these for the Main Jury of the Aga Khan award for their information.

For those who are not familiar with the function of these fridges (rightfully so ,as they think that today's fridges ,like hot water and fried eggs, were made by JAMSHD SHAH who discovered fire. So, why do these all have foreign names? Probably because we Iranians like foreign names so much so that we call our sons : Gengiz, Timour ,and Alexander).

I must point out that: up until a few years ago, our fathers used to build a tall wall (as is shown in the photograph) next to which ,or in front of it, a building resembling a sugar cone was constructed. Pit swere dug at the foot of these walls , creating pools of water.

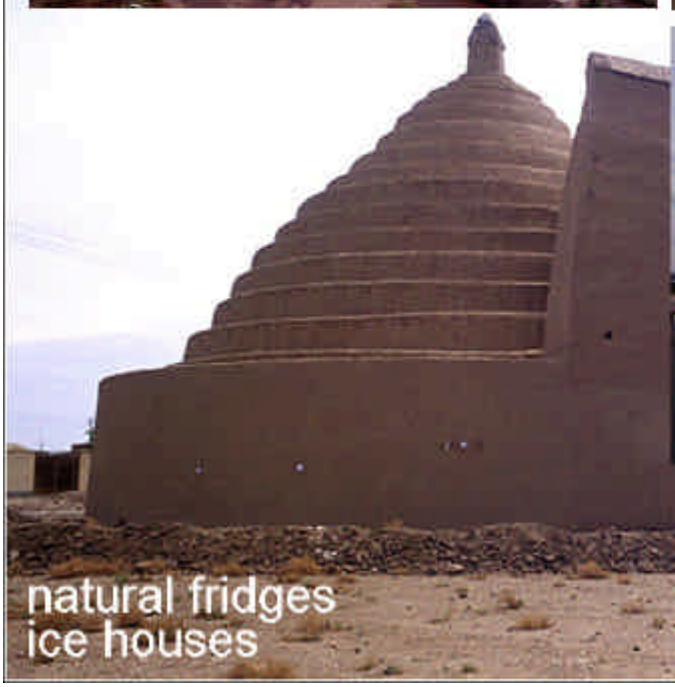
As our country has a continental climate ,with large temperature fluctuations - even in the sun and shade-with very cold winters (except for the last few years), the waters on the shady side of the wall froze quickly.

Labourers collected the ice and stored it in the building.
From the end of spring till the beginning of summer ,when the heat began to rise uncomfortably,the ice was taken out of storage and sold .this continued until recently ,in 1333 AH (1954 AD),when the first fridgidaire was brought to Iran .

And until then ,I too used this same sand covered ice and was very healthy too .Those were the days.

(photo by Kamran Adl)

From the end of spring till the beginning of summer ,when the heat began to rise uncomfortably,the ice was taken out of storage and sold .this continued until recently ,in 1333 AH (1954 AD),when the first fridgidaire was brought to Iran .
And until then ,I too used this same sand covered ice and was very healthy too .
Those were the days.



natural fridges
ice houses

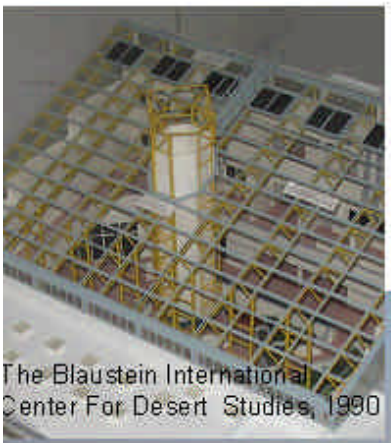
Ancient City Ovdat (beginning of 300 BCE)

LIVING IN THE DESERT

Nabateans who settled in Ovdat (300 BCE) used to live with limited resources that desert offered. Run off water used to be harvested for agriculture at that time.

LIMITED RESOURCES

Today in desert new housings are designed according to climatically responsive principals.
Houses incorporate passive design elements and require no additional heating and cooling.


The Blaustein International Center For Desert Studies, 1990

Adobe House, 1980

EXTREME CLIMATIC CONDITIONS

Neve Zin Residental Neighborhood, 1989

ARCHITECTURE IN THE NEGEV DESERT

Lusi Morhayim
Ben-Gurion University Negev, Israel

Despite the limited resources the desert can offer, Nabateans used to settle on the spices trade routes. One of the examples of such ancient settlements is Ovdat in the Negev, Israel, surrounded by ancient cisterns and wells as well as an agricultural land that was irrigated by run-off water collected from the surrounding hills after the limited number of floods. During the Roman and Byzantine eras Ovdat continued to flourish until the Arabs conquered the city.
(http://www.boker.org.il/english/ovdatcity.htm).
Today, Desert Architecture and Urban Planning Unit, Department of Men in the Desert, J. Blaustein Institutes for Desert Research, Ben-Gurion University Negev, Israel continues experimental research on sustainable architecture in hot and dry climate. The Adobe house is the first pilot project of the Desert Architecture and Urban Planning Unit and constructed entirely with mud bricks that were produced on site from local soil. Summer night ventilation is provided via a cooling tower with a wind catcher oriented towards the prevailing wind. The living area is heated passively by direct solar gain in winter, and shaded by deciduous vines in summer. "Of particular interest is a rotating prism wall, installed in the south facade of the house's bedroom. During winter, the prism's dark face captures solar energy during the daytime, and at night it is rotated inwards, releasing stored energy to the building interior. In the summer, the prisms' light-colored, insulated faces are directed outward to avoid overheating". (http://www.bgu.ac.il/CDAUP/adobe.html)
The central courtyard of the Blaustein International Center for Desert Studies incorporates an evaporative cooling tower utilizing high air temperatures and low relative humidity to create a mild indoor environment. Water sprayers and a downward blowing fan placed at top of the tower helps to achieve fast and intensive evaporation and lower the air temperature. On a typical summer day the cooling potential of the tower is approximately 950kWh/day. "The courtyard is covered by a prismatic glazing material, which acts as a seasonally-selective solar interface. In summer, when incident rays are normal to the surface, most radiation is reflected - creating a broad shading canopy. In winter, low-angle sun is mostly transmitted - turning the courtyard into a solar greenhouse".
(http://www.bgu.ac.il/CDAUP/updates2001/bic1_files/frame.htm)
The Neve Zin Residential neighborhood was designed according the guidelines that were prepared by the Desert Architecture and Urban Planning Unit. Building solar rights were ensured, meaning lots are designed so that each house will benefit from direct solar gain during winter. North-south orientated and 2.5 meters wide pedestrian walkways are shaded by adjacent building mass during morning and afternoon hours on a summer day. A common design language identifies morphological characteristics such as: geometry of the openings, thermal properties of the buildings and finishing materials (http://www.bgu.ac.il/CDAUP/).

Location: Ovdat City, Negev (beginning of 300 BCE)
Adobe house (1980), Sede Boqer campus, Negev (1990)
Neve Zin Housing (1990)

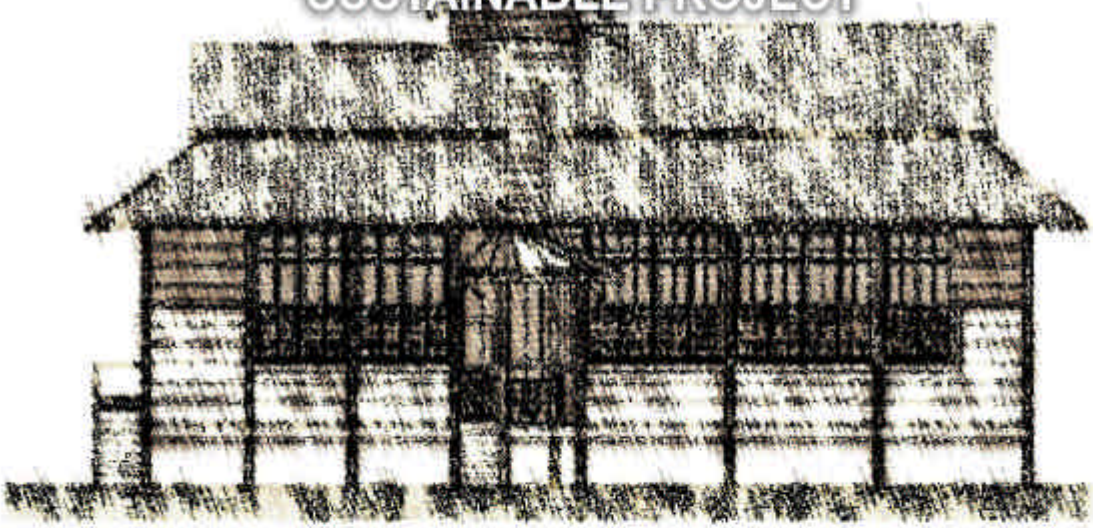
Sustainability Concepts:Passive solar heating and cooling in hot and dry climate

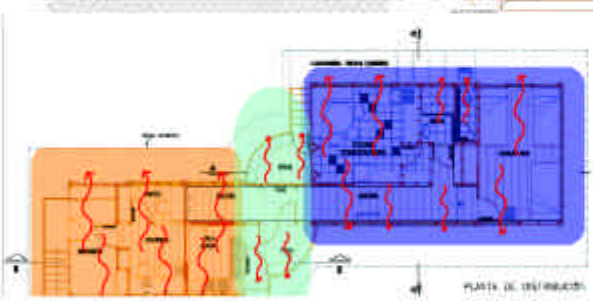
RANGER'S FACILITIES IN CUZCO

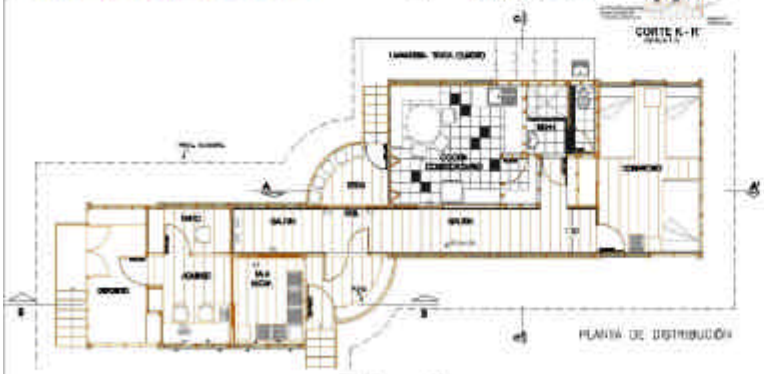
Angelica Maeireizo Tokeshi
Waseda University, Japan

Title of the project: Sustainable Control and Lookout Post for The Natural Reserve Areas of the Camisea Gas Project in Cusco
Location: La Convencion, Echarate, Cuzco, Peru. 2005.
THE PROJECT-This project was on designing for the Peru's Ministry of Energy and Mines and the Inter American Development Bank Program. Each one of them is a strategically localized ranger facility that contemplates typological, constructive system, natural climates, and community managing-involving criteria.
TYPOLOGY-This architectural object was conceptualized as a "place" of control-management and shelter; seemingly opposing actions (quiet vs. constant rouse). A landmark firmly incorporated with its surroundings, a warm inner space, as well as an authority nerve center. That is why there are two volumes, the administrative area is the "face" and the private area go off outsider's looks. Both related by a common entrance hall area as an inner pivot which looks as a control tower and characterizes the Ranger's Facilities.
CLIMATE CONFORT
-Ventilation: Under hot/humid weather conditions, ventilation is the main factor on which comfort sensation depends. Wood made lengthy volumes and the Stack Effect (affected by atmospheric conditions such as temperature and wind) were considered for the design.
-Sun lighting: North-south oriented, the absorbing and transmitting heat surfaces are reduced. Windows will act as sun blocks/ parasol especially on summer time, when eaves are not enough. On the other hand, large windows surfaces reduce the energetic lighting consume.
-Air quality and smell comfort: Cesspit is sealed and located considering wind direction and other measures (human activities are considered the main source of air contamination).
CONSTRUCTIVE SYSTEM-Sustainable concept&modulated structure design had been considered.
-Wood as shihuahuaco, quinina and capirona, abundant in the surroundings and its commercialization have been already regulated.
-Fiber-cement, because of its inflammable - no humidity properties;
-Polypropylene because of its insulating properties and the fact that the palm eaves are scare in the area nowadays.
SANITARY FACILITIES-Alternative rain water harvest time is really short (half a year), so the water is directly taken from the river. The cesspit and the water treatment tank could last up to 15 years minimum.
ELECTRICAL FACILITIES-The administrative office should decide the equipment according to their necessities. Solar panels were suggested.
COMMUNITY MANAGING-INVOLVING CRITERIA
The communities must have been involved in the whole process as a way to compensate their territory and way of life abrupt invasion. Therefore, the training period and their carpentry skills improvement will lead them to apply this knowledge for better life expectations.

RANGER'S LANDMARK, NATURAL RESERVE, SUSTAINABLE PROJECT







Sustainable Control and Lookout Post for The Natural Reserve Areas of the Camisea Gas Project in Cusco, for the Peru's Ministry of Energy and Mines and the Inter American Development Bank Program. Each one of them is a strategically localized ranger facility that contemplates typological, constructive system, natural climates, and community managing-involving criteria.

LOCAL COMMUNITY GENES

Angelica Maeireizo Tokeshi
Waseda University, Japan

The fact that Camisea was designed with a specific focus on protecting the area's unique biodiversity and ensuring respect for the indigenous communities living in the Camisea surrounding areas is not precisely accurate. Reading Patricia B. Caffrey's 2002 independent report, one will notice that the Camisea Project will have negative irreversible impacts on the biodiversity of this area and on indigenous groups living in isolation, regardless of the implementation of the strictest mitigation measures. In the midst of these views, there was this opportunity for doing something to diminish the program execution's failures.

As there are no settled populations inside the Machiguenga Communal Reserve and the rangers facilities must be located by the river, I was about to meet the cultural space occupied by the ethnolinguistic communities (organized in mostly in Machiguenga's native communities: Timpia, Kirigueti, Mishaua, and then it was Miaria, a different native community called Yine).

3. Adapting Professor Goto's "Tetra-Model"

Although by the time I was being introduced to the Machiguenga's and Yine's communities I had already heard about Professor Goto's work. Thus, this is why I will try to adapt his model to this case study, for the reason that my presence there was to gather information concerning only to the feasibility of the rangers' facilities location and construction.

GENES

NATURAL: Located in the Vilcabamba Range the Machiguenga Communal Reserve presents sui genesis characteristics: various ecosystems and biological diversity.

Considered one of the 25 hot spots for the natural conservation areas on the world. TRADITIONAL: Inhabited the area for over 5,000 years, in a matrilocal pattern of residence.

Use the forest products within a mystic value and practice swidden agriculture.

The Master Plan contemplates the conservation of the natural resources of the location.

COMMUNITY: Ecosystem based on symbiosis parts interaction.

Around 500 Machiguenga and Yine families organized in a self-sufficient and non violence society, which foundation is the balance of complementary functions between genders and a profound knowledge and respect for the forest.

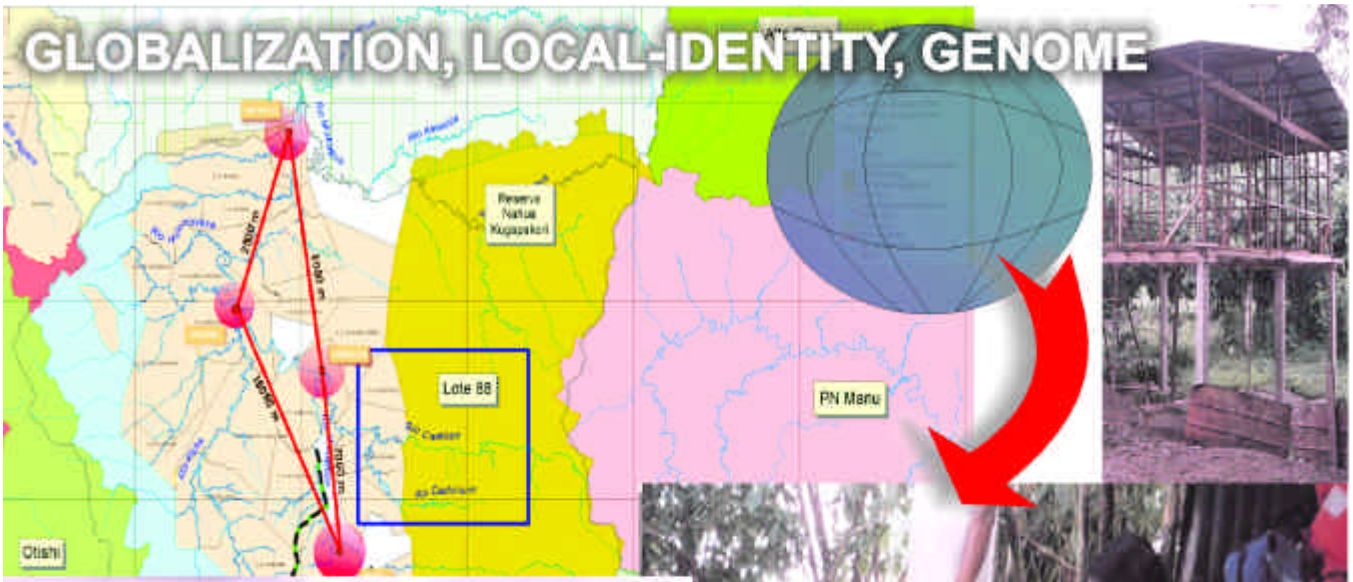
URBAN: Use of some modern communication systems and keep traditional carpentry techniques for house making.

Settled around the Urubamba River and its tributaries, the Machiguenga Community have a Magic-Religious Cosmo Vision on which the Pongo de Manrique or Megatoni is the holiest site of the world.

4. Trying to define the Machiguenga Community's GENOME

Once one have identified the chromosomes and dived into the sea of DNA to discover the very part of the gene accordingly to the tetra model: This is one of the rare cases of sustainable eco-system in which men is naturally involved, on which the self identity truly merges with the natural world and become one.

GLOBALIZATION, LOCAL-IDENTITY, GENOME



Inhabited the area for over 5,000 years, in a matrilocal pattern of residence.
Use the forest products within a mystic value and practice swidden agriculture.
Machiguengas believe the Pongo de Mainique, or Megantoni, is the most sacred site in the world: the holiest of holies.

Globalization, as an economical phenomenon, is like a cancer which is already touching the Machiguenga's existence. As political appeal, economical interests, and bureaucracies prevail over genuinely sensitive ecological consciousness, environmental management trends to consumer models that causes reduction of biodiversity.
The challenge could be to apply and to enhance the positives aspects of globalization as technological progress and information-education access and bond them with the unique cultural values and wise and lovingly use of natural resources that Machiguenga community holds.

The Ecological Apartment Building Pumping-underground-heat Technology

Shandong Institute of Architecture and Engineering CHINA

create a better architectural environment consuming less energy

ECOLOGICAL APARTMENT BUILDING

Wang Hao
Shandong Institute of Architecture and Engineering, Jinan City, China

1, Shandong Institute of Architecture and Engineering regards innovation and development as priority work. Its campus covers a total area of 160 hectares with a construction area of 670,000 m2, and nearly 20,000 full-time enrolled students.
2, Due to the scientifically plan and wonderful design, it is full of sustainable concepts and buildings around the central lake and mountain in the campus.
3, The principal concept of design is to harmonize the relationship between human and buildings, between buildings and environment, especially the landform.
4, The main plan concept is a central greenbelt in campus which is named "ecological corridor" to gather sustainable concept and resources including architectural style, art expression & civilizations.
5, The all-important concept of architecture is to utilize the advanced technique and construction to realize sustainable building and energy conservation.
6, The leading concept of construction is to seek the high efficiency, high quality, low pollution, which could build a new comfortable situation for the campus. That is called "rebuilding the environment".

THE ECOLOGICAL APARTMENT BUILDING

1, The ecological apartment building jointly constructed with Canada is the first ecological building among all universities in China. That is a student dormitory which are full of sustainable concept and equipments that are useful for saving energy.
2, The sustainable concept equipments include: Solar Wall System, Solar, Chimney, Natural, Ventilation, Automatic Solar Tracker, etc; indicated that we can create better architectural environment and consuming less energy by using proper technology and make full use of the solar energy.
3, The Solar Wall System is a new project produced by the cooperation of Canada and USA which could apply fresh air and comfortable temperature to the room and also could be used widely in heating, warm-up, drying and dehumidify.
4, That is the first time in China among universities to use the Solar Wall System as the air-condition to realize the effective ventilation
5, Natural Ventilation System is used for reducing the indoor temperature, promote comfortable air environment and reducing the working charge of air-conditions through the appropriate design of ventilation, proper leading of the airflow.

THE PUMPING-UNDERGROUND-HEAT TECHNOLOGY

1, The pumping-underground-heat technology invented by our institute is applied to the library and academic lecture hall.
2, That is the first time in China to use the pumping-underground-heat technology to control the temperature in the room.
3, The pumping-underground-heat technology system is the better way to keep the temperature of the room and utilize the underground-heat effectively. I
4, Due to the balanced temperature of the deep land, Water could be the medium through the pipeline to take heat in summer (cold in winter) into deep land to change caloric.

ENERGY EFFICIENCY IN UNIVERSITY BUILDINGS

Marcos Antonio Leite Frandoloso
Polytechnic University of Catalonia, Barcelona, Spain

Explanation: The thesis has being developed on the Architecture and Energy PhD programme of Polytechnic University of Catalonia (UPC), Barcelona, Spain. The research deals with the energy consumption at universities centres and the energy audit methods to achieve the efficiency and sustainability of their buildings.
The study proposes an evaluation of the recents proceedings and methods adopted by the UPC to include the sustainable principles at the UPC's Master Plans, following some previous researches developed in the framework of Laboratori REAL (Pla de Medi Ambient) of the University.
The main objective is to propose a methodology to integrate all aspects involved in the energy consumption of buildings at universities centres and their relation with the management of natural and economics resources.
The premise to the study is that the energy consumption is related to 3 main factors: building location (outdoor and indoor conditions) and building characteristics (architecture and construction); systems and infraestructures and, finally, the management of use and occupation (intensity and space-time distribution).
Besides the UPC, the methodology should be applied to another contexts with same characteristcs of use, in this case to the South Brazilian University of Passo Fundo (UPF). The application must contextualize both climate, cultural, social and economy situations.
At the conclusion of the study it will be possible to improve the method as an operational tool, to help taking decisons during the whole process of design, construction and use of buildings. Also, as an environmental and economical assessment of building performance, it will be useful to optimize the efficiency of existing buildings.

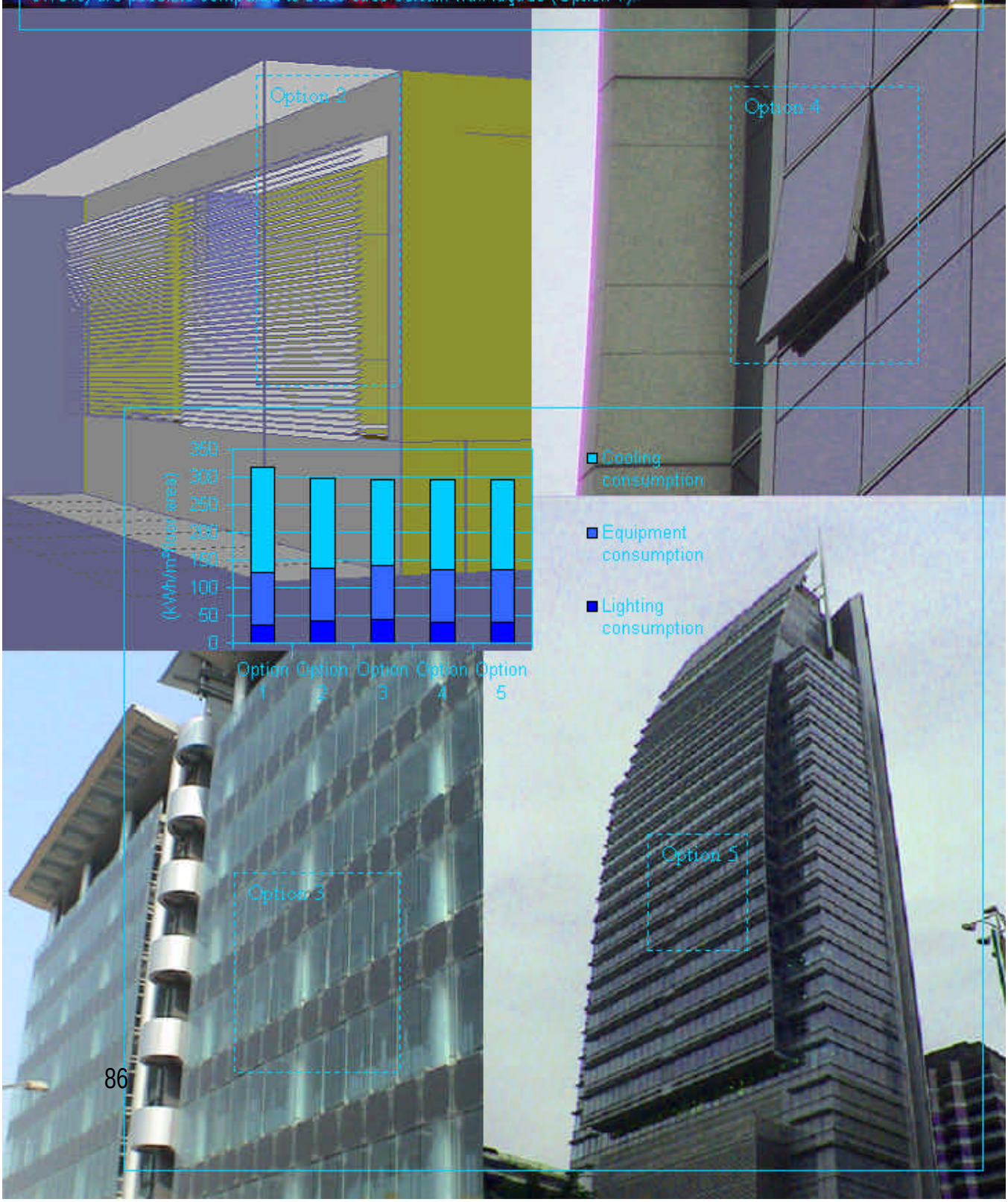
Name: Marcos Antonio Leite FRANDOLOSO, MSc Arch.
Country: BRAZIL
University: University of Passo Fundo, BRAZIL
PhD Student Polytechnic University of Catalonia, Barcelona, SPAIN
Title of the thesis: A Methodology to include the energy efficiency in the universities buildings: environmental and economics considerations
Sustainable concepts: Management of natural resources at the Universities in Barcelona and Passo Fundo

The objective is to propose a methodology to improve (or even include) energy efficiency in universities buildings, in order to integrate the all factors involved in the energy consumption, exploring their relations with the management of natural resources to reinforce the sustainable responsability of the University.

Responsability, Commitment and Efficiency

Hong Kong's double-skin facades

Little work has been done on the behaviour of double-skin façades in hot and humid climates. Recent projects with double-skin façades in Hong Kong were analysed and four different types of double-skin façades were modelled to run accumulation providing overall yearly energy consumption. Considerable energy consumption savings (up to 9.18%) are possible compared to base case curtain wall façade (Option 1).



DOUBLE-SKIN FACADES FOR HOT-HUMID CLIMATE

Matthias Haase / thegreenroom
The Hong Kong University, SARHK, China

There is a need for a sustainable development in the Hong Kong build environment. One of the most significant technologies for energy savings in a building is the facade. Architects working in collaboration with engineers started to take an energy-responsible approach to the design of building facades where the facade contributes to both the embodied energy as well as operating energy of a building. However, little work has been done on the behaviour of double-skin facades in hot and humid climates. It is not sufficient to adopt the new concepts to a different environment. The seasonal and daily climate in respect to mean temperature, humidity and wind speed distribution in Hong Kong is different to the moderate climate in Europe. A new approach has to take the climatic factors into account to find out if a double-skin facade can help to reduce the energy consumption in buildings in a hot and humid climate.

SIMULATION

From the analysis of existing buildings in Hong Kong three different types of facades were identified. This leads to three different simulation models which were compared to a prototype building with a single skin curtain wall system as a base case. The other models refer to the three different projects with different construction geometries as follows:

Facade options	Precedents	Cavity width
Option 1	conventional curtain wall	0 m
Option 2	double-skin facade as external air curtain with 500 mm air cavity and movable blind installed in-between	0.5 m
Option 3	double-skin facade as external air curtain with 2000 mm air cavity and movable blind installed in-between	2 m
Option 4	air-flow window in which interior conditioned air flows through 200mm cavity of double-skin facade and return into ahu	0.2 m
Option 5	air-flow options (Option 4) in which exterior unconditioned air naturally ventilated through 200mm cavity	0.2 m

The simulation software VisualDOE is capable of simulating whole building energy consumption calculating the annual electricity consumption of lighting, small power load and cooling. It was used to simulate the different types of double-skin facades but for the buoyancy flow in the cavity four different assumptions were made. The simulation was run with 2, 5 10 air changes per hour (acph) in the cavity. Additionally 200 acph were assumed as a maximum of buoyancy flow to study the influence of further increases in acph. There was no support of airflow to the HVAC-system assumed so all options were simulated with the same HVAC-system.

RESULTS

Option 3 shows the best consumption reduction of 9.18%compared to the base case follow by option 5 with a reduction of 8.17%. By looking at the consumption pattern of the three different energy-consuming units an increase of lighting and a decrease of cooling consumption is apparent. The difference of energy savings for option 3 between no ventilation and a ventilation of 200 air changes per hour is 2.00%.

VERAMAR PROJECT

SCAP
Universidad La Salle, Mexico City, Mexico

This is an Urban Regeneration Master Plan that involves 15 different projects for an important port in Mexico: the Port of Veracruz. The new shape of this 2 miles long waterfront will include a cruiser dock, a Marina, four shopping malls, an historic district, an aquarium, a beach renewal, a kids museum and a visitor center.

Throughout the water front of this great city, several areas are deteriorated, generating an urban recycling. Some of the old spaces will turn in to commercial areas. With these commercial zones the project will obtain founds to finish its own financing and o making possible all the implementation. The areas that are being operated by particulars will grow with private investments.

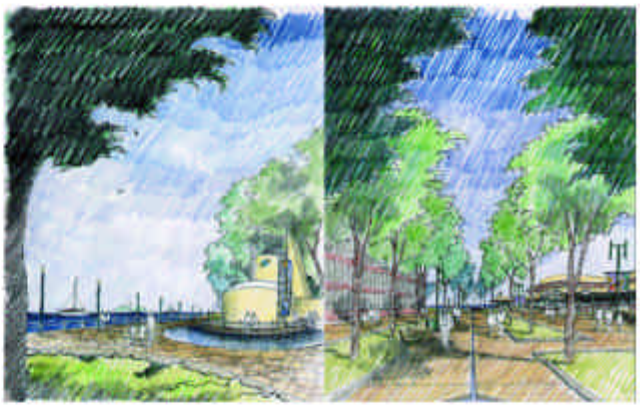
On the other hand, the government will facilitate the permits for the implementation of the master plan. The aquarium of Veracruz, which at the moment is the biggest aquarium in Latin America, works as one of the detonators points of the master plan, and will enhance its spaces.

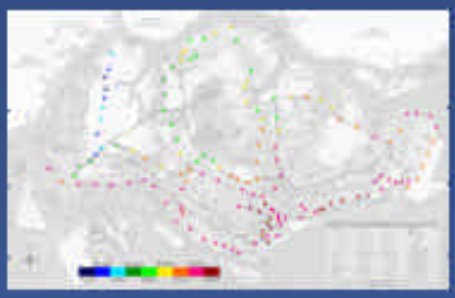
The urban study of the streets, as well as the accessibility from different points will promote the rise of the land cost beneficiating their owners and making them care of the zone. At this moment, the project is in study by the governmental departments.

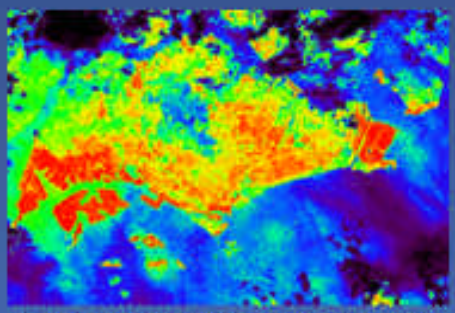
Team's Name:	SCAP
Country:	Mexico
University:	Universidad La Salle, Mexico
Title of the Project:	Veramar Project
Description:	Urban Regeneration Master Plan in the Port of Veracruz, Mexico.
Authors:	Juan Carlos Alvear
	Homero Hernandez
	Victor Marquez
Location:	Veracruz, Mexico
Year:	2001
Sust. Concepts:	Urban Recycling

VERAMAR PROJECT

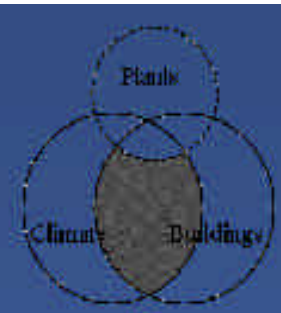
An Urban Regeneration Master Plan that involves 15 different projects for an important port in Mexico: the Port of Veracruz. The new shape of this 2 miles waterfront will include a cruiser dock, a marina, four shopping malls, an historic district, an aquarium, a beach renewal, a kids museum and a visitor center.



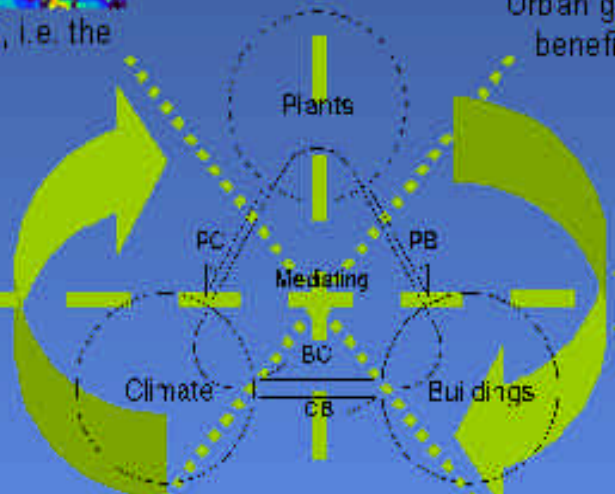




Environmental issues, i.e. the UHI effect

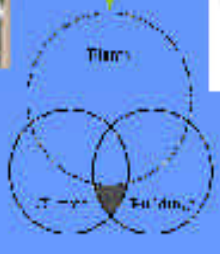


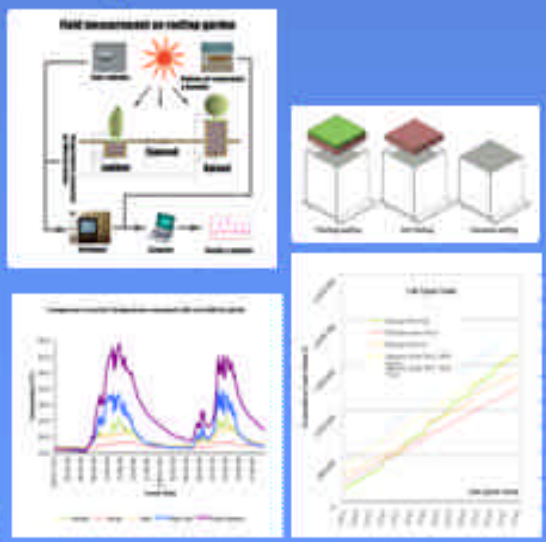
Urban greens and their related benefits (trad.landscaping)



Plants, Climate and Buildings

Plants placed on buildings (3D landscaping)





Research and design (R & D)

BUILDINGS, CLIMATE AND PLANTS

Chen Yu
The National University of Singapore, Singapore

Buildings, Climate and Plants are three indispensables in a built environment. Buildings replace the original plants and create urban climates which may trigger many environmental issues. Climate influences the typology, performances and energy consumption of buildings and governs distribution, abundance, health and functioning of plants worldwide. Plants, in its return, bring many related benefits to buildings and generate Oasis effect in an urban climate. The three indispensables closely link with each other and create an unique Buildings-Climate-Plants system in a built environment. The mechanism of the system will have an important role in achieving sustainable development in a built environment.

Singapore city has been testified by the model. First of all, the current environmental issues related to the conflicts (i.e. UHI effect) between buildings and the tropical climate are measured. Although Singapore is a garden city where the development intensification is balanced with the nurtured landscaping to a certain extent, it is still a question mark whether the existing green could mitigate the environmental issues perfectly.

To achieve a sustainable development, the current landscape should be extended to individual buildings which is the root of a harsh urban environment. Therefore, a new three-dimension greening programme has been launched on the basis of the Garden City campaign conducted in the last 40 years. Greenery in the forms of nature reserves, national parks and large vacant areas is maintained at the macro- level while plants has started to be introduced into local buildings (their facades and roofs) in forms of vertical landscaping, rooftop gardens at the micro-level.

Through a series of studies carried out with different government agencies, the benefits of plants in mitigating the conflicts between the local buildings and the tropical climate have been confirmed. It is believed that a sustainable and balanced urban environment can be achieved in the tropical city with the maximum intervention of introduced plants and the tolerable conflicts between the climate and the buildings.

Name:	Chen Yu
Country:	SINGAPORE
University:	The National University of Singapore. SINGAPORE
Title of the thesis:	The intervention of plants in the conflicts between buildings and climate
Subtitle	A sustainable way to benefit the built environment in the tropical climate.
Sust. Concepts:	Greening the city with traditional landscape as well as 3-Dimension greening concept in the tropical climate

LIVING WITH NATURE IN HARMONY

Faraz Soleymani
Azad University of Mashad, Iran

“Pigeon house” or “pigeon tower” is cylindrical and ornamented tower includes of three stories and thousands nests for attracting and keeping pigeon in order to producing fertilizer from their dung.

From an ancient time Iranians look at respectively because their lives depend on this element, fertilized land is important because nearly one third of Iran is desert so architects helps people keep the soil fertilized, by building “pigeon house”. These kinds of buildings are great masterpieces of ancient Iranian architecture that work entirely harmonically with nature.

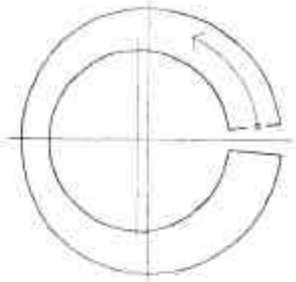
“Pigeon house” or “pigeon tower” is cylindrical and ornamented tower includes of three stories and thousands nests for attracting and keeping pigeon in order to producing fertilizer from their dung.

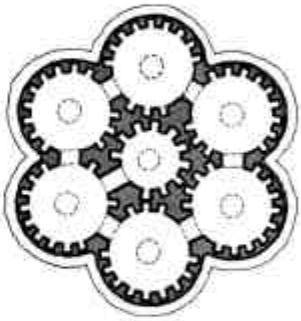
Pigeon house are interesting from two points:
1-harmonical relation between nature, architecture and people
A-environment
B-economic
C-social
2-architectural aspects such as:
A-resistance against vibration that produce by flying pigeons
B-maximum surface of a cylinder
C-technology and material of construction
D-providing optimized space and suitable condition for pigeons
E-architectural solutions for protecting pigeons against other wild animals
F-architectural Solutions for protecting pigeons against climate changes

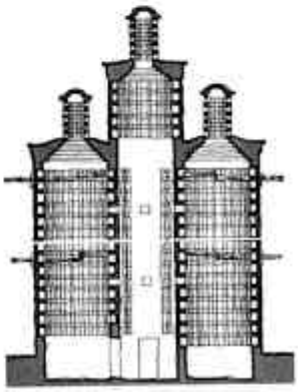
Reference:
1-”Pigeon house, respected usage of nature”, S Hadizadeh, TERRA 2003 conference, Yazd, Iran
2-”A glance to Iran• fs pigeon house”, 45 No, IRANZAMIN magazine, 1993
Introducing sustainable aspects of pigeon house in Iran

Title of project: Pigeon house, living with nature in harmony
Author: Faraz Soleymani, candidate of master architecture
Country: Iran
University: Azad University of Mashad, Iran
E mail: topfaraz@yahoo.com
Web site: www.faraz.info

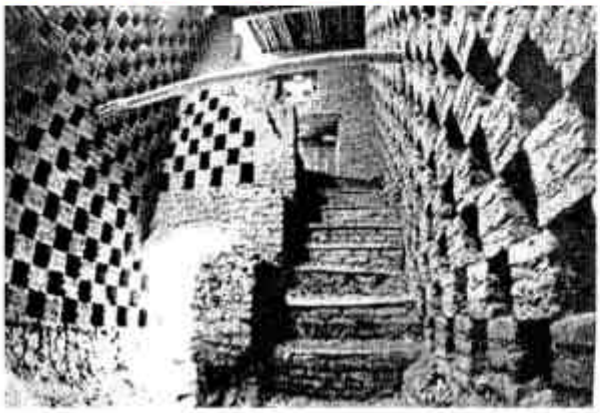
Pigeon house, living with nature in harmony

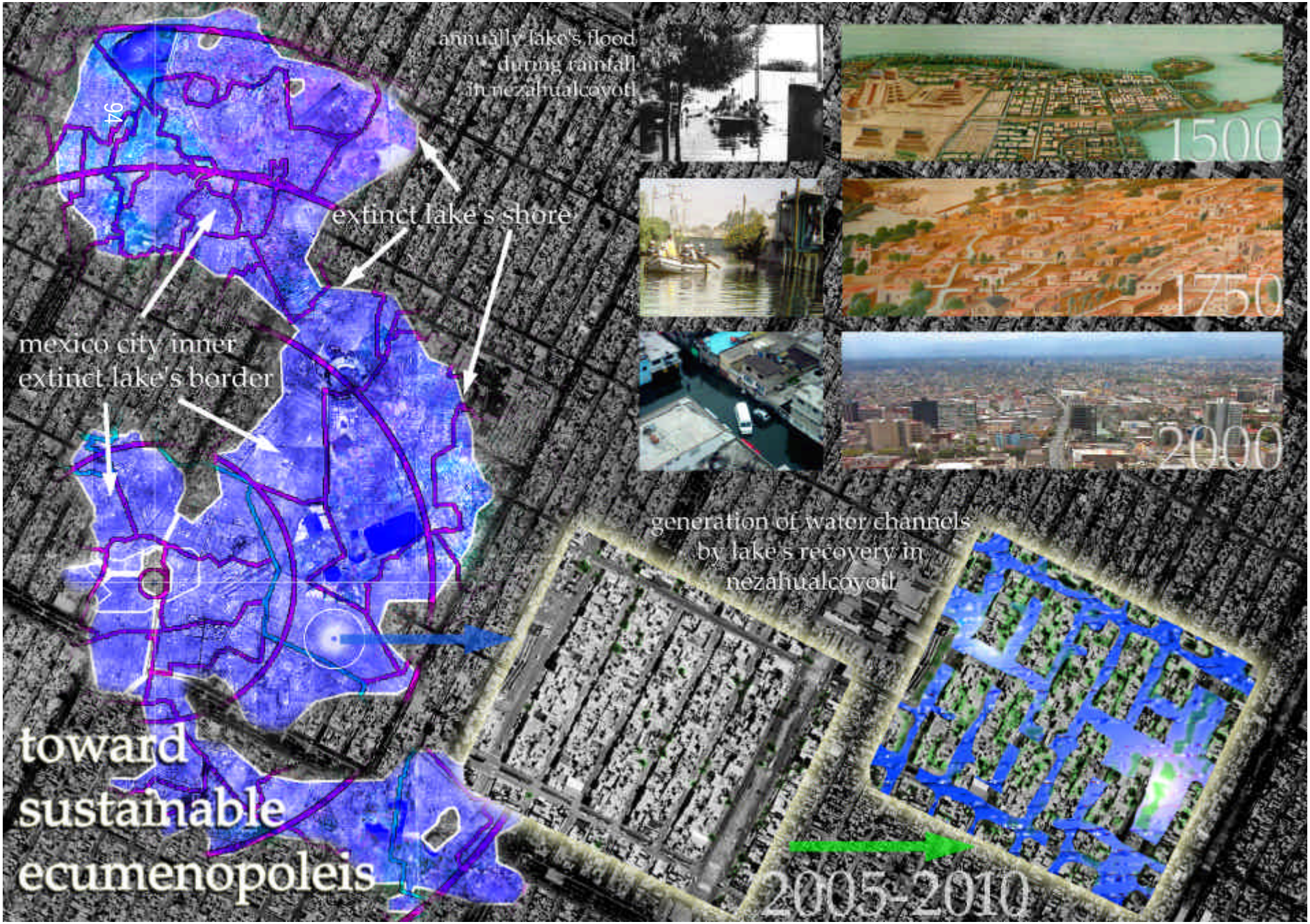






"Pigeon house" or "pigeon tower" is cylindrical and ornamented tower includes of three stories and thousands nests for attracting and keeping pigeon in order to producing fertilizer from their dung.





toward sustainable ecumenopoleis

TOWARDS URBAN SUSTAINABILITY

Jose Martin Gomez Tagle Morales
The University of Tokyo, Japan

Towards Urban Sustainability
Proposal for the flood season in Nezahualcoyotl District, State of Mexico, Mexico.

By 2025, more than 60 percent of the earth's inhabitants will reside in cities, a phenomenon that is now reflected in the “less developed dountries”. Without any relation to their economic condition, big cities are taking a place in the world and the populations are growing vertiginously. The urban space has been experienced the “human-hyper-density” creating polarization and new challenges to be solved. Is not difficult to understand that the anarchic over-crowding of cities has unpredictable situations for its inhabitants, sometimes with tragic consequences and we cannot know when or how will be hitten by a natural disasters of big proportions as a earthquake or an inundation as it has happened in the past. We must learn how to live with harmony with the nature and be prepared for this events.

A year ago I meet a Mexican group of architects that proposed the biggest urban regeneration project that can change the face of one of the biggest cities in the world: Mexico City. Their idea was to recover part of the old Texcoco Lake, where the City is founded and make the city emerges again from the lake (some architects call to this city the "Anti-Atlantis") let's say, a kind of a 22 million people's "New Venice", trying to take back the original urban proposals (channels, big streets and the lake, of course) that started the developed of the city 700 years ago. The most interesting project I had ever heard about, but also one of the most difficult, but not impossible dreams. The idea was to change, from the urban chaos into a ecological zone. Today, almost the 70 percent of the drinking water that the city uses is taken from very far dams and lakes, and the sewage system has to run hundreds of kilometers to be dispossed after be treated. The rainwater goes to the drainage and is not use to refill the necessities of the subsoil. But the worst part is that the rainwater affects many communities located in low-altitude zones suffering water flood -even Mexico City is located 2,240 meters above the sea level, is a valley, where the water stack in the extinct lake lower levels.

The idea of this proposal is, taking one of the zones that use to be flooded every year and also has a very simple urban pattern, transform the first floors of the houses in a sort of free-space area and use the superior floors as a close-rooms. Make a series of installations for boats, piers and even gardens that will be parks on the non-raining season, but also water-recreational areas when the water is present. A simple and logical step: to be prepared for every’s year inundation. Then, the people will be ready to receive every year’s changes and also make a better community, a tourist zone and keep the transportation system free of problems switching the car-system into a boat-system. Also the public buses will change into water-buses, trying to keep the zone free of contamination using man-force systems like the ones are using in the south of Mexico City in a tourist place named Xochimilco. To prepare the city for this could be a first step to recover the lake again and domestic the water into a new urban dimension.

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Also we would like to express that this booklet could not be possible without the great voluntier work of the team that selected the projects, visit the architects and sites, call for papers, work on the layouts, translations, organized, compile and put the overall information together to realize this booklet.

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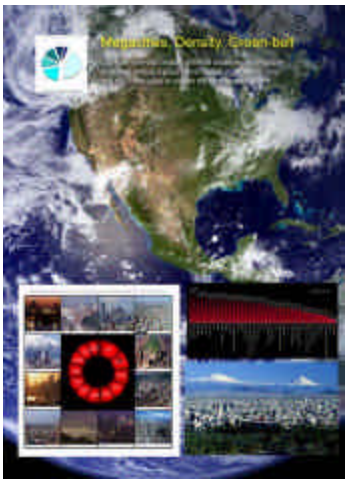

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