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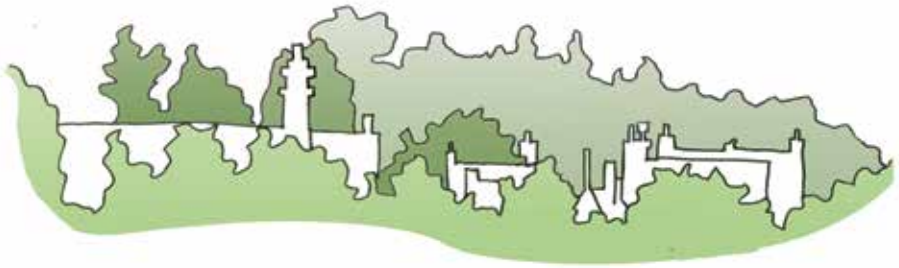


Clare writes a blog at avillagearchitect.co.uk

Can vernacular technologies be used in a modern day context to create sustainable housing design, one that represents climate, culture and environment?

Why this study?

- Need 3 million new homes in the UK by 2020 (Monbiot, 2007)

- Almost 90% of UK housing is built by private house builders and

- Very few are built to Code for Sustainable Homes (Goodier, 2010).

- Concerned that these 3 million new homes will be inefficient, unsustainable, lacking in community

- If these are to be built to current building regulations, they will surely be unsustainable (although 2010 Part L offers a 44% improvement it is still far from zero carbon).

- It should be the right for everyone to live in a sustainable, user friendly, comfortable home with low energy bills. Not just those with the ability to self-build.

- It is up to us as architects as well as planning and building control legislation to ensure that home occupiers best interests are looked after.

- Inefficent housing in the future may be de-valued and lead to expensive retrofit when people start to recognise the high cost of living associated with living in these homes

Identity - Spot the difference.
Housing in the UK

Taylor Wimpey Homes in Swindon, Gloucestershire and Suffolk respectively

Housing in the UK

- Confusion over zero carbon

- Ministers believe that the national building standards are sufficient to deliver high quality homes' (Shapps, 2010)

- Only Code for Sustainable Homes Level 4 achieves a 25% improvement in carbon emmission reduction on current building regulations (44% improvement over 2006 Part L as per the govenment's drive for it's definition of Zero Carbon (ie not zero at all))

- Fabric First, Passivhaus

- Usability issues followng Post Occupancy testing of BRE housing

- If we designed better buildings, using passive methods, less technology would be required, thereby overriding the 'usability issues'.

- Post WW2 mass housing and Modern Movement and Le Corbusier's Manifesto led to thin walls, flat roofs, steel and glass, a move away from traditional building. No coincidence that fuel was cheap.

- Irony of 'traditional' image presented on thin walled suburban housing facade

Accordia, Cambridge, by Feilden Clegg Bradley Studios

Notable UK housing schemes winning awards today respect local vernacular, even using it for inspiration in their designs. They have a strong focus on solar orientation, mass walling and they integrate landscape and community space.

It is interesting to look at the aims for one of my case studies;The Triangle, in Swindon:

- Create an architecture which is strongly rooted in context, both physical and cultural
- Create communities
- Design buildings which provide healthy environments for their inhabitants and are efficient to run

Why vernacular?

- Vernacular building is connected to climate, environment and culture though not necessarily inherrently sustainable

- Vernacular buildings were often built in a time of 'forced sustainablility' in that people had to build with what was available rather than being consciously sustainable.

- We have now returned to a time of 'forced sustainability' caused by oil prices and climate change.

- There is already considerable research into vernacular buildings notably Paul Oliver, Hassan Fathy, Amos Rappoport, Gideon Golany and further research into the particular climatic advantages found in traditional buildings and how these could be applied to modern day design (PLEA conference 2006 and Asquith, Roaf, Golany, Oliver).

- But studies that explore specific cases where vernacular architectural knowledge and skills have been used in contemporary architecture are still rare (Asquith, 2006:19)

Vernacular Architecture

The Encyclopedia of Vernacular Architecture of the World defines vernacular architecture as:

...comprising the dwellings and all other buildings of the people. Related to their environmental contexts and available resources they are customarily owner- or community-built, utilizing traditional technologies. All forms of vernacular architecture are built to meet specific needs, accommodating the values, economies and ways of life of the cultures that produce them (Oliver,1997:xxiII)

Therefore I could argue that vernacular architecture is defined in the following points:
- Functional
- Local materials
- Traditional methods of construction
- Not a historical or academic 'style'
- Owner or community built
- Not commercial
- Representing local culture
- Built by an amateur without training
- Not affected by fashion

A traditional Tibetan stone house in Western Sichuan, China.

A traditional stone house with a clay/ earth mortar and straw roof near San Pedro de Atacama desert in Chile; A traditional Dartmoor Longhouse.

My Aim: To explore and understand case studies that have learnt from vernacular architecture to inform modern sustainable design and to evaluate their success based on the following criteria:

Comfort
Appropriateness
Sustainability
Improvement

All of these criteria were related to the local climate, location, culture, customs, modern standards and way of life.

Questions:

- What are the benefits of using vernacular technologies in modern sustainable design?

-What are the benefits to local culture and economies of using ideas based on the vernacular?

- What are the downfalls of this approach?

- Does using vernacular technologies in modern sustainable design make it more sustainable?

- Is this approach suitable for mass housing in the UK?

Left: A form of traditional 'quincha' construction (mud and straw packed between a bamboo or wood frame) developed by Chilean architect Marcelo Cortes is modified so that it uses a metal lath and frame which means that pre-fabrication is possible. The houses are also remarkably earthquake proof.

Bryant house, Alababama by Rural Studio, the house takes inspiration from local timber building and the veranda from mansion houses in the region. In essence these buildings have been designed with vernacular spirit - that is, to use what is available, to create the most comfort, to suit your cultural needs.

Sustainable Housing Design, A World View

- Hassan Fathy describes how millions of people today live in unsatisfactory housing in stressful conditions, when their ancestors would have lived comfortably under the same climatic conditions in dwellings of traditional design. (Fathy, 1973:xv)

- Strive for modernity in developing countries means people want to live in climatically unsuitable housing e.g brick buildings in Bolivia, tin roofs in Papua New Guinea.

- Chocolate box tradional cottage is prized in Britain and people pay a premium

- In Australia, famous architects frequently refer to the rural vernacular, using double roofs as cooling mechanisms and the lightness of the eucalyptus tree as reference. However the average Australian does not want to live in a 'Chuck Shed'

Methodology

How are the case studies related?

- Vernacular technologies have been used in a modern sustainable design
- A vernacular approach (as defined in Literature Review) to design was adopted.
- User, locality and culture considered
- Architect designed
- Modern standards of hygiene and comfort.

How are the case studies different?

- Different cultures
- Different climate
- Different vernacular styles incorporated

International and UK case studies to highlight a richness of design in different cultures

Interview Questions about the user, their comfort, house appearance, usability, cost, lifestyle, culture, friends\relatives views, personal views on housing in the area.

Method Triangulation:

- Field Observations made by author
- Interview data collected from residents
- Theoretical study of published articles

Data Triangulation:

I interviewed at least 5 different people or households per case study. Occasionally residents were also interviewed in groups or by household. I interviewed the architect/designer (and sometimes also a co-ordinator/project manager/main builder)


Stroud, UK


Swindon, UK


China


Elmswell, Suffolk, UK


UK
China
Papua
New
Guinea
Bolivia

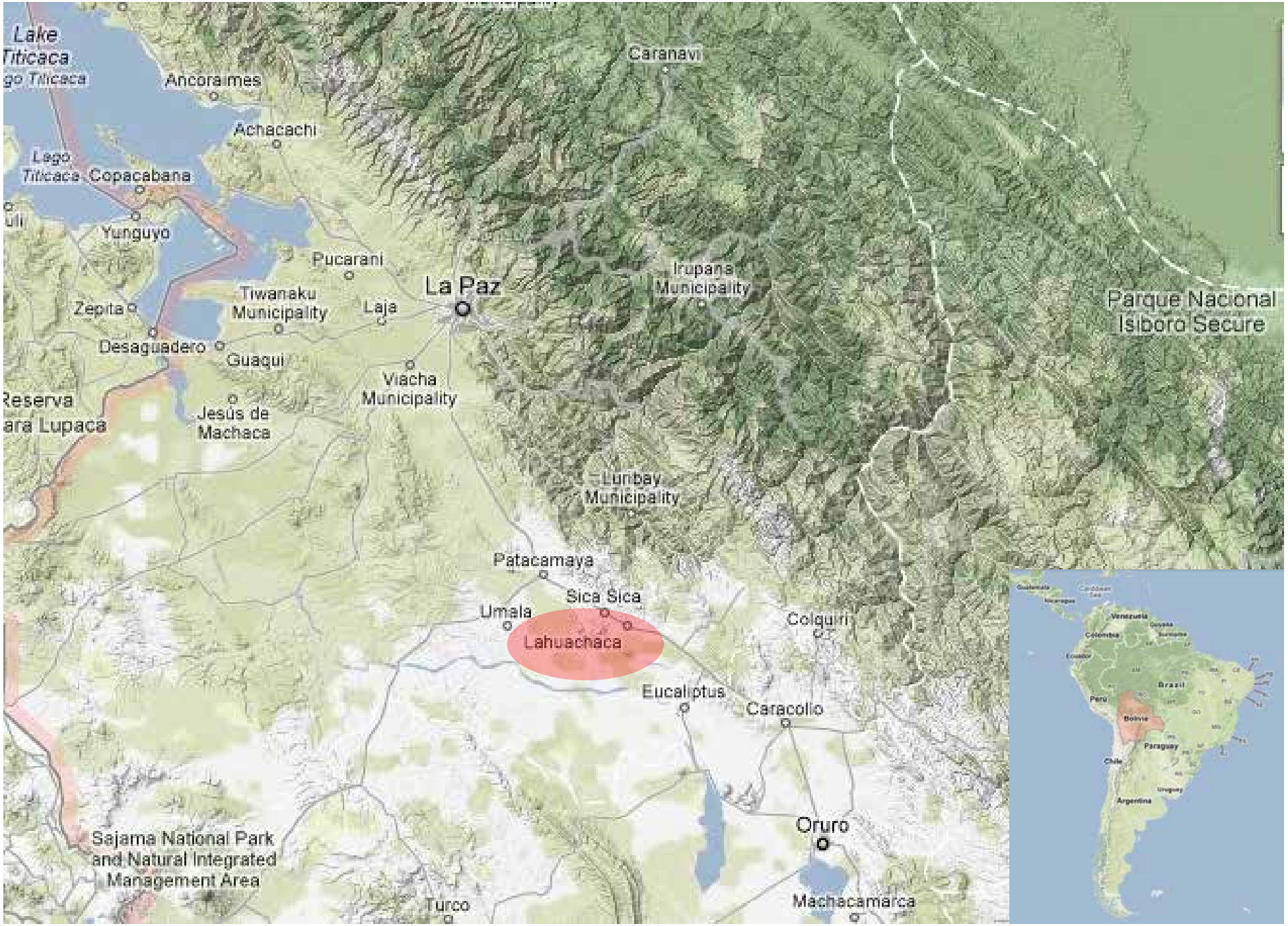

Papua New Guinea


Chile


Bolivia


Australia

Lak'a Uta, Lahuachaca, Bolivian Altiplano Case Study Visited November 2010


Lake
Titicaca
Lago Titicaca
Ancoraimes
Achacachi
Lago
Titicaca
Copacabana
Yunguyo
Pucarani
Tiwanaku
Municipality
Zepita
Laja
La Paz
Irupana
Municipality
Parque Nacional
Isiboro Secure
Caranavi
Desaguadero
Guaqui
Viacha
Municipality
Reserva
ara Lupaca
Jesús de
Machaca
Lunbay
Municipality
Patacamaya
Sica Sica
Umala
Lahuachaca
Colquiri
Eucaliptus
Caracollo
Oruro
Sajama National Park
and Natural Integrated
Management Area
Turco
Machacamarca
Venezuela
Colombia
Ecuador
Peru
Brazil
Bolivia
Paraguay
Chile
Argentina
Uruguay


Bienvenidos
al Centro
LAKA UTA

Culture

Photos clockwise from above: Cordillerra los Frailles near Sucre, some examples of traditional clothing in a museum in Sucre, a lady weaving in Cordilllera los Frailles.

BOLIVIA VERNACULAR

Left: Housing in Angostura near Lahuachaca (photo Lars Jorgen Jakobsen)
Far left: A vernacular house type in Sica Sica, Bolivian Altiplano.
Below: Shrines in Angostura.

- Thermally massive earth walls keep the building warm in the cold Altiplano nights and cool during the hot days
- Outside living areas
- Separate buildings for toilet, kitchen, sleeping
- Straw roof, cactus timber used for structure
- Owner/Community built

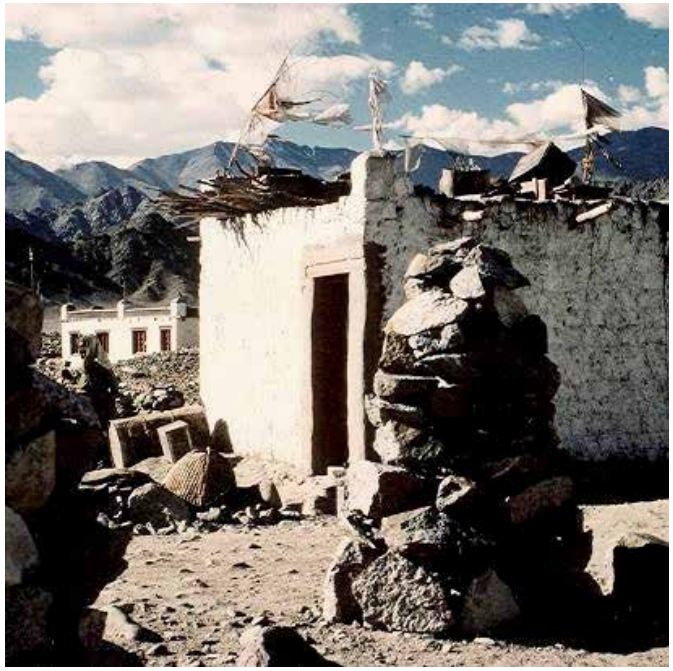
NEW - VERNACULAR

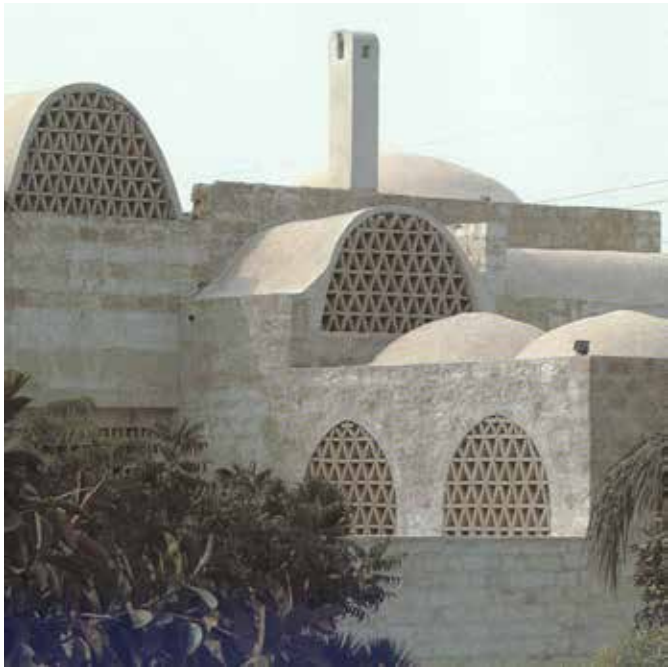
- Addition of Cactus gum to the adobe plaster mix makes it water resistant, a technique learnt from the Incas
- The parabolic form of the building and the thermal mass benefit of the adobe wall taken from the vernacular
- Social needs understood regarding separate buildings for separate functions and outdoor living area
- Community self-build
- Better living conditions provided than so called modern brick buildings and traditional adobe huts

Interviewees

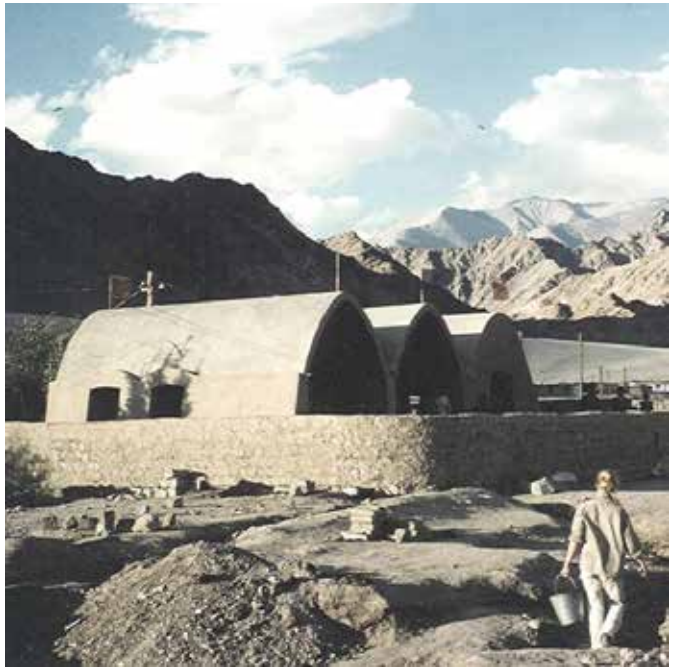
Jaime Ayra from DIB in his office in La Paz. Right; Don Juan Quespa ‘ El Tecnico’ at Centro Lak’a Uta; Dona Rosa and her son’s family.

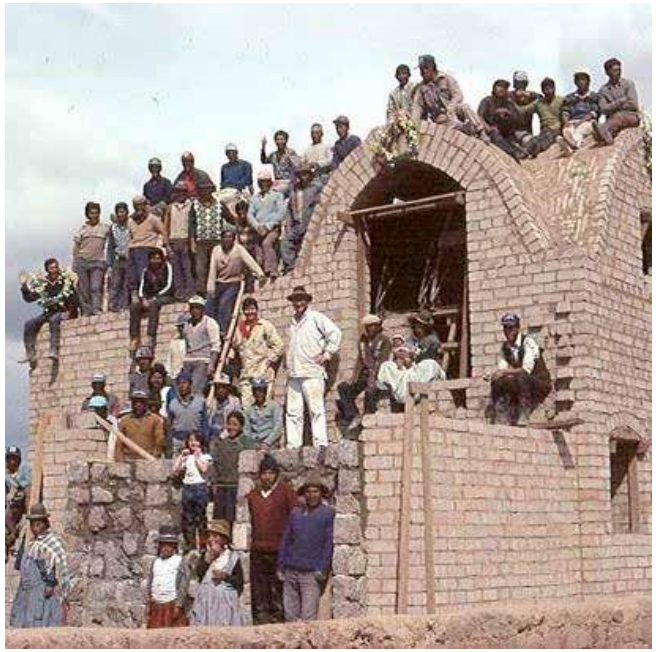
Photos from Lars Jorgen Jakobsen: Working in Ladakh, Kasmir, Hassan Fathy's work in Nubia where people have been building self-bearing parabolic curved earth roofs for more than 6000 years. (DIB, 2004), a health centre built in Ladakh inspired by Fathy, initial drawings for housing in Bolivia.

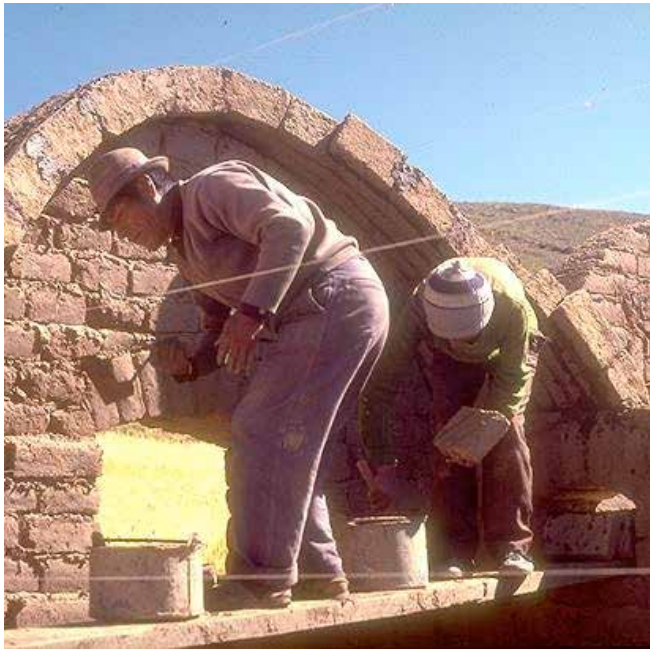


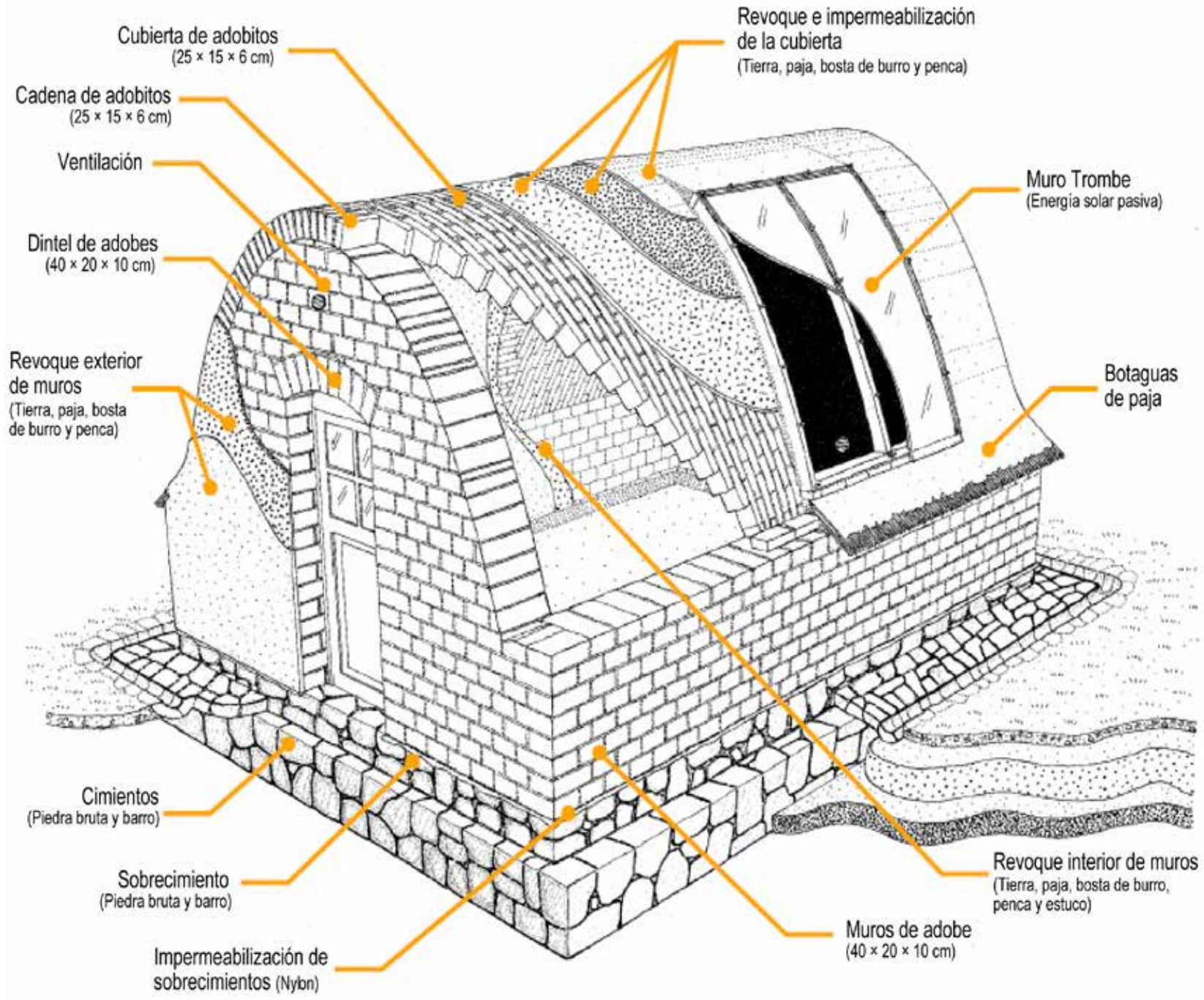


The Inca adobe wall in Raqchi, Peru.







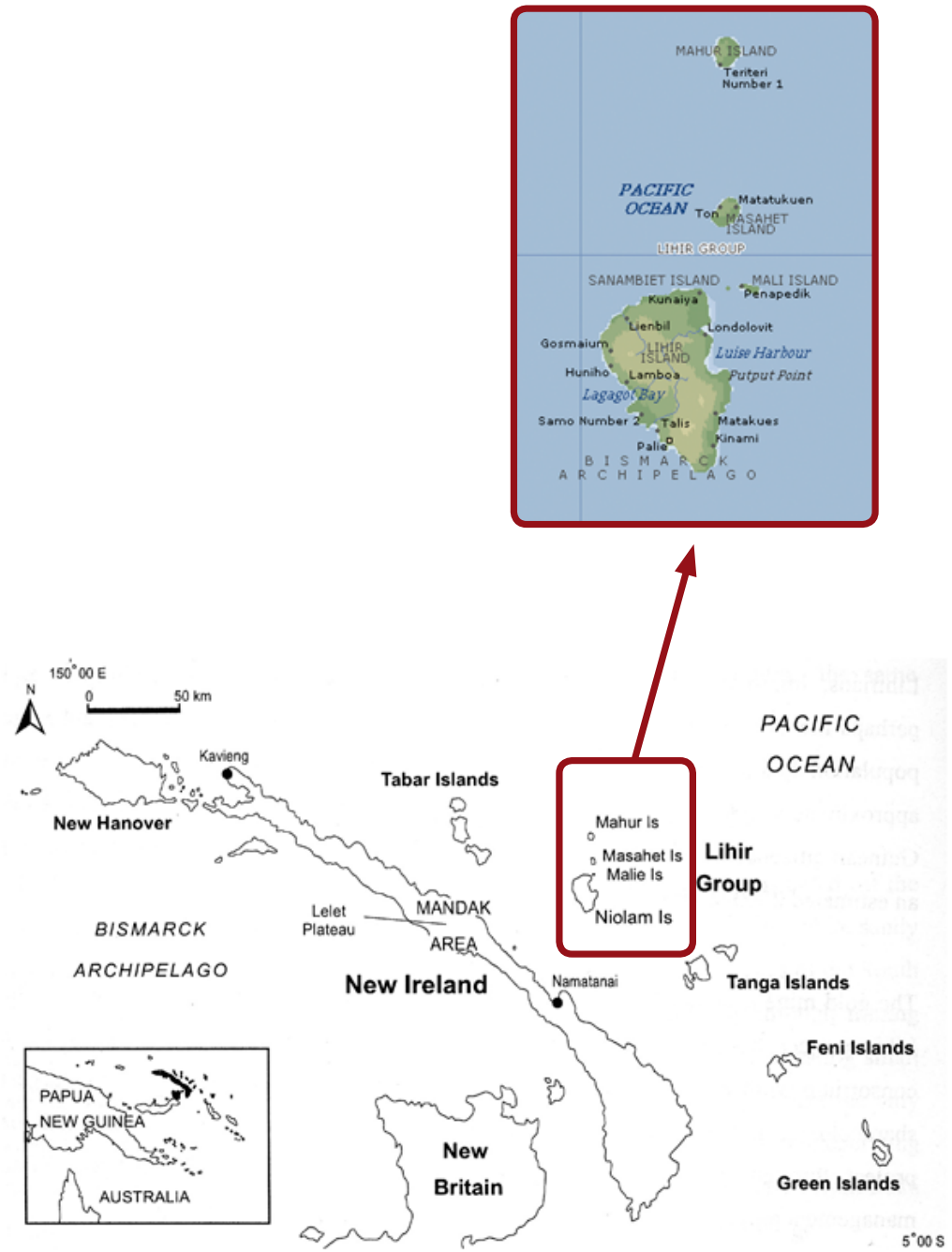

Cubierta de adobitos
(25 × 15 × 6 cm)
Cadena de adobitos
(25 × 15 × 6 cm)
Ventilación
Dintel de adobes
(40 × 20 × 10 cm)
Revoque exterior
de muros
(Tierra, paja, bosta
de burro y penca)
Cimientos
(Piedra bruta y barro)
Sobrecimiento
(Piedra bruta y barro)
Impermeabilización de
sobrecimientos (Nylon)
Revoque e impermeabilización
de la cubierta
(Tierra, paja, bosta de burro y penca)
Muro Trombe
(Energía solar pasiva)
Botaguas
de paja
Revoque interior de muros
(Tierra, paja, bosta de burro,
penca y estuco)
Muros de adobe
(40 × 20 × 10 cm)

Photos from top left clockwise: Showing parabolic roof inside, rear of one of the tourist houses showing the trombe wall. View from the outside.

New Vernacular
DIB (Danish International Human Settlement Service)

Tourist development Copacabana

Lihir Island, Papua New Guinea
Case Study
Visited February 2011



Above: Map taken from the Lihir Cultural Heritage Plan by the Lihir Cultural Heritage Committee

Photos from top left, clockwise: Haus Boi (Men's House), the villager's receiving hand outs, some Malie villagers.

Culture

The church in Kunaye, some residents I interviewed and a group of men enjoying Sunday by the beach

Interviewees

PAPUA NEW GUINEA VERNACULAR

- Low eaves protects walls & windows from sun & rain
- Bamboo walls and a sago leaf roof allow ventilation
- Sharply sloping roof is resistant to heavy rains and protects from the sun
- Cross-ventilation through a large shutter at each end
- The roof does not touch the walls allowing air to flow under the roof and into the main room
- Thermally massive earth floors, kept cool with sea breezes
- Owner/Community built

Housing built by the mining company

- Steep sloping roof - out of Zincalume (more hard wearing than cast iron) is easier to maintain and less costly than traditional shakes or sago leaf mainenance
- Rainwater collection
- Mosquito proofing
- Hardwearing materials for a coastal environment
- Shading and high ceiling apex to allow heat to rise
- Community built

New Vernacular
Assai Consult

A selection of houses in New Kapit, you can see the rainwater collection butts, this area benefits from clear views and breezes but is further away from the coast and is lacking in vegetation of sufficient height to provide shading

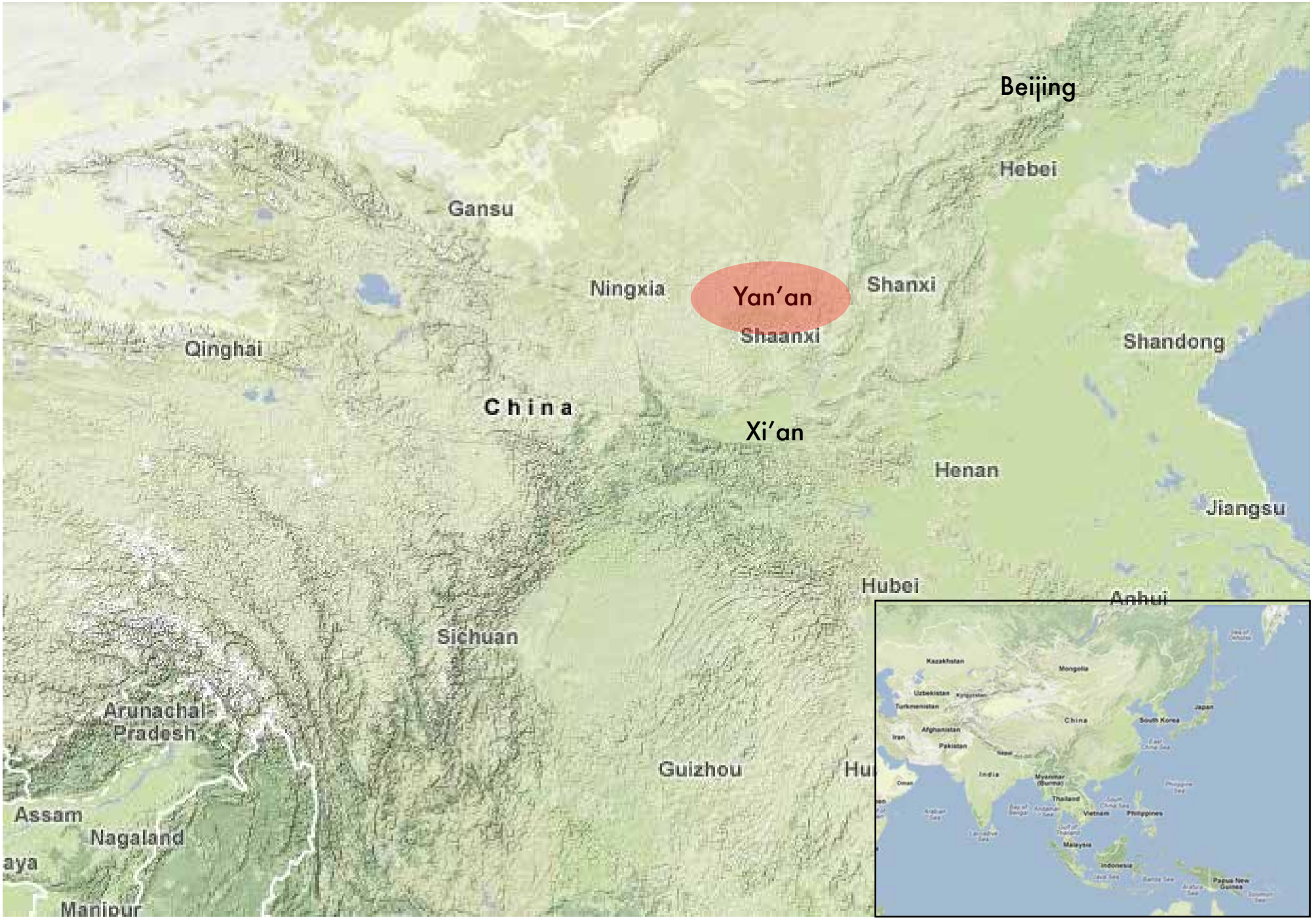
New Kapit

No shade, in addition the ground surface reflects heat, causing glare and discomfort;

Filled in underneath to allow the women to sleep and live downstairs, they have also built in much larger windows

Stanis' Uncle's house
Shade and vegetation behind. It is protected from the harsh western sun by a steep bank of vegetation, it is also benefits from sea breezes. They have modified the house to allow for rainwater collection and downstairs living.

New Generation Cave Dwellings
Zaoyuan Village, Yan'an, Shaanxi, China
Case Study
Visited March 2011


Beijing
Hebei
Gansu
Ningxia
Yan'an
Shanxi
Shaanxi
Qinghai
Shandong
China
Xi'an
Henan
Jiangsu
Hubei
Anhui
Sichuan
Arunachal
Pradesh
Guizhou
Assam
Nagaland
Manipur
Kazakhstan
Mongolia
Uzbekistan
Turkmenistan
Kyrgyzstan
Japan
China
South Korea
Afghanistan
Iran
Pakistan
Nepal
India
Myanmar
(Burma)
Thailand
Vietnam
Philippines
Malaysia
Indonesia
Papua New
Guinea

Xi'an showing city wall buildings juxtaposed with new apartment buildings.
Above: Yan'an showing traditional Yaodong close to new apartments.

Context


Zaoyuan Village
Chairman Mao
hideout

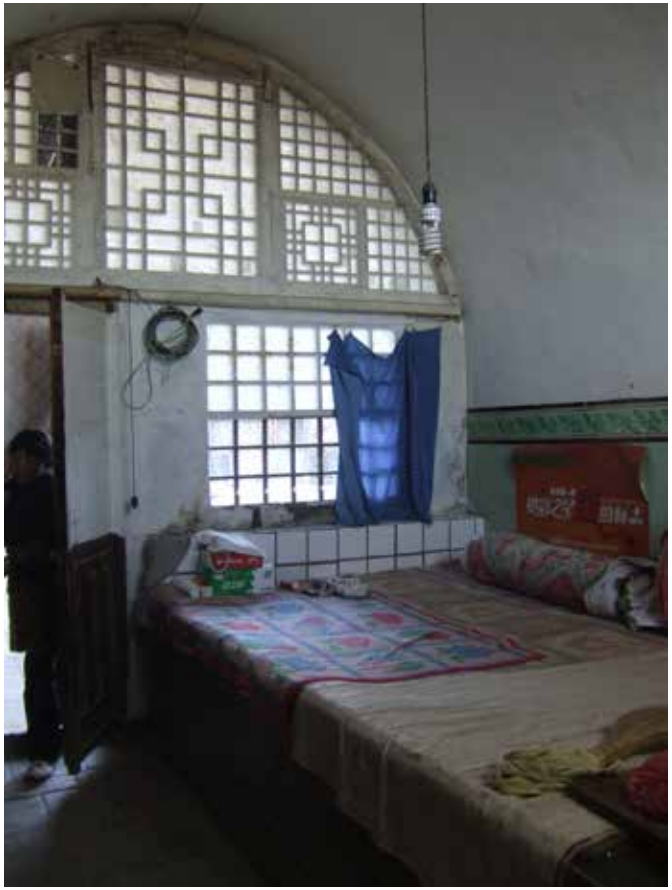
Culture

CHINA VERNACULAR

- High thermal mass of the earth walls keeps a more or less constant 16 degrees inside without heating (Golany)
- Regional identity with the yellow earth of the Loess Plateau
- K'ang bed - hot air from the stove travels under the bed, providing a warm place to sit during the day and sleep at night.
- It can be damp, earthquakes have caused casulties and light levels are not good.
- The form of the dwelling is very culturally important, Chairman Mao even hid in these dwellings to plot the communist revolution
- Owner/Community built

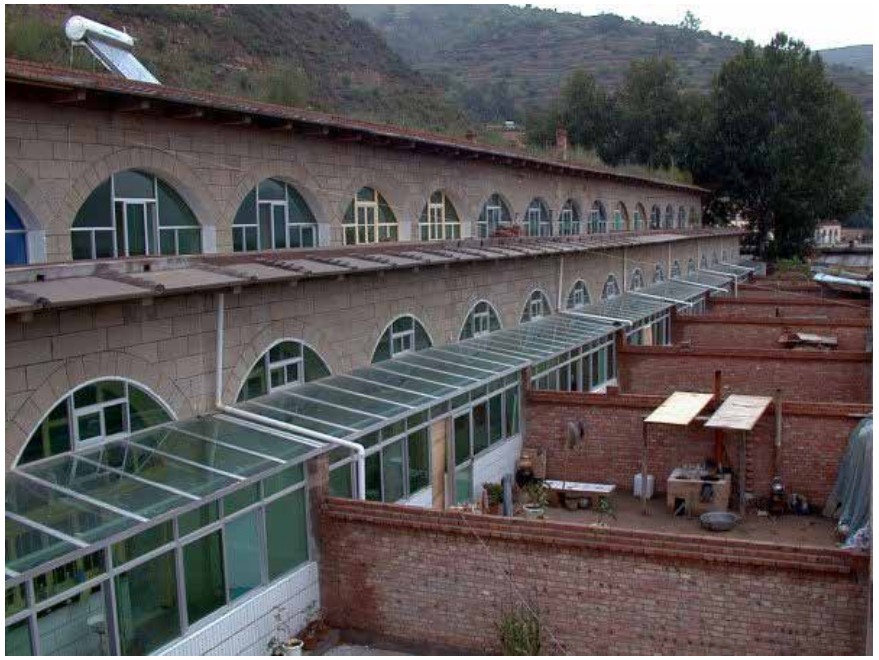
Photos: Lijiashan village in Shanxi and the Loess plateau's Mars like appearance.

Vernacular - Loess Plateau



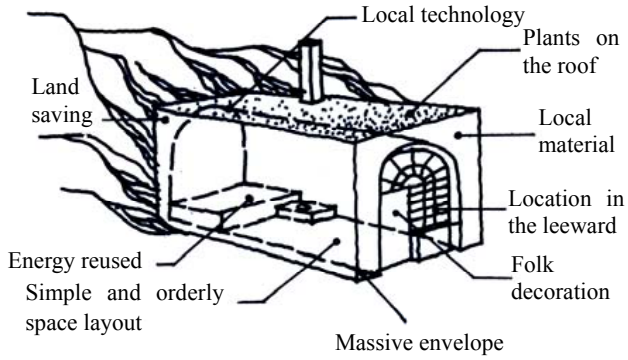
Courtyard Cave Dwelling in Lijiashan.

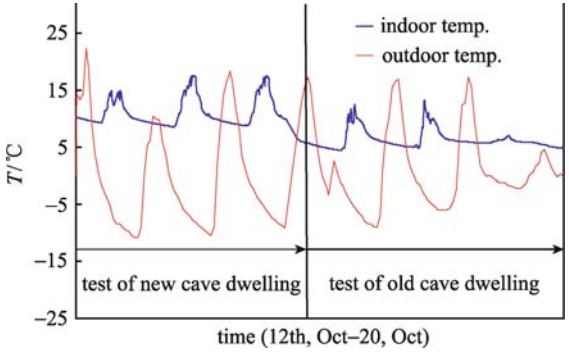
NEW - VERNACULAR

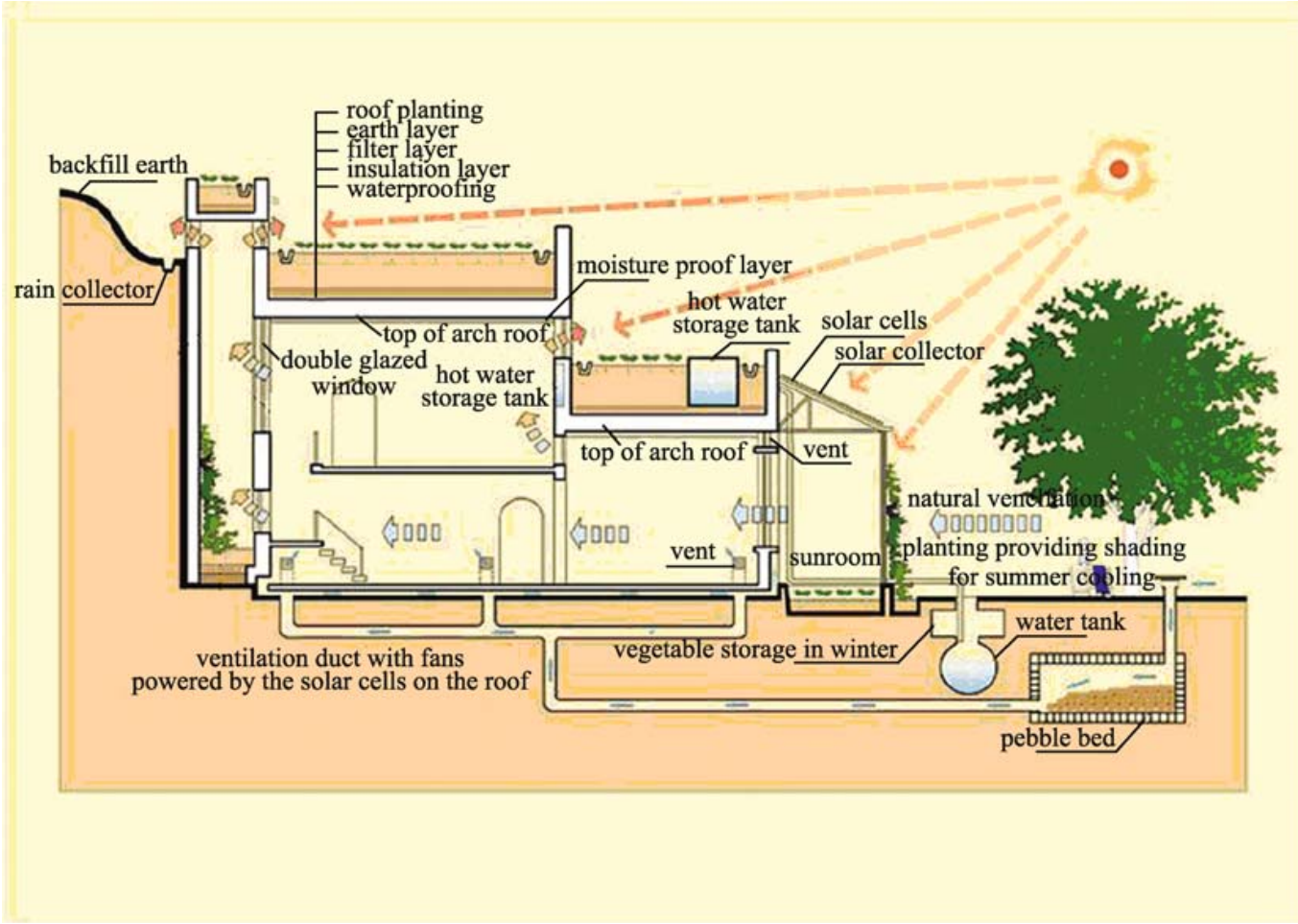


- High thermal mass earth and stone walls
- Local materials and modern materials combined for structural reasons
- Green/earth roof retains heat
- Retention of the K'ang bed for heat benefits and local culture
- Earthquake proof
- Much lighter and less damp than the original Yaodong cave dwelling
- Traditional Yaodong shape retained for cultural reasons

The new generation yaodong cave dwellings with sunspaces that were not present on the houses I visited. Pictures (WHA, 2006).







Clockwise from top left: an aerial shot of Zaoyuan village, extract from (Liu, 2009:126) showing the design of the new ideal green cave dwelling, graphs show that the new cave dwelling is warmer in winter, extract from (Wang, 2007:1757) showing the advantagageous regional genes of traditional Yaodong cave dwellings.

New Vernacular - Design

Interviewees

The Triangle, Swindon, UK
Case Study
Visited May 2012

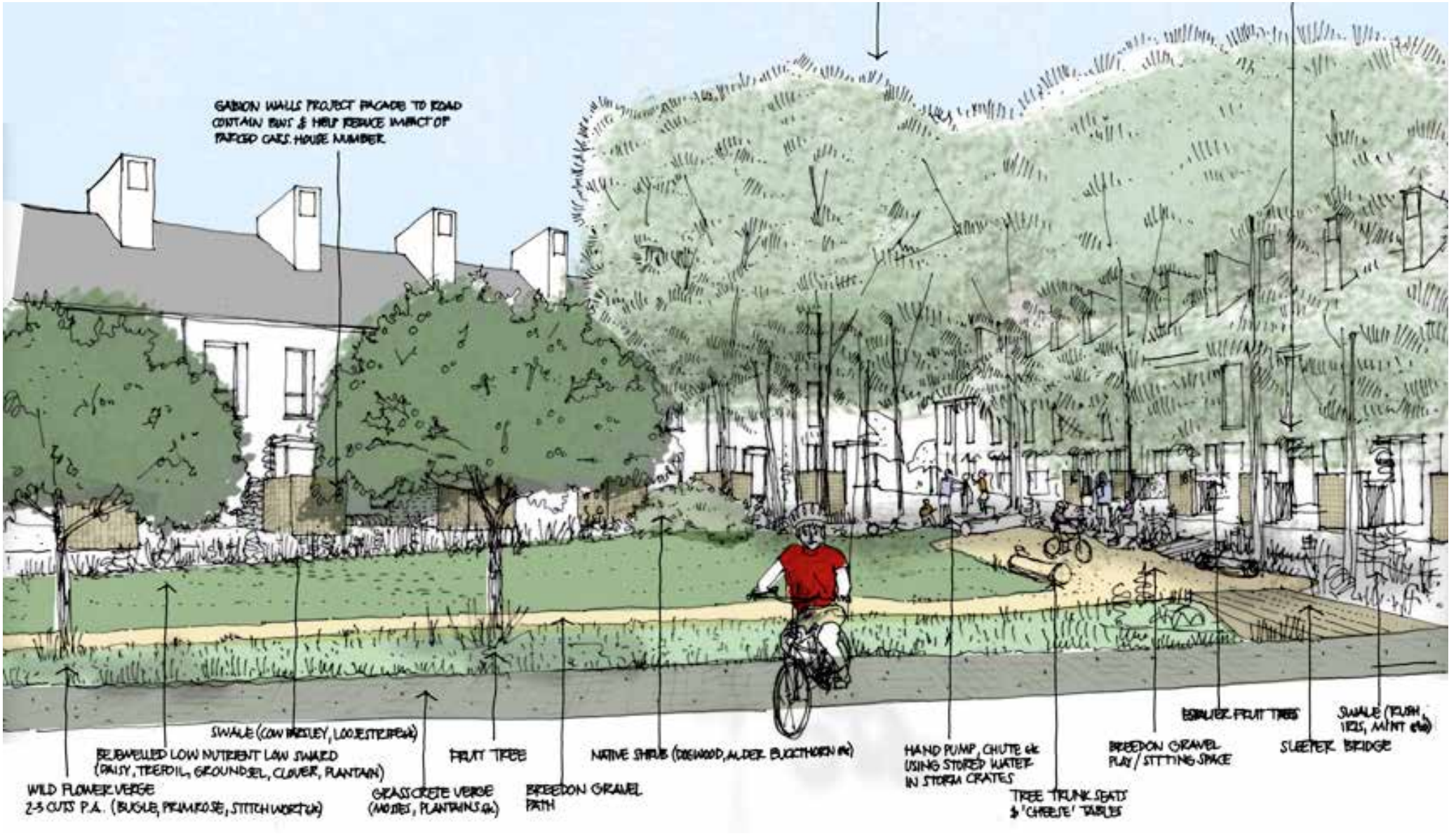

Leamington Spa
Bedford
Great Malvern
Evesham
Hereford
Banbury
Milton Keynes
Cheltenham
Stevenage
Bishop's Stortford
Bicester
Luton
Wigmore
Gloucester
Merthyr Tydfil
Ebbw Vale
Witney
Aylesbury
Harlow
Stroud
Oxford
Hemel Hempstead
St Albans
Cirencester
Blackwood
Pontypool
Abingdon
Enfield
Kingswood
Watford
Pontypridd
Cwmbrân
High Wycombe
Swindon
Newport
Caerphilly
Chipping Sodbury
Maidenhead
Slough
London
Portishead
Cardiff
Chippenham
Calne
Reading
Hounslow
Penarth
Clevedon
Bristol
Bath
Bracknell
Croydon
Barry
Devizes
Newbury
Sunbury
Weston-super-Mare
Farnborough
Woking
Sutton
Trowbridge
Basingstoke
Guildford
Andover
Aldershot
Frome
Bridgwater
Salisbury
Winchester
Taunton
Yeovil
Southampton
Chard
Verwood
Fareham
Honiton
Wimborne Minster
Ringwood
Bridport
Christchurch
Cowes
Dorchester
Sidmouth
Poole
Bovington Camp
Newport
Exmouth
Weymouth
Swanage
United Kingdom
Ireland
Netherlands
Belgium
Germany
Denmark

SWINDON VERNACULAR

- Urban terrace vernacular (Brunskill) due to the arrival of the railways
- Breathable stone mass walling
- Chimneys articulate the skyline, venting smoke from the only source of heat
- High density building
- Local identity

NEW - VERNACULAR

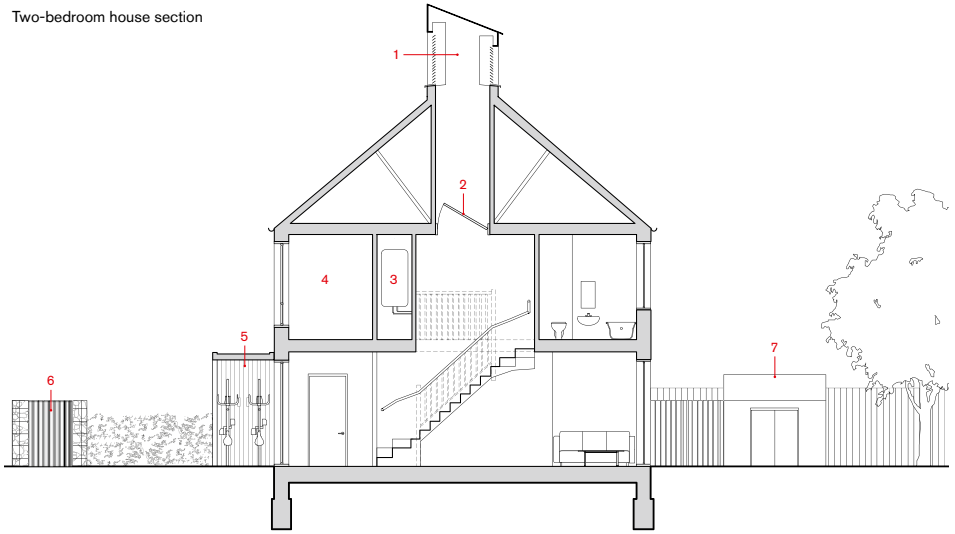
- Colourful render comes from local buildings
- Chimneys provide passive stack ventilation and articulate the skyline
- Mass walling using renewable hemp provides insulation and breathable walls for better air quality without draughts
- Placemaking, village green comes from vernacular typology
- Improved health benefits than modern housing due to high ventilation, one resident's asthma has almost disappeared
- Space for allotments, community use the green regularly for events



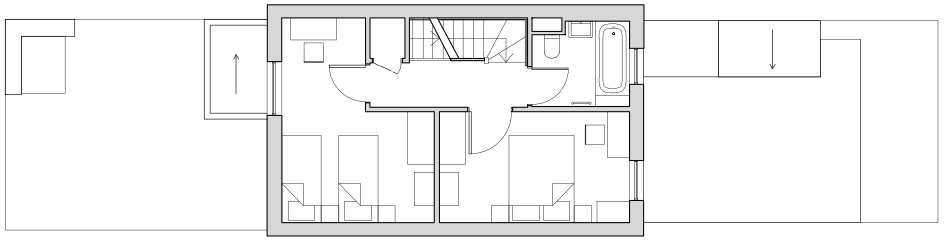
New Vernacular

Habhousing, Glenn Howells Architects, Studio Engleback

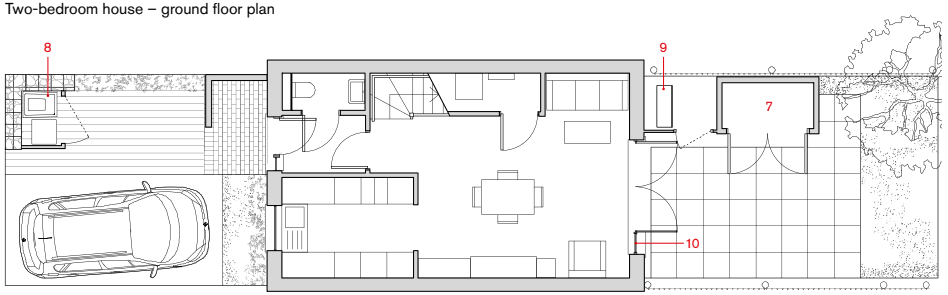
Two-bedroom house section



Two-bedroom house – first floor plan



Two-bedroom house – ground floor plan



New Vernacular - Design

Springhill Co-Housing, Stroud, UK
Case Study
Visited April 2012


Newtown
Aberystwyth
Birmingham
Nuneaton
Corby
Stourbridge
Kidderminster
Solihull
Coventry
Rugby
Kettering
Redditch
Wellingborough
Royal Leamington Spa
Northampton
Worcester
Great Malvern
Evesham
Hereford
Banbury
Milton Keynes
Cheltenham
Gloucester
Stroud
Cirencester
Bicester
Witney
Oxford
Aylesbury
Luton
Hemel Hempstead
Abingdon
Merthyr Tydfil
Ebbw Vale
Pontlliw
Neath
Llanelli
Swansea
Aberdare
Blackwood
Pontypool
Cwmbrân
Pontypridd
Port Talbot
Newport
Llantrisant
Caerphilly
Kingswood
Swindon
Chipping Sodbury
High Wycombe
Watford
Maidenhead
Slough
Portishead
Cardiff
Penarth
Barry
Clevedon
Bristol
Chippenham
Calne
Bath
Devizes
Weston-super-Mare
Trowbridge
Frome
Ilfracombe
Barnstaple
Exmoor National Park
Bridgwater
Taunton
Yeovil
Salisbury
Tiverton
Bristol Channel
United Kingdom
Ireland
Denmark
Netherlands
Belgium
Germany
Luxembourg


Springhill
Co-housing

Context

Interviewees

SELF BUILD VERNACULAR

-Architype adapted the Walter Segal method for use in their scheme for Hedgehog Self Build, Brighton and Diggers Self Build, Brighton in 1996.
-The project represents Eco-minimalism an idea that stems from the simplicity of vernacular buildings
- Passive solar gain
- High levels of warmcel insulation
- The first green roofs in the UK
- No petrochemical paints were used
- Community built
- Easily assembled by low skilled people

Right: Photos taken from Architype website

Vernacular - Walter Segal method

NEW - VERNACULAR

- Use of Christopher Alexander's 'The Pattern Language' (a book based on vernacular design patterns)
- Though perhaps you would not refer to the Springhill scheme as being 'very Stroud' or even 'very English', it represent a vernacular builder's ideals.
- Emphasis on community
- Whole community involved and part of the self build, though it was contractor built
- Village atmosphere and sharing of meals, group activities
- Local materials
- Orientation for passive solar gain
- Breathable insulation provides a healthy environment akin to a vernacular 'leaky' building
- A very sought after place to live

Sectional Elevation HH

Clay Fields, Elmswell, Suffolk, UK
Case Study
Visited May 2012


Elmswell
Derby
Nottingham
Carlton
Grantham
Sleaford
Boston
Loughborough
Melton Mowbray
Spalding
King's Lynn
North Walsham
Market Deeping
Wisbech
Dereham
Leicester
Norwich
Great Yarmouth
Wigston
Peterborough
March
Rockland St Mary
Nuneaton
Corby
Lowestoft
Kettering
Ely
Thetford
Coventry
Rugby
Huntingdon
Mildenhall
Wellingborough
Bury Saint Edmunds
Royal Leamington Spa
Northampton
St. Neots
Cambridge
Stowmarket
Bedford
Milton Keynes
Banbury
Sudbury
Ipswich
Felixstowe
Stevenage
Bishop's Stortford
Braintree
Bicester
Luton
Wigmore
Witney
Aylesbury
Harlow
Oxford
Hemel Hempstead
St Albans
Chelmsford
Abingdon
Enfield
Watford
Brentwood
High Wycombe
Basildon
Slough
London
Maidenhead
Dartford
Reading
Hounslow
Gravesend
Bracknell
Croydon
Gillingham
Ireland
United Kingdom
Denmark
Netherlands
Belgium
Germany
Luxembourg

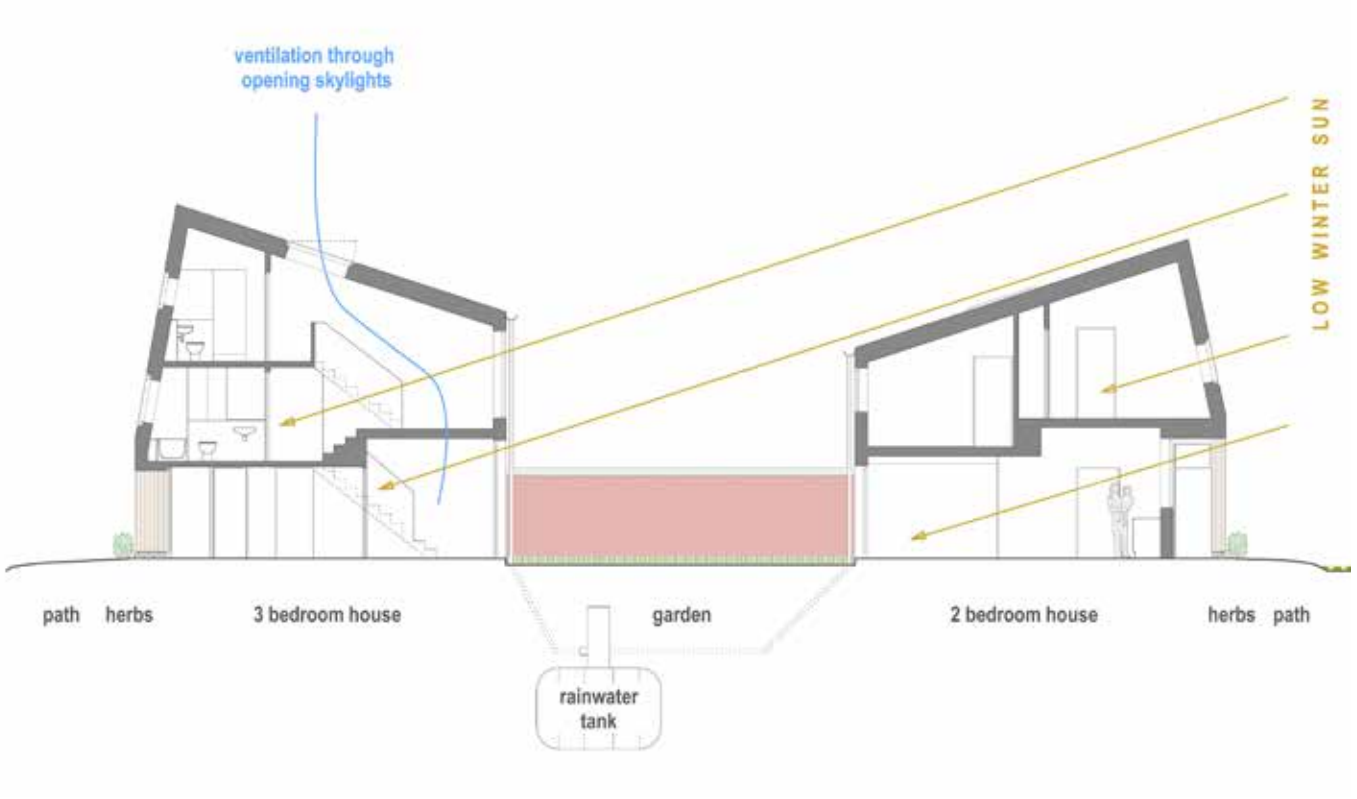

Clay Fields

SUFFOLK VERNACULAR

- Clay lump (unfired clay mixed with straw to create bricks) for mass walling and timber is commonly found on agricultural barns all over Suffolk.
- Irregular shaped roofs and colourful render can be see throughout Cambridgeshire in vernacular buildings.
- Pantiles were favoured for lightness in agricultural buildings in Suffolk.

NEW - VERNACULAR

- Orientation provides passive solar gain
- Passive stack ventilation through rooflights
- Irregular shape and deep eaves taken from vernacular offers interest and shed water quickly for rainwater harvesting and wall protection
- The appearance is unusual but stems from vernacular housing and farm buildings in Suffolk, this helps to define areas and gives identity.
- Village/rural typology provides a good place for children to grow up
- Local builders and trades used supporting the local economy
- Clay bricks made locally were used
- Mass walling in the form of hemp, a locally grown and renewable resource
- Shingle roof cladding used here, pantiles used on another project in the same village



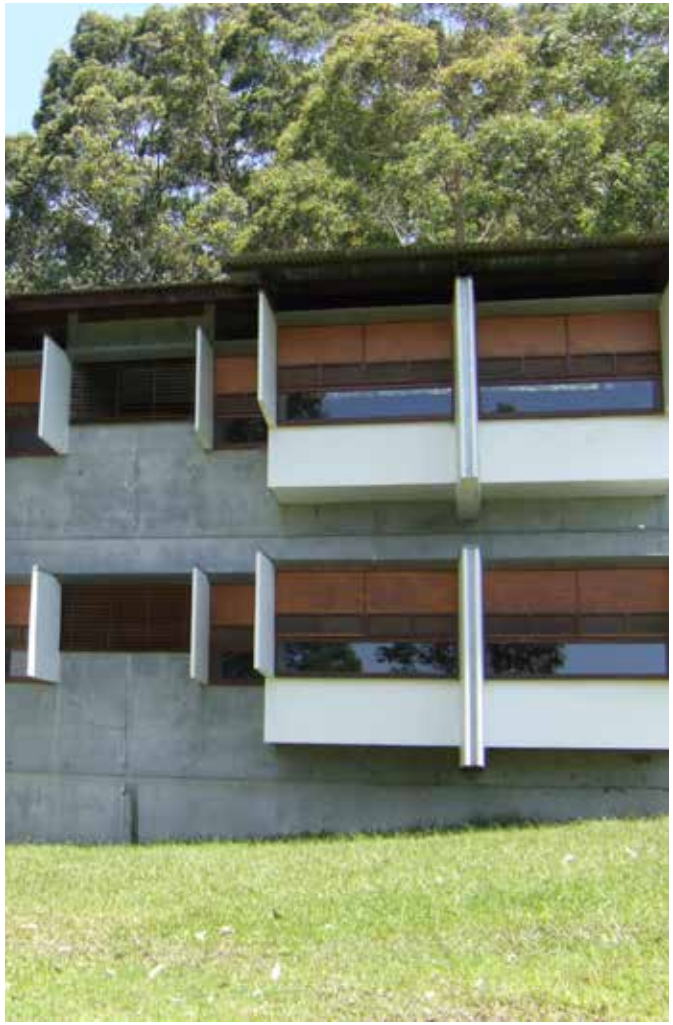
New - Vernacular - Design

New - Vernacular - Design

New - Vernacular
2nd Phase

Other Cases:
Santiago, Chile by
Marcelo Cortés

Other Cases: Four Horizons house by Lindsay Johnston



Other Cases: Glenn Murcutt's Arthur Boyd Education centre in Riversdale

Vernacular






New - Vernacular