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Tendencies of transience in the traditional architecture of Insular South-East Asia – Sketching theories and possibilities of research in house development

Tendenzen der Vergänglichkeit in der traditionellen Architektur in Insel Süd-Ost Asien

Abstract

The spread and evolution of building types in insular South-East Asia is a question, which has been seldom debated so far. There have been attempts to bring together data gathered by archaeologists, anthropologists and architects and to trace the development of certain building forms (Domenig, 1980) but no consistent framework and no methodology was created either in which more specialised and localised building research could fit.

One aim of the article was to outline the archaeological, historical and ethnological data available at the moment and the possibilities for its use regarding research in the history of building types.

I also tried to comment on those mechanisms of architectural change which I feel are relevant in the investigated areas and to discern processes which are valid for architectural development in most places of the world, and to discern those, which are specific to the region.

Of course, as data is still sparse, I tried to suggest a classification of architectural properties, which, if analysed in further research can be used in comparative studies. These properties are form (ground plan form, silhouette, volume, proportions), structure (structural principle, elements, materials, technique), spatial division and inner organisation and special architectural elements (decoration, symbolism etc). In each case I gave examples of local relevance and importance in wider development processes, as far as known at the moment.

Although much is quite unclear, and there is still dire need of research, I attempt at the end of the paper a brief synthesis of available data, albeit mainly by presenting more unsolved questions than by being able to give answers. However, I hope that this last part gives an idea on what still has to be researched and which topics can be regarded as already sufficiently documented and which assumptions are being part of presently accepted theories.

Architecture in Insular South-East Asia can be regarded as partly autochthonous to the region, as Papua New Guinean hunter-gatherers, whose ancestors entered the archipelago around 35 000 BC started to evolve a gardening culture in the Papua highlands around 5000BC. Due to the development of gardening techniques the population numbers rose, and this led presumably not only to expansion of these peoples even into the lesser Sunda islands but also to the development of an own style of sedentary architecture.

The second, and more defining architectural influence reached the archipelago with the expanding Austronesian people, who were early agriculturalists originating from southern China and moving via Taiwan and the Philippines into the area. They knew how to cultivate rice and there is evidence, that longhouse-style pile buildings were known to them. Also they were able to make mortise and tenon joints with their

stone age tools, albeit presumably using lashed bindings as the main connection technique.

The Austronesian expansion began approximately 4000BC, reached around 2000BC the lesser Sunda islands, from which point on one branch of the new settlers turned in western direction to become the ancestors of the present day western Indonesian and Malay populations, whereas the other branch continued its migration via Melanesia to Oceania.

Whereas in the Oceanian region somewhat separate developments took place, insular South-East Asia stayed in close contact with the mainland.

It seems, that after in southern China, particularly in the Yunnan region (around 1500BC) and in northern Vietnam (around 500BC) bronze artefacts started to be produced, new technologies were used in housebuilding. Namely it seems, that the introduction of the box-frame structural principle seems closely related to these innovations. We can also find many parallels in roof forms, if we examine bronze age mainland house models and depictions and present insular South-East Asian house forms. Shortly after the emergence of bronzeworking technology on the mainland we can also find archaeological evidence for these very peculiar roof styles in Japan. Thus the question emerges, whether that roof-form, which up until now was known as an Austronesian architectural speciality, could not be an invention of the bronze age and whether it could spread with the use of metal tools.

As an alternative we could contemplate, that this roof form was a common heritage of all the peoples originating from southern China. However, at the moment there is not enough evidence to decide this question.

Later developments, which influenced local vernacular architecture can be traced much more easily, as they can usually be linked to certain stages in state formation or the introduction of new religions like Hinduism, Buddhism, Islam or Christianity. Also from the 8th century AD there is already pictorial evidence of buildings available in the archipelago itself, mostly found on temple reliefs or as terracotta house models.

Although structural and technical questions of house development are better researched at present, we do lack comparative studies of the development of interior spaces or space utilisation. A particularly interesting question is from which time on certain buildings started to be partitioned into several rooms and why.

I hope that the further study of mechanisms of architectural change, subdivided according to their aspects related to social change, cultural and spiritual perceptions of the house, building knowledge, economy, environmental and site factors will reveal more on this complicated subject in future.

Inhalt

Die Verbreitung und Entwicklung von Gebäudetypen in der südostasiatischen Inselwelt wurde bis heute selten in einer umfassenden Weise untersucht. Verschiedene Ansätze um archäologisches Datenmaterial, völkerkundliche Forschungen und architektonische Dokumentation gemeinsam auszuwerten, mit dem Ziel die Entwicklung verschiedener Architekturformen zu rekonstruieren, wurden zwar getätigt (Domenig, 1980), jedoch wurde kein größerer Rahmen und keine Methodologie entworfen, das die Gebäude mit Hilfe von mehreren Forschungsansätzen kategorisiert und in welchen Rahmen spezialisierte, lokale Forschungen eingefügt werden könnten.

Ein Ziel dieses Artikels ist es, den momentanen archäologischen, völkerkundlichen und architektonischen Forschungsstand grob zu umreißen, und die Verwendbarkeit dieser Daten für die Konstruktion eines größeren Rahmens oder Überblicks der Gebäudeentwicklung im südostasiatischen Raum zu evaluieren.

Ein Versuch, wesentliche Punkte von Prozessen des Wandels in der vernakulären Architektur zu erfassen und zu beschreiben ist ebenfalls unternommen worden. Die Beschreibung ist natürlich weit davon entfernt umfassend zu sein, dennoch wurde bei den behandelten Aspekten versucht, zwischen wahrscheinlich global gültigen Entwicklungsmustern und lokalen Sondersituationen zu unterscheiden.

Da auswertbare Daten nicht immer vollständig vorhanden sind, wurde versucht Kategorien architektonischer Eigenschaften aufzustellen, die bei näherer Untersuchung und Einbringung von neuen Daten bei weiterführender komparativer Forschungsarbeit verwendet werden können. Diese Eigenschaften sind Form (Grundriss, Umriss, Volumen und Proportionen), Konstruktion (Konstruktionsprinzip, Bauelemente, Materialien, Bautechnik), räumliche Aufteilung und interne Organisation und besondere architektonische Elemente (Dekoration, Symbole, etc). Bei jedem dieser Eigenschaften wurde versucht auf lokale Besonderheiten und deren Relevanz für einen größeren entwicklungsgeschichtlichen Zusammenhang (soweit momentan schon bekannt) hinzuweisen.

Obwohl bei jetzigem Stand der Forschung noch viele ungeklärte Details existieren, wurde am Ende des Artikels der Versuch einer kurzen Synthese unternommen, allerdings auch auf die Gefahr hin, dass bei vielen Untersuchungsfeldern eine Vielzahl unbeantworteter Fragen präsentiert werden müssen. Da dieser abschließende Teil jedoch nicht nur als wissenschaftliches Resümee sondern auch als gezielte Anregung einer weiteren Debatte verstanden wird, wurden hier nicht nur durch bereits akzeptierte Theorien und durch Forschungen untermauerte Ergebnisse, sondern auch bis dato unbestätigte Annahmen dargestellt.

Zusammenfassend kann man feststellen, dass die Entwicklung von Gebäuden im südostasiatischen Archipel einerseits autochton mit einem Zentrum in Papua Neuguinea begonnen hat, andererseits jedoch Gebäudetypen durch eine neusteinzeitliche, vom südchinesischen Festland ausgehende Expansionsbewegung in die Region gebracht wurden.

Der südostasiatische Archipel wurde in etwa 35 000 v.Chr. von aus der Richtung des Festlandes einwandernden Jägern und

Sammlern besiedelt. Diese entwickelten in den Hochlandgebieten Papua Neuguineas um etwa 5000 v.Chr. eine Gartenbaukultur. Da diese neue Subsistenzmethode höhere Einwohnerzahlen erlaubte, kam es zu einer Expansion bis in die Kleinen Sunda Inseln und wahrscheinlich auch zu der Entwicklung eines eigen sedentären Architekturstils.

Der zweite, bei weitem bestimmendere Architektureinfluss erreichte das insulindische Archipel im Zuge der austronesischen Expansion. Diese neolithische Gesellschaften, die frühe Formen der Landwirtschaft betrieben, wanderten über Taiwan und die Philippinen in die Region ein. Sie brachten das Wissen um den Anbau von Reis, und Funde aus Südchina bezeugen, dass dortige, ihnen nahestehende Kulturen in Pfahlbau-Longhäusern siedelten. Diese Häuser waren teilweise mit Holzverbindungen erbaut, die mit Hilfe der steinzeitlichen Werkzeuge hergestellt wurden. man kann jedoch davon ausgehen, dass ein Großteil der Konstruktion von gebundenen Verbindungen zusammengehalten wurde.

Die austronesische Wanderbewegung begann um ca. 4000 v.Chr., erreichte um 2000 v. Chr die Kleinen Sunda-Inseln. Hier wandte sich ein Teil der Siedler in westliche Richtung, und wurden so zu den Vorfahren der heutigen modernen westindonesischen und malaischen Gesellschaften, während sich der zweite Teil die Expansion über Melanesien in die ozeanischen Gebiete fortsetzte. Während diese letzteren ozeanischen Bereiche eine eigene und separate Entwicklung verfolgten, blieb die insular südostasiatische Region in engem Kontakt mit dem Festland.

Man kann annehmen, dass nach dem Beginn der Herstellung von Bronze und Bronzeartefakten in Südchina, im Gebiet von Yunnan (ca. 1500 v.Chr.) und in Nordvietnam (ca. 500v.Chr.) auch neue Techniken im Hausbau angewandt wurden. Besonders das Konstruktionsprinzip des (Kasten-)Rahmenbaus (box-frame) scheint aus dem innovativen Einsatz von Holzverbindungen und Bronzewerkzeugen hervorgegangen zu sein. Bei näherer Untersuchung von archäologischen Funden mit Hausabbildungen (Modelle, Zeichnungen) vom Festland und dem Vergleich dieser mit heutigen insulindischen Hausformen ergeben sich bestechende Parallelen und Übereinstimmungen. Auch in Japan findet man nach der, vom Festland ausgehenden Verbreitung der Bronzebearbeitungstechniken prähistorische Darstellungen von Häusern, die ebenfalls sehr ähnliche Konstruktionsweisen und Dachformen aufweisen. Die Frage, ob jene Dach- und Konstruktionsformen, die bislang als spezifisch austronesisch angesehen wurden, nicht eher ein Produkt der Bronzezeit und der schnellen, grenz- und ethnienübergreifenden Verbreitung bronzezeitlicher Technologie sind, ist eine, die diskutiert und weiter erforscht werden muss.

Ein alternativer Ansatz wäre es, die Dachformen als gemeinsames neolithisches Erbe der agrarischen südostasiatischen Festlandkulturen zu betrachten, doch fehlen bislang jegliche Funde, die Rahmenbauten aus einer so frühen Zeit bestätigen. So scheint es, dass selbst wenn die Dachform früher datierbar wäre, das Konstruktionssystem selbst aus der Bronzezeit stammt. Eine definitive Entscheidung ohne weitere Funde scheint momentan sehr schwer.

Spätere Entwicklungen, die lokale Varianten traditioneller Architektur beeinflussten, können viel leichter nachvollzogen werden, da sie oft mit gewissen Stufen der Staatsbildung oder der Einführung von Weltreligionen, wie Hinduismus, Buddhismus, Islam oder dem Christentum in Zusammenhang zu bringen sind. Ab dem 8.Jhdt existieren außerdem auch Abbildungen von Architektur aus der insulindischen Region, meist auf Tempelreliefs oder als Terakottamodelle.

Zwar sind die konstruktiven und technischen Aspekte der Hausentwicklung momentan besser erforscht, doch wären auch Untersuchungen der Innenraumorganisation und -entwicklung vonnöten. Eine besonders interessante Frage ist warum und wann manche Gebäudetypen interne Partitionen erhielten und warum dies bei anderen nie geschah.

Auf diese und viele andere offene Fragen kann in Zukunft, so hoffe ich, die weitere komparative Erforschung der architektonischen Evolution, besonders in Hinblick der Auswirkungen von sozialem Wandel, kulturellen und spirituellen Gesichtspunkten, Bautechnologie, Wirtschaftsfaktoren und Umgebung und Standort, weitere Antworten liefern.

1 Stone buildings are extremely unhealthy compared to airy wooden-frame houses. They possess too much thermal storage capacity

2 Building technique and materials have changed at a rapid pace in the last 80 years. These changes have had an effect on traditional buildings. It is also important to be aware that in the last 1000 years there have been fewer technological changes than in the 20th century alone.

3 For more information on these social and ritual aspects of the house in Indonesia see Waterson 1990.

4 as opposed to up to 500 years in temperate climate

Introduction

„Some societies hold a conception of the house as perennial, a building erected and restored to endure the test of time; others, on the contrary, hold a conception of the house as ephemeral, a structure which they can leave or even pull down before settling in a new one.“ (Christian Bromberger in Oliver 1997 p.119)

South-East Asian houses are ephemeral by nature, and thus they have to be frequently rebuilt. Yet, despite this constant process of rejuvenation and modification the thoughts and ideas of the people building and inhabiting these structures have essentially remained similar for more than five thousand years and hence ensure a certain degree of longevity and continuity of this particular architecture.

In this article I will try to give an overview of the prevailing general theories on origins, evolution and diffusion of the house in insular South-East Asia. In particular, I will be attempting to trace the prehistory and history of the people who settled there. After all, archaeological findings suggest that there must have been strong links between the Neolithic South Chinese communities and later Insulindian settlement. Bronze Age South-Chinese and mainland Southeast Asian communities seemed to have a determining influence on certain developments in insular South-East Asian peoples, especially in today's Indonesia. This will hopefully help to unfold the history and development of their homes and reveal subsequent aspects of architectural modifications.

I will try to explore mechanisms of change in traditional building types and present some selected aspects of South-East Asian building culture, which I believe are essential for understanding these processes.

These special aspects are form (ground plan form, silhouette, volume, proportions), structure (structural principle, elements, materials, technique), spatial division and inner organisation and special architectural elements (decoration, symbolism etc).

Although at present state of research very few questions can be answered ultimately, I will try to relate these properties, if possible, to endogen or exogenous influences.

General characteristics of the insular South-East Asian living situation

There is maybe nothing more ephemeral in Architecture than a wooden building in a tropical climate. Humidity, rain, and insects will almost always destroy the structural parts, and strong winds will further affect the stability of the building. The effects of these destructive influences are far more severe than in temperate or arid zones, and yet a very high diversity of wooden building forms can be found in tropical regions.

The reason for this is, of course, that there is or was plenty of wood to build with and that wooden buildings, although not long lasting in their physical structure, offer the optimum of living comfort under the prevailing weather conditions in these parts of the world. The material stone, highly regarded in other regions, is only of minor importance in the traditional architecture of insular South-East-Asia¹.

As the life expectancy of a traditionally built

structure in Indonesia usually is around 25 to 50 years at best (or in most cases even shorter) it is unusual to encounter physically old houses during a trip to the region. Yet, while investigating building techniques, forms and types in Insulindia, the impression of a very old heritage emerges.

Of course, we can assume that there have been a vast number of formal and structural alterations and developments in the past², most likely with the introduction of new materials and structural elements, but interestingly Eastern Indonesian traditional architecture displays a high resistance against fully breaking with "long-term-traditions", as can be noticed in other countries where a modern lifestyle and a market economy are rapidly overtaking the traditional life. This reluctance to alter old ways should not be mixed up with a lack of flexibility or stubborn narrow mindedness- in most fields of life Indonesians utilise the merits of the so called "western civilization" with surprising inventiveness and adaptivity.

However, architecture seems to belong to a part of life, where alterations are slow (at least in the countryside) and not without a purpose.

The image and the idea of the house are of central concern in most Indonesian societies. The house is not only a mere shelter from the elements or a sign of rank and wealth, but it is also focus of social and spiritual life, maybe in a far more intense way than in any other society. These buildings possess their own "spirit", "name" and "personality" which in turn is interwoven with the history of families and clans.

The continuity of a family is upheld and its spirit refreshed each time a new generation is born, the re-building of old houses serves a similar purpose. Although the materials may have decayed physically, the essence and the idea of the building is re-established each time a rebuilding process takes place³.

Although the "idea of the traditional house" may be continuous, the techniques and the form of a new -old building may change to a limited extent, depending on knowledge, preferred way of working, and cultural influences or social developments. However, as the construction process itself is highly ritualised changes occur only slowly, similar to the text of an ancient epic poem does not alter much when transferred to the next generation.

Possibilities of investigating the past of architectural Traditions

As stated above wooden buildings in humid tropical climate have a life span of usually not more 30-50 years⁴. This means that a building has a shorter lifespan than its builders, a situation which is highly uncommon in European countries where houses are designed usually for more than one generation. In a physical sense these structures are really short-lived but the typologies, construction methods, and the "idea" or "mental plan" of the house structure is not, as we will see.

If we wish to investigate the development of traditional housing in Eastern Indonesia over a longer period of time, we have to turn to sources other than houses themselves. Unfortunately

written records are also very rare, as Insulindian communities transferred their knowledge orally. Historical accounts of "outsider" persons or groups like colonial powers, traders, travellers or anthropologists are very rare for most areas and usually can only be used to describe the periods of the 19th century. Older accounts of more than 200 years in age generally report on architecture in very hazy terms (if they report at all). In recent times archaeology has made large advances in reconstructing certain events in the South-East Asian past, but this field of science still only delivers clues regarding architecture.

There is little chance to reconstruct an overall development scheme of insular South-East Asian traditional architecture from the "usual" sources. So we have to consider whether the detailed investigation of current traditional buildings can produce any usable results. Even if we will never be able to trace all the finer changes and interactions within different building types of the region, I am convinced that by constructing a wider framework using the results of archaeological excavations and historical research, it is possible to "fit" certain building types (or groups of building types) into their approximate place within a larger "picture".

For this purpose it is important to consider following statements about the nature of change in architecture:

- A, Architecture Evolves. It changes. Usually from less complicated forms to more complicated ones⁵.
- B, There are areas, where change is slower and there are areas where change is faster.
- C, Changes can be caused by exogenous (outer influence) or endogen (innovation within) factors.
- D, In the case of exogenous changes cultural transmission or culture replacement can occasionally happen. (Oliver 1997)
- E, Older forms and techniques can exist parallel with new ones, usually in not so prominent positions

From these statements the following questions emerge:

- 1, Is it possible to determine, how "ancient" or "archaic" a certain aspect of a traditional building is?
- 2, Are there building types still left which can be assumed to be more "archaic" than others (even if existing parallel to more recent ones)?

We should be aware that usually there is never a straight line of development, but rather a vast number of influences and reasons are being responsible for the emergence of a building type. This, in fact, means that something which strikes us as being "archaic", does not necessarily have to be a relic of ancient times, but can also pose a more recent adaptation to changing circumstances. For both of the above questions there is no definitive positive answer, but by examining certain cases in a comparative way (together with prehistoric and historic evidence) I believe we can draw at least certain assumptions, which then can help us to

understand the overall distribution of building types as we find them in Indonesia at present.

Prehistory and History of the area

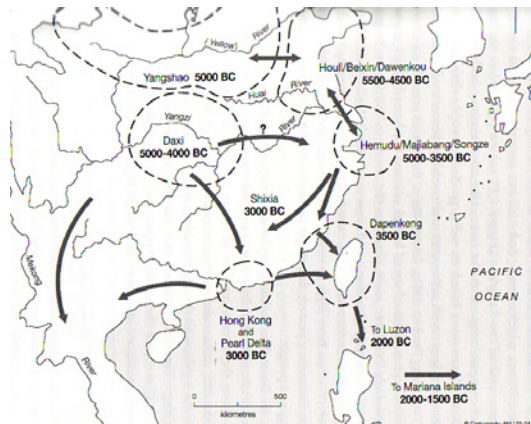


Fig. 1

Before examining the buildings and their transformation, it is important to know about certain historic developments in the area of research. I would like to give a short overview, since it is important to understand certain sources, which describe or depict traditional architecture in a wider historical framework. These sources can be historical accounts, temple reliefs, stone monuments, but also archaeological findings and artefacts.

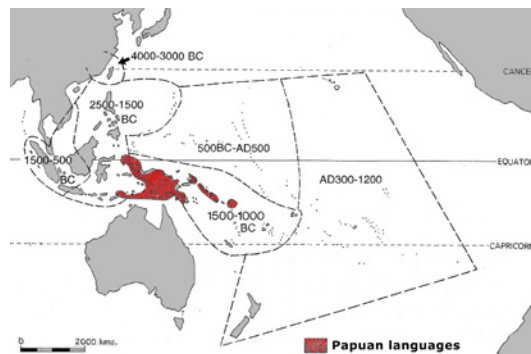


Fig. 2

The majority of the people of Indonesia speak so-called Austronesian languages, with the exception of inhabitants of the province of Papua (formerly Irian Jaya) on Papua New Guinea and a few groups on islands in the vicinity of Papua.

Both linguistic and in physical appearance of certain parts of Eastern Indonesia seem to be a strong contact zone between these two main spheres of influence.

According to archaeological findings (Bellwood, 1997) Papuan groups of hunter-gatherers entered the archipelago approximately 35000 years ago, whereas the ancestors of the Austronesian speaking people started to expand from their assumptive homeland in southern China via Formosa and the Philippines into present day Indonesia by 4000BC⁶.

Bellwood also states that the Austronesian migration route led via Sulawesi to the lesser Sunda-Islands (2000BC) from where the new settlers continued their journey in two directions: Some heading west, reaching Java and Sumatra by approximately 1500BC and

⁵ However in certain special cases also simplification is possible.

⁶ The Austronesians reached the Philippines presumably by 2500BC.

Fig. 1: Distribution of archaeological cultures in China between 5000 and 3000BC, showing likely early axes of communication and population spread. Based in part on Chang 1986 (Bellwood 2004 p123)

Fig. 2: Approximate dates derived from archaeological findings for the expansion of the Austronesian settlement. (Bellwood 1997 p118)

7 The kingdoms of Champa on the Southern Vietnamese coast were founded by Austro-nesian speaking people.

8 From the 4th century there is evidence of trade with India and China, in which not only foreign ships but also Indonesian vessels were involved.

finally expanding to mainland Southeast Asia by occupying certain territories of present day Malaysia and Viet-Nam by 1000BC⁷. This movement was stopped by the encounter with Austro-Asiatic-speaking people (the ancestors of the Mon-Khmer).

The second migration from the Lesser Sunda Islands was eastwards, occupying the shores and little islands along the Papuan coast. Here the so-called Lapita-culture emerged and developed fully by approximately 1500BC (Kirch, 1997). Archaeologists are convinced that the excavated "Lapita" settlements are linked to Austronesian people, who later on settled in Oceania and became the ancestors of present day Polynesians. These findings are strongly supported by linguistic evidence. The only architectural evidence before the time of Lapita settlement (which is fairly well documented) are two excavated houses on Dimolit, northern Luzon(2500 – 1500BC, see Bellwood 1997, p. 220) and some archaeological sites of the Tapenkeng (see Kwang-Chih, 1969) culture on Taiwan.

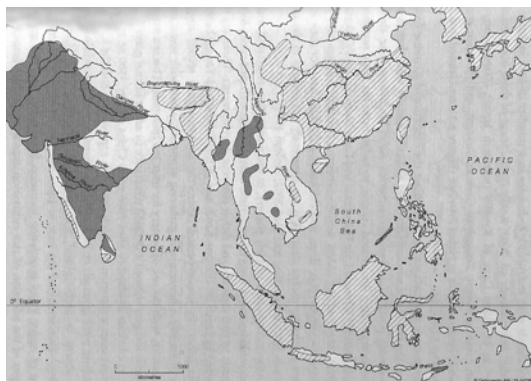


Fig. 3

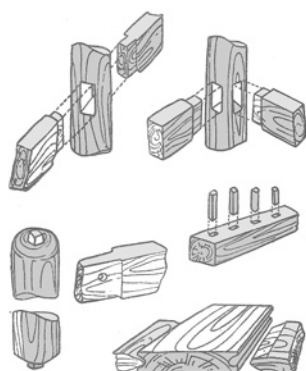


Fig. 4

Fig. 3: South, East, and Southeast Asia showing zones of low, medium and high dry season stress. Mainland Southeast Asia and northern China are occupying intermediate positions, Island South East Asia and Southern China are the wettest regions. (Bellwood 2005 p113)

Fig. 4: Wooden joints used in buildings at the neolithic site of Hemudu. (Liu 1985 p 6)

Fig. 5: Excavations at Hemudu.

Fig. 6: Banpo-culture village in Jiangzhai, Lintong County, Shaanxi Province: plan of archaeological site and drawing of the village as it might have looked. (Chang 2005 p 69)

Fig. 7: Reconstruction of a house from a Banpo site, Shaanxi Province. (Steinhardt 2002 p. 15)



Fig. 5

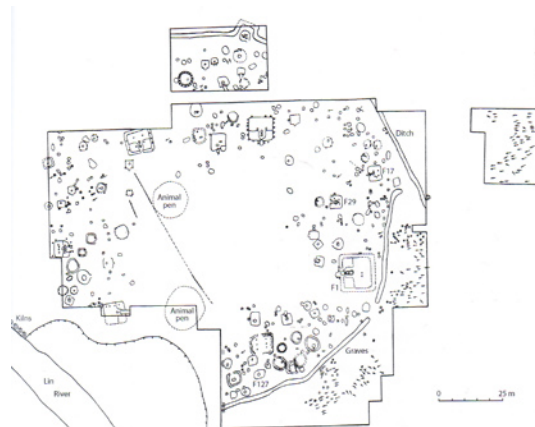


Fig. 6

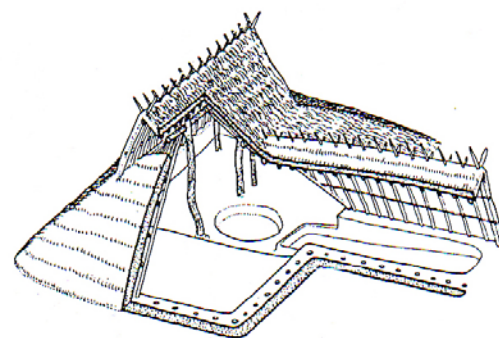


Fig. 7

The Austronesian migrants had stone-age tools and were agriculturalists. It is assumed, that the surplus of their agricultural produce made population growth and thus demographic expansion possible (Bellwood, 2005). They cultivated rice, but after moving into tropical latitudes tropical tubers (taro) and fruits became more and more important. Only when reaching areas suitable for its cultivation (mainly on Java and its vicinity) a change back to rice as the main staple crop did take place.

While colonising newer and newer islands seafaring and navigational skills were developed, which served to establish an inter-island exchange network, which would form the basis for future large-scale sea trade⁸. The new settlers first occupied coastal locations, only gradually moving into the interior of the islands. During this process already existing hunter-gatherer populations presumably intermingled with the newcomers or were pushed back further and further into the forested hinterland.

As a hunter-gatherer lifestyle was not able to support high population numbers they vanished without leaving much trace⁹.

However, certain parts of eastern Indonesia seem to have been settled by Papuan inhabitants, who had developed at the time of Austronesian arrival already an effective gardening system, allowing to sustain higher population numbers. Scientists today regard this development to be part of the reason why Papua New Guinea and certain other Islands were not settled by the Austronesian newcomers. However, as the result of their respective expansion the two populations met, and intermingled to certain extent. A strong contact zone among others is presumed to be Timor, eastern Flores and some close islands, where not only the physical appearance of the inhabitants shows strong Papuan characteristics, but also Papuan languages can be found in certain isolated areas.

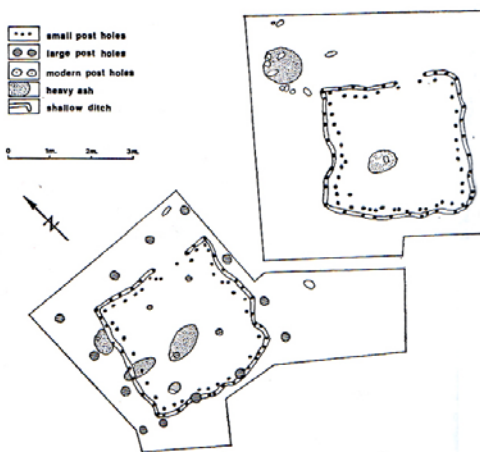


Fig. 8

Austronesian expansion reached its peak in approximately 400AD when ships with crews originating from somewhere in southern Borneo under the command of Javanese captains landed on Madagascar. At this time trade on the sea routes from India via Sumatra and Mainland South-East-Asia to China was well established. Even late Roman artefacts were found in some trading ports of the mainland (Glover, 2004, Higham, 1989).

Around 500BC important centres with high technical knowledge in bronze working emerged on Mainland South-East Asia¹⁰ (Higham, 1996). Some artefacts from Dong Son in Northern Vietnam apparently reached Indonesia via trade (albeit presumably a little later than the above given date). The fact, that the Chams, an Austronesian speaking group had established itself in Southern Vietnam by 600BC eased the transfer of metal working techniques into the Indonesian Archipelago. Interestingly, some of the Bronze Age cultures had very peculiar megalithic monuments. Iron-working industries are also established quite soon in these early centres. Bronze artefacts show depictions of raised floor houses, with roofs resembling some present Indonesian types very closely. These depictions are found as models and bronze plastics in Yunnan, and as images on Dong-Son (Heger) drums originating in northern Vietnam.

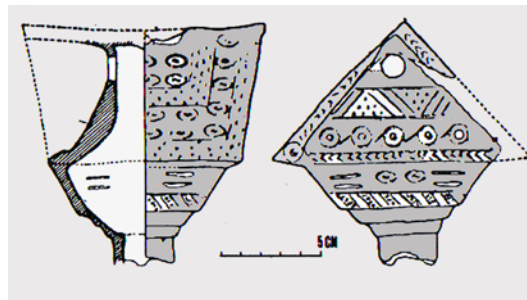


Fig. 9

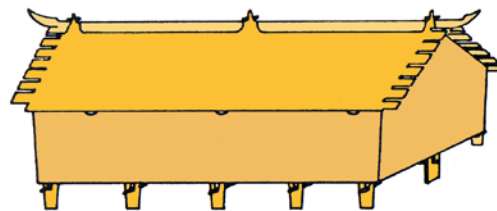


Fig. 10



Fig. 11

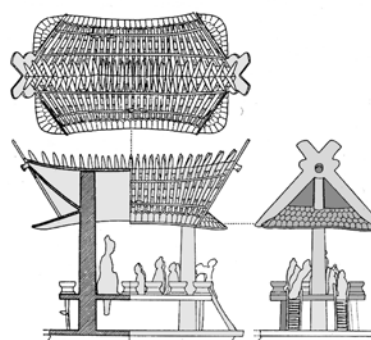


Fig. 12

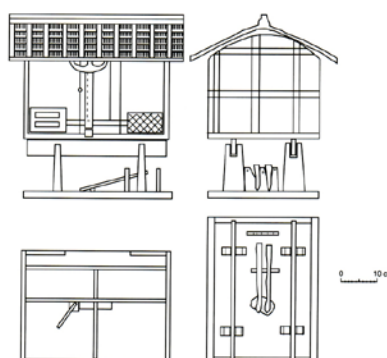


Fig. 13

9 Negrito tribes on the Philippines are regarded as descendants of such hunter-gatherer peoples.

10 Although bronze artefacts are already manufactured in several places from 1500BC onwards.

Fig. 8: House plans excavated in Dimolot, northern Luzon. (Bellwood 1997 p220)

Fig. 9: Handle of a ceramic jar in form of a house, found at Ying-panli, approx. 1500BC. (Domenig 1980 p 85), late neolithic.

Fig. 10: Bronze coffin in the shape of a house from Tapon, Hsiang-yün, Yunnan (approx 500BC) (Chang 1986).

Fig. 11: Bronzemodel of a house from Yunnan, 2nd century BC. Yunnan Museum.

Fig. 12: Drawing of a housemodel found in Yunnan, 2nd century BC, after Domenig (1980 p 87).

Fig. 13: Clay house model from burial 24 at Liujiaoguo, Yunnan, Bronze age. The depicted house shows every aspect of box frame buildings also found today in insular South-EastAsia. (Higham 1997)

11 from Kutei in Eastern Borneo (Miksic, 2004)

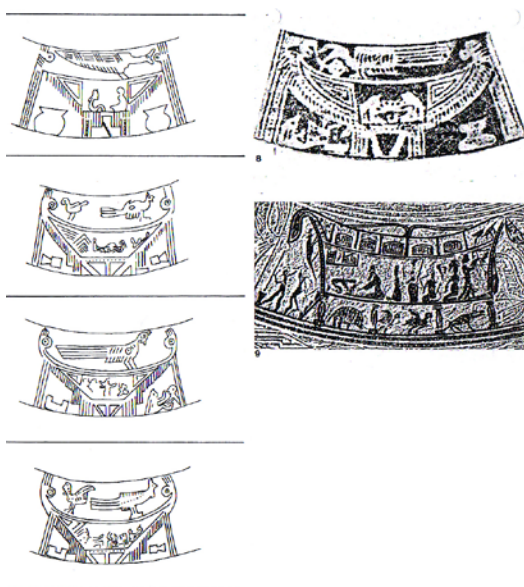


Fig. 14

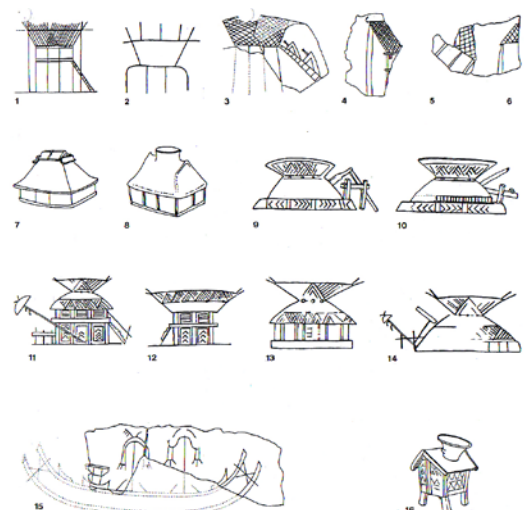


Fig. 15

From 170BC onwards these northern parts of Vietnam were subjugated by the expanding Chinese Han Empire. In present day Thailand, Cambodia and Viet-Nam small kingdoms (so-called "mandalas") were formed, where the ruling elite tried to consolidate its power by introducing Indian court ritual, script and religion with the help of invited Brahmins.

In Indonesia first stone Inscriptions date from 400AD onward¹¹, and soon there is record of the first kingdoms. A Javanese kingdom called Taruma existed around 430 and in 454 envoys from a Sumatran kingdom arrive at the Chinese court. In 644 the existence of a kingdom named Malayu is recorded by Chinese historians. Later in the 7th century the kingdom of Srivijaya seemed to have taken over control over the sea trade in the Sumatran region. In 742 the last embassy from Srivijaya reached China, afterwards information on this kingdom is rare. It is assumed from archaeological data that it continued to exist, but we do not know which role it played in the region.

Boomgaard (2006) explains the organisation of early states in the region in following terms:

"The coastal states had a dendritic physical structure: one "city" (town would be the better word) dominated a river with its various branches and the river's hinterland. As contact between two rivers over land was difficult or downright impossible, trade between two adjacent river systems had to be conducted along the coast between two establishments that dominated these systems. Srivijaya is an example where one river system dominated various other systems for a time, but where at a certain moment the hegemony shifted to another system (the Batang Hari, with Jambi-Malayu)." (Boomgaard, 2006, p.63)

These structures were in part due to the dense jungles and mountainous areas, which restricted land connection between the rivers; a situation quite similar to present-day Borneo and in this respect there are historical parallels between the Sumatran and Borneo kingdoms.



Fig. 16



Fig. 17

Fig. 14: Depictions of houses found on Bronze Dong-Son drums (Domenig 1980, p.33)

Figure.15.: Depictions of houses from Japan 1st-2nd century AD (1-6), 3rd century AD (7,8), 4th century AD (9-14), 6th century AD (16), without exact date but belonging to the Kofun era(15).

Fig. 16: Depiction of a building on a relief of the Prambanan temple.

Fig. 17: Depiction of a building on a relief of the Prambanan temple.

In the middle of the 8th century the formation of Hindu or Buddhist mandalas is recorded on the island of Java, some of which produced not only inscriptions but also built structures that survived until today. Here we can mention the Temples at the Dieng Plateau and at Gedong Songo. Borobodur is maybe the best known monument and was the centre of a late 8th century Buddhist mandala. Miksic (2004, p.242) states that "During the eighth and ninth centuries, Java formed an integral part of a far-flung Asian religious and economic network". It takes no wonder, that reliefs on Borobodur show Austronesian trading ships, with house like superstructures on board (presumably cabins). The roof style again is reminding us of roofs often encountered in present day Indonesia. On

a next panel right beside the boat a rice barn or some kind of storage house with rat guards and a box-frame structure is depicted. Again, modern ethnographic parallels can be found. Other buildings like pavilions and the like can be also seen at Borobodur.



Fig. 18

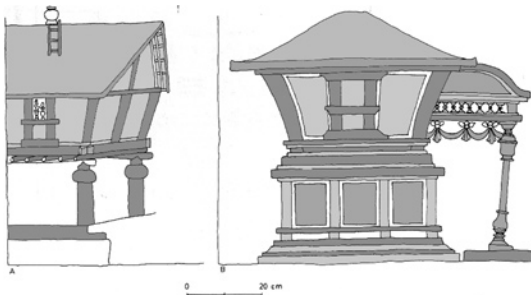


Fig. 19



Fig. 20

A last glimpse on the Srivijayan kingdom is provided by an inscription erected AD 775 in Thailand by the Maharaja of Srivijaya. Vietnamese and Cham records tell about Javanese military actions in 767AD and in 787AD in the region. This means that both Sumatran and Javanese kingdoms were influential powers, who maintained some sort of presence (even if it was maybe only the occasional military raid) on the mainland.

In 856 AD the Hindu temple Candi Loro Jonggrang at Prambanan was built by the Sailendra dynasty. Later the centre of power shifted more to Eastern Java and the influence of the newly emerging Kingdom of Singasari even reached Sumatra. We also find architectural depictions on these temples, albeit compared to Borobodur they are more abstract and less information can be extracted from them.



Fig. 21



Fig. 22

On Sumatra Srivijaya seems to have been defeated by the Kingdom of Malayu, and this seems to have put Muara Jambi at the political centre for a time instead of Palembang. Around 1263 Singasari and Malayu were at war. Singasari was defeated by the Javanese Kingdom of Majapahit in 1292. In the 13th century there was a "golden age" of Javanese culture, with Majapahit and its political centre, Trowulan (situated in Eastern Java) possessing the hegemony over large areas of the Indonesian Archipelago. There is a large number of house model finds and depictions, so it is possible to reconstruct Trowulan building types with a certain accuracy.

Trowulan was an important centre with significant architecture. As mentioned above, sherds, bricks, house models and carvings on temples give us a fairly good idea how its buildings could have looked like.

While the power of Sumatran kingdoms seems to have been based more on trade than on agriculture, the power of Javanese kingdoms was backed by agricultural production possibilities¹². This fact is maybe also due to the better possibilities for wet rice production (in particular more fertile soils) of Java (Boomgaard,

12 Which of course does not mean at all that Java was not involved in the trading networks – on the contrary, Javanese kingdoms played defining roles in this respect.

Fig. 18: Image of a building on a relief at Candi Singasari.

Fig. 19: Buildings shown on reliefs of Borobodur. (Dumarcay 1990 p5)

Fig. 20: Relief at Borobodur (8th century AD) showing a ship with a cabin on its deck having a typical Insulindian roof.

Fig. 21: Reliefs at Angkor Wat do not show any pile or stilt houses. Only elevated platforms, which seem to be more thrones than buildings can be found.

Fig. 22: The only proof of pile or stilt buildings in Angkor is this library building at Preah Khan. From archaeological evidence it does not seem likely that in Angkor (unlike present day Cambodia) a tradition of pile or stilt buildings existed.

13 The power of these Kingdoms was based on trade. This was the reason of coming in contact with Arabs and their religion.

14 The Arabs arrived as traders and settled in own quarters of coastal towns.

15 The state and the term Indonesia is a product of Netherland colonial rule. Present state boundaries are laid out according to former colonial borders. Indonesia is therefore no geographic or cultural delineation, but a result of European imperial politics. For the cultural area the term Insulindia and insular South-East Asia is used.

16 Rapoport, 1969.

2006). With time on Java a system of irrigation canals was developed. Sumatra lacked such institutions completely.

However, coastal Islamic kingdoms started to seize power of Java and forced Majapahit into decline¹³. Islam soon spread and a big part of the population of the archipelago embraced the new faith: among others the Acehnese, the Malays, the Javanese and the Bugis.

Not only Arab merchants were present in the area¹⁴, but soon the Europeans started to arrive.

The Portuguese were the first colonial power in the Southeast-Asian archipelago. They conquered Melaka in 1511 and their ships crossed the Indonesian seas¹⁵ regularly from the beginning of the 16th century. Then, in 1596 the Netherlands began to establish trading posts, soon dominating the region and its trade routes after only twenty to thirty years. Spain never gained a foothold in Indonesia; they only possessed peripheral settlements for some time, like Tidore (from 1521 onwards) on the Spice Islands. Spanish colonial efforts were mainly focused on the Philippines. In the following centuries, vernacular architecture was often influenced by colonial regulation or showed reactions to inevitable European contact.

It is very clear that the Insulindian archipelago was always part of a wider network. Although certain parts of this network became isolated during certain periods in history, to some degree the connections were never lost. On the contrary, most peoples and tribes of Indonesia had regular contact with other parts of Asia and participated in trade and cultural exchange. Thus Insulindian vernacular architecture is also not an isolated phenomenon, but part of a wider cultural network. However, I believe that changing patterns of contact and isolation together with a certain mentality of local conservatism or "openness" had an effect on the "progressivity" of local building culture.

Important Factors for architectural change

Most South-East Asian house forms share an obvious common heritage, despite the extremely high local variation in form, shape and appearance of these buildings. We can convincingly argue that a majority of the peoples, who created these houses, originally expanded from a homeland somewhere in South China. It can also be assumed that variation in house form before the expansion was rather limited because the communities before migration were early agriculturalists who settled on a comparatively small area of land (in contrast to the variation in vernacular architecture over the vast areas presently occupied after 7000 years of differentiation and spread).

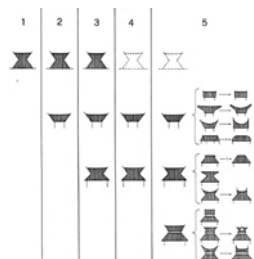


Fig. 23

Fig. 23: Evolution of insular South-East Asian roof forms according to Domenig (1980).

As movements took place into different terrain and surroundings and into differing climate conditions, the question arises as to the extent of change the architecture has undergone due to the change of environment as juxtaposed to changes due to cultural aspects.

After all, this expansion in territory and these changes in environment transformed the economy and agricultural practises as well, with a parallel social and cultural development of these communities, that actually mark the formation of distinct tribes and ethnological groups which then developed the typical local forms of the buildings attributed to them.

However, we have to bear in mind that it is not the environment, but ultimately man and his ideas, attitudes, worldview and way of thinking who determines the phenomenon which we term architecture.

As Reimar Schefold expresses it:

"An Important topic became the quest for potential factors which determine the shape of architectural constructions and which can explain the enormous diversity of house forms. In a much quoted work, Rapoport¹⁶ investigated the influence of physical and social forces such as climatologically or ecological conditions, available materials, technical knowledge and the role of the local form of economy. His conclusions, shared by many authors, were not surprising: such factors are constraining rather than determining, they facilitate and make possible or impossible certain solutions, but never decide form." (Schefold in: Oliver, 1997, p.6)

Therefore, although it is absolutely necessary to analyse site given environmental factors of the buildings and social structure and economy of a given peoples, we must never forget to thoroughly examine the ideas and perceptions about the house, as these ideas might reveal a deeper understanding for the mechanisms of change in the vernacular architecture of a region.

By analysing physical factors (site conditions, environment) and cultural traits of local architectural traditions, tendencies on superregional scale can be identified. A definition for cultural traits is given in Oliver:

"Traits are distinguishing qualities or characteristics, identified in specific instances within a broader conceptual class. [...] The concept of traits has also been applied to the smallest definable units of which an assemblage of artefacts within a society consists. [...] Clusters of characteristics are regarded as trait complexes, by which related clusters may be mapped within culture areas."

In this case culture traits and attributes are considered on a larger scale, as components of culture which are broadly common to most, sometimes all peoples, but which have specific expression in each particular culture, contributing to its collective identity." (Oliver, 1997, p.69)

I have selected for this study "social organisation", "perception of the house", "building knowledge" and "economy" as extremely relevant categories which will be examined more closely. Of course there is a wide range of other categories also

relevant and of course cultural traits can be grouped also in a different way. My selection is based on priorities set in relevance to the aim of this particular study, no claim of wider or general validity of this approach for other architectural investigations is made.

As it is clear from the short historical introduction into the situation in Insular South-East Asia, we have to investigate an expansion from a certain agricultural people from South China into present day Philippines, Indonesia, Malaysia and even Oceania. These people transported their specific architecture into the area, evolving special local forms during this diffusion.

According to this history therefore the following main statements can be made:

- diffusion of one or more original building types, which evolved over time and differentiated into local building styles
- there is the possibility that upon contact with other cultures ideas or innovations were transmitted from one peoples to others altering their architecture, or maybe even replacing some types of buildings (contact with Papua highland cultures, contact with cultures on the Malaysian peninsula and ultimately in mainland South-East Asia)
- as during expansion the Austronesians crossed zones with different climatic and environmental conditions, this supposedly also had an effect on their economy and also on their housing
- Important technical changes did happen as bronze and iron tools spread into the archipelago. This may have happened from 200BC onwards.
- as from the first century AD and consequently from the 4th century AD certain peoples of the archipelago were incorporated in international trading networks, the advent of new ideas and new religions caused cultural and social changes, which had strong effects on architecture
- with social stratification the need of architectural display in certain areas became strong
- the advent of Islam, and later Christianity and European colonial powers also had fundamental effects

For more precise statements let us investigate cultural traits and environmental factors and their possible effects on architecture more closely:

Change of Social organisation

As archaeological records of a certain peoples only permit indirect theories to be made on their social organisation, we do not know much about Austronesian society. However, comparative linguistics and the examination of present day ethnographic situation may allow for some assumptions.

All over the Austronesian world, founders of a settlement and their descendants have a special status. In many regions it is also customary, that the senior son inherits the position of the father, which gives younger siblings an incentive to establish households of their own in

new, previously unsettled locations, to become "founders" in their own right. This phenomenon is called by researchers the "founder principle" (Bellwood 1997, Kirch 1997) and recognised as one the reasons why Neolithic expansion into insular South-East Asia was conducted at a rapid pace. Kirch states connected with the Lapita-culture, the eastern offshoot of the Austronesian expansion (around 1500BC, in the region of Papua New Guinea and Melanesia) that terms in Proto-Malayo-Polynesian language were reconstructed, which imply that the institution of hereditary chieftainship with primogeniture was common among the peoples of this culture. He also suggests a model for cognate, ambilinear descent reckoning, which means, that these peoples were focusing on the "house" as a social unit (Kirch 1997 p. 188). These assumptions are made based on the analysis of linguistically reconstructed kinship terminology, and are consistent with social practises in many present-day Austronesian societies. Bellwood (1997, p.142) characterises social organisation within small-scale traditional agricultural societies in Insular South-East Asia as follows:

"In terms of descent ideology, the societies of Sumatra and the Lesser Sunda Islands tend towards unilineal norms (as do the Chams in Vietnam), while those of Peninsular Malaysia, Borneo, Sulawesi, and the Philippines are basically cognate (mainly bilateral, but occasionally with ambilinear descent reckoning)" Bellwood(1997, p.142)

These small scale traditional agricultural societies are maybe still the closest "relatives" of the early Neolithic Austronesian societies.

As we can see, we have good reason to assume, that the house was a defining factor in prehistoric times in this region, a fact which has not changed since then. Many Authors stress the importance of the house as the unit of social organisation (Waterson 1990, Fox 1993) in the Austronesian world.

We may assume that social stratification was less significant (or not present at all) in Neolithic times, whereas with the beginning of the metal age the formation of hereditary noble and ruling classes maybe anticipated (Higham 1996). Many present-day Indonesian tribal societies were stratified into at least one class of nobility, commoners and also slaves.

However, this stratification not always does have architectural effects. Usually commoners and nobles reside in the same type of house, although differentiation in size, elaborateness of decoration or use of superior material may indicate the rank of the inhabitants.

At present, there are many societies, where certain architectural elements are still used to indicate social class: The use of different roof types in Java for example or the number of gable panels, number of house-posts, buffalo horns as decorations and the use of ramps or the alignment of stairs among the Bugis of South Sulawesi. It is very hard to determine at what times such architectural elements became the prerogative of the nobility, but as a general rule we might say, that up to the point from which a society stepped over the threshold of being a mere "tribe" and started to become an organised and institutionalised "kingdom" or "mandala", architectural distinction started to be codified¹⁷. Before that, we can assume that there was only a principal distinction between

¹⁷ However this question should be researched more thoroughly as not much information is available at present.

18 Only in Oceania can we find among Austronesian speaking peoples elaborate rites centring on tropical garden produce like taro or yams, but here no rice can be found.

19 Or maybe the attic is sacred, because rice is stored there.

20 What legitimizes and proves direct descendance from some distant ancestor.

the house of the tribal leader and all the others. If there was a noble class present, their houses differed in size and elaborateness from those of the commoners. As state formation usually was combined with the advent of a world religion (be that Hinduism or Islam) often other aspects of architecture also changed with respect to these new ideas.

With the forming of "kingdoms" or "mandalas" on certain island (starting from around the 4th century AD) ideas of Hindu cosmology and cast society penetrated the communities, and also a ruling class was formed, which lay an emphasis on demarcating itself from the rest of their people not only spiritually, but also in their material culture and architecture. Although this is also a topic which should be researched more thoroughly, we can assume, that a distinctive "court architecture" was established, which served as the architecture of the ruling class.

'New' sacral architecture was also developed. However, certain ideas and concepts of the new religion and architecture found their way to the commoners, as we can witness in Bali until present day, where the layout of the common Balinese farm has incorporated a great deal of these ideas.

With the advent of Islam a stronger segregation of genders and of private and public areas was superimposed on existing house layouts. This also sped up the partition of one-room interior spaces by walls blocking sight and separating different zones inside the house. However, there is a general tendency of houses becoming partitioned over time (this is typical for house evolution all over the world), so it has to be considered carefully in each case what the determining factors might have been.

In Christian areas the importance of family life and the nuclear family as the "ideal" household unit was emphasised (following the ideas of missionaries based on European society as a desirable standard also for the converted "savages"). Thus policies against settlement in long-houses were advocated and also community houses as gathering places for the men of the tribe were abolished, if possible. Usually these activities were backed by colonial government, which also cared for improving "hygienic" standards. This meant the encouragement of separate kitchens, houses with windows, and where possible also smaller houses to stop the spreading of diseases (Waterson 1990). It is remarkable, that present-day Indonesian government for a long time also emphasised the importance of these colonial interventions, without any critical evaluation.

Perception of the house ("Cultural" and "Spiritual" reasons)

Sacredness

Sacral Architecture in Insulindia is very much connected to the living house itself, only in some cases special buildings are erected for this function. If belonging to some main religion like Hinduism, Buddhism, Islam or Christianity the communities tend to have their own sacral architecture which is either a blend of imported and local forms, or an adaptation of a local building type according to the requirements and cosmology of their religion. However, original

religious concepts of the Austronesians seem to have always incorporated a strong tendency towards ancestor worship. This had of course the implication that houses with many ancestors were regarded as more sacred or spiritually charged than others (Waterson, 1990, Kirch, 1997). Views on this spiritual "energy" can be observed in then concept of "semangat" which is the Indonesian expression for life force, which is believed to dwell in all human beings. Headhunting practices of former time had the aim to collect this life force of other beings, and through incorporating the heads (usually through their attachment to some parts of a house) their life energy was also adsorbed. Other spiritual concepts involve the sacredness of the rice harvest; rice also being a symbol of fertility. This hints, that maybe rice was amongst the first domesticated plants used in Austronesian agriculture (as other plants like millet or corn are not regarded sacred to this extent¹⁸) and makes the buildings and places where rice is stored very special.

Within the building itself the attic and the roof part can be demarcated as particularly sacred, thus not surprising that valuable heirlooms and rice (as well as other harvest) is always stored in the attic¹⁹. Of course this has other, more practical reasons, too, like protection from moisture, vermin and preservation through the smoke of the fireplace. However, in some places storage buildings consist solely of roofs, a fact that can be regarded as an Austronesian speciality and demonstrates above mentioned points in a very placative way.

If a form is regarded as "sacred" we can assume, that it will only change slowly (or slower than "profane" forms), as religion is always a conservative matter, and especially by being linked to ancestor worship, the display of "ancientness"²⁰ is also of special concern.

As a sacred building has a very high status within the community, the rules for display of prestige also apply to sacred structures. The question of course is, what part of the sacral building will be regarded as carrying the essence of its spirit – if it's the form and structure, it will be unaffected, but decoration might be progressive, if it is the spatial zonation and layout, they will stay the same for long time, but form might be monumentalized very fast, and if it's the decoration, it will not change much, even if all other aspects of the building will be transformed.

In Indonesia we find for example "rumah adat" (lit. houses of tradition, traditional origin- or clanhouses) which does not necessarily look traditional in a European sense, since they use new materials, and the like. Yet, for the local people some of their aspects are traditional and therefore can be assumed to be in continuity with the oldest buildings known by them. Thus, in each case it is important to find out which parts of a building or which aspects of a building type are those which are regarded to carry the essence of its spirituality.

We have to be also aware, that if decoration (carving, colouring, etc) was applied to houses in former times (and this applies especially for tribal communities) it had some sacred or at least highly symbolic meaning. It might not carry the "essence" of the sacrality, but we can assume for sure, that it is nearly ever "l'art pour l'art", and usually conveys at least some kind of deeper message.

In Insulindia the arrival of world religions only modified beliefs of sacredness within living buildings, it did not make them profane space by concentrating religious worship in congregation buildings. The concepts of the new religion were incorporated into the older cosmology, which was thus deformed but not abolished. For example Islam changed the desired orientation for houses to make them face Mecca (Malay and acehnese houses). In many cases the main axis was a relative, mountain-seaward vector, which was now modified by the new religion (Bugis houses). However the spiritual division of the houses remained essentially the same.

Roof forms of Austronesian houses are usually rectangular, however very rarely there are round forms, mainly in Eastern Indonesia. Domenig (2008) explains these forms as follows:

"In Indonesia the round roof apparently belonged to originally rather small-scale sacred structures. When practical considerations like the impact of strong winds occasionally suggested the application of a round roof to other buildings as well, this was sometimes done provided the buildings possessed a certain degree of sacredness as well, as in the case of granaries. As I have tried to show, the structural aspects strongly suggest, that in most regions where traditional dwellings in Indonesia had a round roof, this roof had first been a feature of the granary."

This statement however leaves some unclear points:

Eastern Indonesia, where most round or oval shaped buildings occur, is according to Bellwood (1997) also a strong contact zone to Papuan culture. Investigations on Papuan highland house styles should be made, to reach comparative conclusions, whether some of the forms could not have been inspired by these buildings, as many Papuan highland tribes have round or at least quadratic building forms. A similar phenomenon of Melanesian influence on Austronesian Lapita settlers and their descendants is known from Fiji and New Caledonia, where central house forms can be attested to an intermingling with Melanesian population.

At least one type of Austronesian Granary seems to have possessed a hipped roof on a quadratic ground plan²¹. This quadratic ground plan can be transformed in round or oval shapes, which seems to be the case in the lesser Sunda Islands as Domenig describes. However, there is also a duality of small scale sacral structures in the lesser Sunda Islands – very often round, umbrellalike structures occur parallel with rectangular ones.

Therefore I do not agree with Domenig, that original Austronesian settlers had small scale round sacred structures. I believe, that if there was an especially sacred building type, it had to be the granary (or the living house, but in many eastern areas these two types seem to be very close, as Domenig also points out). These granaries were rather quadratic and centered, but not necessarily round, with hipped roofs. In some areas they seem to have adopted round forms, maybe on contact with resident Papuan people, maybe out of other reasons.

However, this is only a theory at present, and needs closer research. It also does not explain western Indonesian round sacred structures (or at least not all of them). I believe this field is open for further research.

Prestige in architecture

Prestige can be gained if material wealth, money or labour is invested in buildings or in rituals connected to buildings in a way that other people can witness it.

The actions to show status have to have following effects that they can be recognised as such:

- their result has to be seen or witnessed, at best from the outside so that everybody can notice it
- the building has to be distinct from others after applying the measure (either optically, or spiritually)
- the measure should be as money or labour consuming as possible, else everybody else could imitate it.

These results affect certain parts of houses more than others, thus buildings or parts of buildings especially near public areas are more often used to display prestigious elements and of course those buildings or those parts of them which are more intensively frequented by visitors, both outsiders and community members.

In Insulindia also the arrangement of expensive rituals which include the distribution of wealth to relatives and other community members can be used to enhance the status of a house. In this case the prestige gained is spiritual and is remembered by the community, although on the house signs of the size and lavishness of these rituals may be placed, like the number of buffalo horns indicating the number of animals slaughtered in commemoration of the ancestors at festivities or funerals.



Fig. 24



Fig. 25

²¹ Austronesian ground floored houses with a quadratic ground plan where excavated in Dimolit, northern Luzon. The occupation of the site has been dated to 2500 – 1500BC (Bellwood 1997, p. 220).

Fig. 24: Buffalo horns adorn a house as a sign of feasts held for the house and the ancestors. Sumba, Waitabar village.

Fig. 25: Toraja village in central Sulawesi. Rice barns are located on the left side, houses on the right. The buildings are decorated with carvings. Buffalo horns attached to the pole supporting the characteristic roof show the number of animals slaughtered during rituals connected with the house and its inhabitants.

22 "Monumentalization" means the disproportionate aggrandisement of building dimensions. A very common development is the use of "overhuman" or giant measurements to make outsiders feel very small and uncomfortable, strengthening by this the homeowners position of power.

23 "Langlebige Gegenstände wie auch materielle Kultur insgesamt sind insbesondere in Gesellschaften ohne schriftlich kodifizierte Geschichte eine wichtige historische Quelle und Ausgangspunkt für ein eigenes Geschichtsbewußtsein."

Building measures to show enhanced prestige of a building include the use of a special surface (special material, colouring or decoration), monumentalization of architectural elements or the whole building²², in some cases even the use of new, special building types.

With time some signs of prestige became reserved for certain social groups like the nobility (certain architectural elements, decorations) and signalled permanent rank and status.

However, buildings of lesser importance are usually still built with not-so prestigious materials and older techniques, even if representational buildings employ expensive material and a different design or style. This survival of older techniques and designs is very typical for vernacular architecture, only if there is general affluence or a complete and radical technical change, less important buildings are also executed in similar ways like the representative and highly prestigious ones.

However, in some cases even outbuildings themselves may become a sign of prestige and affluence, especially if they carry spiritual or other meanings.

An example are granaries and storage buildings. Among the Toraja of central Sulawesi the number and decoratedness of storage buildings is a sign of prestige. This pattern can be also found in other Insulindian societies.

Other examples of prestigious building features in insular South-East Asia include the roofsize and -form (among the Toraja, Bugis, and on Java), the placement of stairs and ramps (Bugis), the placement of decorative elements (buffalo horns on Bugis nobles houses) and signs of past rites (number of sacrificed buffalo skulls on Toraja houses), carvings, colours, and use of more modern and more expensive materials like wood instead of bamboo or bricks and concrete instead of wood.

Forms as symbols

Houses are the collective memory of societies: *"Objects with a long lifespan and material culture in general are particularly in societies without written historical records an important historical source and a base for their own historical awareness"*²³ (Brumfiel 2003 cited in Hahn 2005)

This collective memory uses symbols and spatial organisation to convey certain attitudes, values and even behaviour to the people living in them and to future generations. Symbols are always culturally defined, and even though their meaning can change over time some interpretations seem to be quite persistent. Of course, if conventions change, symbols are very often filled up with new meanings or these meanings are even intentionally "redefined" by certain social groups. Also new social fractions (for example a clan or tribe) might try to discard old sets of symbols and try to use new ones to demarcate themselves from other peoples. In Insulindia one of the most remarkable symbols is roof form, which is perceived by the people as a marker of ethnic identity. We can therefore assume, that during differentiation of social groups within the Austronesian community this element could have been used as a sign of group affiliation, and this could have led to the development of new forms.

However, this topic is not really well researched

yet, specific comparative studies should be conducted how much relevance symbolism for architectural development processes in insular South-East Asia holds.

Building Knowledge

From archaeological excavations all over the world it is evident, that there is usually a development in building technique, mainly due to improvements in tool technology. Even if at times technological development lines break and restart at a former level, the tendency is always the same, albeit development speed is sometimes faster and sometimes slower.

Following general characteristics apply:

1, More effective tools are developed over time. – Working tools are usually quite simple in the beginnings, but become more and more complex with time. They are manufactured by better and better trained specialists.

2, With the increasing effectiveness of tools the level of processing and workmanship applied to building elements increases (change from round posts to rectangular beams, from simple joints to more elaborate ones).

3, The higher level of processing is usually also connected to scarcity in building material (as population levels and use of wood heighten also at the same time) – with better processing more building material can be extracted from the forest and the felled trees.

4, Whereas in the beginning the building process is conducted by untrained village people under the supervision of a few more or less knowledgeable semiprofessionals or professionals, with time the whole building process is executed by trained craftsmen (in the case of wooden buildings). Later on all building activity tends to move in the direction of prefabrication and industrialisation.

The use of quite high technical knowledge is attested from very early times. In Europe, a wooden well-frame found in Erkelenz (Gerner 2000, p.13) is dated to 5000 BC and is constructed with stone-age tools with well executed joints. In South China the stone age settlement of Hemudu, which is dated 5000 - 4600 BC consisted of longhouses which made use of mortise and tenon joints and dowels (Liu, 1985). This culture has presumably similarities to early Austronesian cultures, so it is reasonable to assume, that wooden joints were also known to the people settling insular South-East Asia.

However, excavations in Europe also give evidence of use of lashing and lashed joints in neolithic pile dwelling villages at lakes near the Alps (Gerner 2000, p.13). In these settlements also mortise and tenon joints were used. Construction principles of excavated neolithic houses in China also suggest the use of lashings. As in Insular South-East Asia and Oceania lashed joints are still very common, we can assume that they existed parallel to mortise and tenon joints during the stone age.

I want to stress, in architectural evolution the lashed joint is older than any mortise and tenon construction, as it was much easier with primitive tools to join two pieces of wood with lashings than to fabricate joints. Even if familiar to the technique of mortising, with only non-

effective tools at hand, it is supposedly more energy-effective and faster to resort to binding techniques, than to try to make joints.



Fig. 26

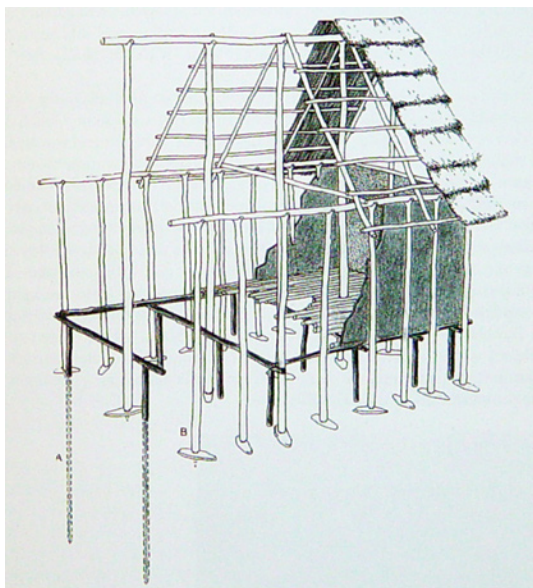


Fig. 27

For a very long time, structural principles were used in traditional architecture, which favoured the use of lashed joints. We can assume, that although joints were used during the stone age to a limited extent, they only started to be determining with the advent of metal tools. However, in Europe the shift from a system of house structures which make the use of lashings favourable to systems completely relying on mortise and tenon joints took place only around the 13th century (Theune-Vogt, 2009). This change pululated all over Europe

(within one generation), since the area was at that time economically strongly interwoven. However, the new techniques did not necessarily mean a change in local house forms, only a change in the underlying structure.

The systems favourable for lashings have dug-in posts to stabilise the whole structure, as lashings are not rigid²⁴. However, from the bronze age, but especially the iron age we can notice the more and more frequent use of joints not only in the technically quite advanced mediterranean world, but also in the northern parts of Europe (for example Biskupin, see Rajewski, 1959).

Interestingly, in many areas of Indonesia we still find houses which have structures working very much with the same principles of dug in posts. We have to remark, that although in Europe structural change to wooden frame buildings took place in the middle ages, in the graeco-roman world frame constructions entirely using

joints were the standard (already around the 1st century AD! – Adam, 2003, Johnson, 1983). However after the collapse of the roman empire these technical achievements were forgotten for some time (or in certain European regions they were never introduced).

For East Asia a similar high standard of woodworking is attested at the forming Chinese imperium at approximately the same time.

We can see, that although dealing with two quite unconnected culture areas, similar line of architectural evolution took place in Europe and in East-Asia. However, in some parts of Insular South-East Asia and Oceania technical solutions seem to prevail, which were abandoned in Europe and Mainland East-Asia (especially in the technically quite advanced Chinese empire) during the middle ages or in some cases even before that. The use of lashings is one such feature, which seems to have been common in the whole world, but in many places has been replaced by mortise and tenon joints. Ultimately the change from lashings to joints also causes a change in structural principle.

A strong correlation between the availability of effective tools and processing of building elements can be found. If effective tools were to be found, more elaborate joints, which had to be fabricated in exact ways determined more and more the building technology. Complete changes in building structure to systems relying on joints with a high degree on prefabrication happened in the roman empire and later again in the 13th century, when there were enough well trained building professionals and also ample supply of tools. This is also supposedly the time, when the shift from construction of a band of village people guided by one professional occurs to professional craftsmen executing the constructions (this is at least true for the wooden frames of the house constructions)²⁵.



Fig. 28

Economy

As real hunter-gatherer societies are mobile, and in tropical climate only need simple shelter to protect from rain, it can be assumed, that populations living in Insular South East Asia prior to Austronesian settlement did not have a more sophisticated architecture beyond simple sheds or tents. Therefore, it can be assumed that the architectural input from these tribes has played no role for Austronesian tribes, who had at that time already developed a very sophisticated system of agriculture and buildings. The only exception are the highland areas of Papua New Guinea and some nearby islands, as here gardening techniques were evolved by the indigenous population, which were able to support higher population densities, and thus presumably required more elaborate architectural structures. Some areas of Eastern Indonesia, especially parts of Flores and Timor and adjacent islands seem to belong to a contact zone between the Austronesians and the

24 However, in temperate Europe log cabin building had a strong tradition over a long time (at least from the metal ages on). This technique requires the use of certain (simple) joints. We may assume that it coexisted in certain areas with lashed constructions all the time.

25 This of course doesn't mean, that there where no ordinary people involved in the construction of a vernacular home in a village, but rather, that the technical level of wooden constructions became already to high for untrained people to master. From this time on, as far as the wooden parts of a house were concerned, could only help in certain limited ways. Of course house construction remained nevertheless communal activity for long time, as there are many other tasks at a building site apart from manufacturing the wooden frame.

Fig. 26: Lashed details of house structure from Samoa. In Oceania lashed connection techniques survived until present day.

Fig. 27: Reconstruction of a neolithic pile building from the area of the Alps, Europe. Simple joints were already used, but most connections were made supposedly with lashings.

Fig. 28: A selection of metal woodworking tools from Indonesia (Borneo and southern Sulawesi). On the right: Carpenter working on a ship plank (Tana Beru, southern Sulawesi).

highland Papuan gardening cultures (Bellwood 1997). A closer comparative investigation of the two areas might reveal in future, whether here also architectural ideas were transmitted or not. At present there are no findings in this respect, however, the architectural situation in Melanesia shows definitive traces parallel use of Austronesian and Non-Austronesian concepts, so similar facts might apply also for the Lesser Sunda Islands and other parts of Eastern Indonesia.

In agricultural or gardening societies buildings for storage of harvest surplus are essential. Sometimes this task is solved within the houses, as in many present Indonesian areas rice or corn is stored in the attic of living houses.

I think, that it is very likely that the storage house as a separate building type emerged at a very early date, especially because in Eastern Indonesia a functional change between storage houses and living houses (and the reconversion of living houses to storage houses) is known from the recent ethnographical past, which may not only indicate a flexibility in space utilisation, but the enormously high priority of the function of food storage itself.

The Austronesians practised at the beginning of their expansion an agricultural mainly depending on rice cultivation, which they brought with them from the Chinese mainland. As they moved into tropical latitudes, tubers (taro, etc.) and fruits (breadfruit, coconut, etc.) in connection with gardening techniques were becoming more and more important. The tribes moving into Oceania, who were to be the ancestors of the Polynesian peoples, gave up rice cultivation completely and turned to gardening. Those Austronesians, who reached regions again more suitable for rice cultivation (especially Bali, Java, parts of Sumatra) turned again to rice as main staple.

Bellwood (1997) also suggests on the basis of some archeologically excavated sites, that a part of the Austronesian settlers practised a maritime oriented foraging economy, based mainly on fishing.

Environmental and Natural Factors

Climate Change / Different climate zones

The climate of Insular South-East Asia is tropical, with constant temperatures. There is little variation during the day and during the seasons. The only exceptions are mountains, where general temperature drops 1°C every 160m. In the case of mountain settlements this means mostly, that overall climate can be a little bit more moderate, and that it can get comparably cold during nighttime (although only for tropical standards). Only in very high altitudes there is frost or even permanent snow. On Papua New Guinea there are even Mountains with glaciers, albeit human habitation does not extend in these regions.

Protection from the cold is therefore of minor importance, only in mountain villages thickly thatched roofs reaching down to the ground or walls made of thick layers of insulating material are sometimes used for keeping the warmth of the fire. In all other instances cooling is a main objective, which can be achieved through raising the buildings on piles or stilts and using for floors and walls materials, which allow air

circulation, like woven bamboo walls or sliced bamboo flooring. Wooden structures have also the advantage of having little thermal storage capacity (as opposed to stone and solid building materials), which is essential for a good microclimate. Thick thatch not only protects from rain, but is also a very good insulation against solar radiation. Overhanging roofs provide shade from the sun, which usually is high up in the sky all year round and therefore very intense in these latitudes.

The most important factor in the tropics is rainfall, both agricultural methods (and with this the economic base of most peoples) and architecture had to be adapted to it over time. We can discern two main rainfall regimes and three different zones in the area:

The zone within 5° of the equator has constant rainfall all year round. The availability of water supports dense, lush, and evergreen tropical forests. Peninsular Malaysia, Sumatra, Western Java, Borneo, Central Sulawesi, the Southern and Eastern Philippines, and parts of the Moluccas belong to this *equatorial zone*.

North and south of this equatorial belt there are two *intermediate tropical* zones with differentiated wet and dry seasons. Winter seasons last from 2,5 to 7,5 months. Rainfall tends to be concentrated to one of the seasons. The amount of rain received by a specific area is also very much depending on topography, what can produce fairly dry local regimes (like in parts of the Lesser Sunda Islands). These intermediate tropical zones fade gradually into the temperate zones to the North and to the South. The north part of the Malay Peninsula, West and North Philippines, Southern Sulawesi, and the Sunda Islands from Central Java eastwards fall into this intermediate zone (Bellwood 1997, p9).

In the zones with clear dry seasons we can observe, that housing forms emerge, which clearly break with the usual raised floor building pattern so typical for Insular South-East Asia. Especially in the lesser Sunda islands houses are sometimes built on earthen platforms or only partly contain areas elevated on piles, whereas much of the living area is the ground itself.

Agricultural opportunities

Most peoples in the investigated region rely on agriculture as a form of subsistence supplemented by fishing or hunting, albeit mostly on a much smaller scale. Main staples include rice, corn and millet. The way of agricultural production is very much depending on soil quality and fertility and also, but on somewhat lesser scale on the rain regime. Usually not only field crops but also fruits and vegetables in gardening systems are grown to supplement nutrition or to have something to resort to in case of crop failure. Of special significance are sago starch and the lontar juice, which are both palm tree products collected either from cultivated or wild palm stands. The sago starch is very often the backbone of (hunter-gatherer) societies in rainforest surroundings like on Borneo or Mentawai, the lontar palm juice is a pivotal factor in the economy of some island in the lesser Sunda Islands.

What kind of crop is grown as the main staple, has usually also architectural implications:

Storage houses or at least storage areas within the house are needed for the harvest and of course some agricultural plants not only provide food, but also building material (sago palm, coconut palm, breadfruit tree, etc).

As mentioned it depends on soil quality what systems of agriculture can be used in a certain region. Basically there are two main kinds of soils present, one are acidic latosols (containing iron oxide, and therefore appearing usually as "red soils") the other kind being basic, volcanic soils.

Bellwood describes the possibilities connected with the red soils in following terms:

"These lateritic soils are generally characteristics of the equatorial and nonvolcanic lowlands of Sumatra, the Malay Peninsula, Borneo, Sulawesi and western New Guinea. Today they support low populations because they are fairly infertile, unsuited in traditional cultivation systems to anything but shifting agriculture, and difficult – for reasons of structure and excessive rainfall – to bring under irrigated or terraced rice. Furthermore, the forest itself is ever-wet, hard to clear and burn with simple equipment, and subject to rapid regrowth of weeds and secondary vegetation." (Bellwood, 1997, p.12)

In central and eastern Java, Bali, Lombok and the Minahasa peninsula of northern Sulawesi the soils are basic and much more fertile because of volcanic activity, which enriches their contents. Similar is true for the rest of the lesser Sunda islands, albeit here already a very marked dry season limits agricultural possibilities. On Sumatra the volcanic soils are more acid, and not so suitable for agriculture than the other volcanic soils.

It is obvious, that there is a definite reason, why certain parts of the archipelago became areas with a high agricultural productivity, therefore supporting high population numbers which in the turn required to organise people in form of primitive states. Thus, it is also evidently seen why certain areas (for example Sumatra) had to rely more on trade than on agriculture, and why other areas were only organised on intertribal and tribal level until recent years. Of course, agriculture is not the only reason for these developments, but certainly food surplus and available manpower are assumed to be determining factors for political power patterns.

Site

Settlement sites were chosen according to a range of different preferences: availability of drinking water, defence possibilities, the distance to the cultivated fields or garden plots, sufficient protection against natural hazards such as floods were driving forces in the process of the foundation of a new village or compound. In some regions a shift of villages in a cycle of several years took place, as people followed the relocation of their agricultural plots through the system of shifting cultivation. In Borneo sites near rivers are preferred, as the large rivers pose the only reliable way of infrastructure. Longhouses raised high on pilots give protection from floods and enemies. On other islands with less dense forests compounds are located on rickety hilltops providing protection from enemies, however in these regions water

supply is normally insufficient. In some Eastern Indonesian areas (East Flores, parts of Timor) it is still customary for a village to have a few houses ("upper village") on the slopes of a nearby mountain, but the main village had been relocated (often for better control on behalf of colonial authorities) to a lower position.

People depending on fishing prefer sites located on or near the shoreline, or even live in pile dwelling villages over the water. Where coral reefs are available villages are built wherever open access to the water is possible and the entrance to the surrounding lagoon can be easily overlooked and controlled.

Definition of properties of traditional buildings which should be investigated

In this article I want to investigate changes of building types or modifications within those types. Up to present there have been studies of Architecture in South-East Asia, which were trying to categorise the buildings mainly according to distinct features like roof shape (Domenig 1980). Structural aspects, like the technical details of raised floor constructions were used by Schmitz (1961) in a now outdated theory on migrations in Insular South-East Asia and Melanesia. However, no attempts were made to combine several features and try to establish development lines.

Examinations of this type seem promising, as there is a continuous history of settlement in the archipelago by the same peoples. Architectural development, from better known European prehistory and history is likely to follow a certain path, at least regarding technical aspects. These findings seem to be applicable for the eastern and south-eastern Asian region and therefore it is justified to search for links in the different building types present.

For this investigation I would like to describe vernacular architecture and its local "representatives", the building types through certain aspects, specially chosen for the research area in South-East Asia.

Vernacular architecture in South-East Asia is usually characterised by following criteria:

- Use of local materials
- The construction work is executed by a local specialist with considerable help of parts of the local community (family, relatives, friends, neighbours or dependents of the builder).
- Usually there is no high differentiation of functional types (living house- storage house – working shed)
- Public buildings often use very similar designs to the above mentioned functional types.

A distinction between building type and functional type will be made:

Building Type

A building type is a category for vernacular buildings, which are built in the same building tradition and have similar form and structure. Within a building type different functional types with different functions and spatial zonation can be discerned. An example would be a community

using a house design for living and basically the same design (with minor modifications) for storage buildings as well. The Toraja or some Batak tribes pose here a good example.

Of course there is also the possibility to use completely different designs for different functions. In this case two different building types (albeit belonging to the same building tradition, as they were constructed by the same people) are used to represent two different functional types.

Sometimes functions can be integrated, so a living house can often be storage building, temple or place of ancestor-worship at the same time. Briefly, a building type consists of form + structure + function + spatial zonation. A functional type is a sub-category within a building type, which has mainly to do with function and spatial zonation (details see below).

It is important to discern form and structure as main fields of investigation within analysis of building types, as it very often happens, that old forms are built with the help of different structures, since the form has symbolic relevance and carries certain messages. Of course sometimes also the opposite can be noticed, that new techniques define new forms in a somewhat "revolutionary" manner.

However, a certain form - a three dimensional volume as perceived from the outside- can be built with very different structures (massive brick walls and wooden frame can be used to create two houses looking identical from the outside) and this transition can be often witnessed in building history. To this outer appearance of course the building can have different inner organisation or different division into rooms or no rooms at (consisting thus only of one singular space), which leads us to the last two fields of investigation within a building type, which are function and the spatial zoning which is needed to be able to fulfil this function.

The investigation fields of form, structure and spatial zoning have further investigated subaspects which will be described in detail later.

Modifications in Building types

As not two houses are exactly the same in an investigated area, there are always slight differences in form, structure, spatial zonation, material, decoration, and proportions. These slight variations are to be expected, as although vernacular architecture is usually quite similar in its main aspects, it is very "individual" or rather "personal" on the micro-level. Taste, habits, likes and dislikes of the builders are expressed in little alteration or details. This is also possible, because there are no written building codes and construction work is not carried out wholesale in an industrial manner. However, there are certain constraints, posed by technical tradition and the need to integrate into the community according to one's status, but some aspects of these traditions are flexible, negotiable and can be altered.

If a community as a whole develops significant differences in building tradition compared to other communities, we can speak of a modification of the building type. If these differences are so significant that the formal, structural, or spatial aspects of most of the

buildings differ to a very considerable degree, the local building tradition must be considered as having developed resulting in new building types.

Functional type

A functional type is a sub-category of definitional aspects of a "building type". The name of the functional type is derived by the main function of the building (for example "living house" or "storage building"). Of course in insular South East Asia in particular (and in many other regions of the world in general) a functional type integrates many functions. A residential house may contain different functions such as sacred areas, spaces for sleeping, food preparation ("kitchen"), working, stables, food storage, etc. According to this multitude of requirements the inhabitants organise the space of their house. This is what is called spatial zonation.

I would like to describe shortly some functions of architecture and derive from them the functional types we will be working with.

Basic functions of a house include:

- to provide shelter from the elements and the environment (rain, sun, flood, ground moisture, nasty animals)
- to provide protection against outsiders (defense)
- protection for food resources (crop)
- protection for valuables

Architecture provides also an artificially modified environment for

- accommodation
- food preparation and consumption
- social interactions within the community
- (house) work, ("workshop area")

The expression "artificially modified environment" was used, as especially in the tropics vernacular architecture not in each case and not in every aspect optimizes surroundings for human life. An example would be the dark and smoky interiors of some (usually highland) multi-family clanhouses, which do certainly not provide better living conditions, but maybe have other important functions.

A very important function of vernacular Architecture in insular South-East Asia is to

- provide cultic and ritual space
- delineate boundaries and contact points between human "culture" areas and natural environment and also between human world and the supernatural

In many cases vernacular houses in Insulindia unite most of these functions, but often during time separate functional types have evolved, if one of the functions was superior to others. This development was always connected with adaptation in spatial organization, and sometimes even changes in structure or form followed.

We can distinguish following functional building types:

- living house (rumah)
- storage house, granary or rice barn (lopo, sopo, lumbung)
- temple
- working shed / workshop (bale, balai)
- gathering house (bale)
- palace
- (fortification)

A very specific characteristic of insular South-East Asian architecture is the very close proximity of living house and storage building in many areas. Vatter (1932) mentions dwelling-granaries on the island of Lembata (East Flores) and Domenig (2008) suggests that some Batak living houses are in fact converted storage buildings or vice versa. In a recent study he also mentions several examples in Eastern Indonesia (Domenig 2008).

It is not surprising, that the Austronesians supposedly developed the first serious buildings as early agriculturalists and for agricultural societies the storage of crops and harvest surplus within the house or in a separate building would have been always of serious concern (unless of course the surplus was stored in a pit, which is not possible everywhere²⁶ – especially not in the humid tropical regions). As the agricultural and the architectural development was supposedly parallel, we have to take into account a very early dualism of living house and storage building. However, during an investigation of the living house the location of hearths may be a very useful indicator, as the hearth is definitely attached to the living area²⁷ even if parts of the family sleep in storage buildings or other localities.

The living area is elevated above the ground in most Austronesian buildings; therefore they are termed "raised platform buildings". This living area is usually at least partly walled, although unclosed platforms are also a prominent feature. They are usually attached as verandas or ante-rooms to living houses, or are part of granaries and thus function as a semi-public working and meeting place.

There are several alternatives to build raised floors and we find quite a technical variety in different regions of Indonesia. In some parts, especially in the dryer regions of the here discussed area (East Flores, Adonara, Solor, Lembata, parts of Timor) the houses are built on earthen platforms and do not feature real raised floors; only internal platforms of various heights are arranged, each assigned to one of the functions of daily routines helping to define the spatial interior zoning.

Form

The form of a house is made up of geometric elements which are perceived by the observer as volumes or shapes which can be seen from the outside or can be explored by walking around them or in them. I would like to discern following categories of Form:

Ground plan shape:

The ground plan shape is maybe the most abstract term in this category, since it is not always perceivable at once. However, as most South-East Asian vernacular buildings are small structures, and their ground plan forms basic shapes, it is quite obvious, whether a building is quadratic, rectangular, round or oval. Many buildings possess no annexes or extensions, only certain types have more sophisticated ground plans. Usually the core house with its basic geometric ground plan shape is easily recognisable, even if there are extensions added to it.

Certain structural solutions also have implications for ground plan design:

In the case of buildings with dug-in posts (piles) it is possible very easily to build oval or round forms, whereas stilt buildings of the so-called "box-frame" or "H-frame" type (see below) tend to be rectangular (the only exception maybe being some houses which are partly of H-frame type on northern Nias).

Silhouette form and /or volume form

The appearance of a building is not only determined by the form of its ground plan, but also the form of its elevation. Within the elevation it is customary to discern different elements. In the South-East Asian case this would be most often a tripartite division into roof, walls and the zone of the piles, stilts or earthen platform.

Whether these elements give the building a more three dimensional appearance (to appear as a more or less massive volume) or whether a single view (usually from a certain angle of sight) gives the house a very defining silhouette depends on the place of the building within a compound or settlement, whether it is detached or is part of a tight row of buildings, and of course whether it has main axes which are overemphasised (for example the roof of Toraja-houses) or whether it is unidirectional (conical-oval roof). Especially the roof form is often a hallmark of house types in South-East Asia, often even linked to ethnic identity. In some cases these very memorable silhouettes are definite and easily recognisable symbols used by the respective peoples to identify themselves also in non-rural contexts (for example urban housing, administrative buildings, etc).

Proportions

It is not only the form of the above mentioned three defining elements of the elevation (roof-walls-piles/stilts/platform) which characterises a building, but also the relative size and combination of these parts.

The proportion of these elements tells us much about their importance, as for example roofs have always been an extremely dominating feature of South-East Asian houses. Today their importance in proportion has a little bit diminished, but still they are maybe the most important part of the appearance of houses.

The second most important elements are piles or stilts, which were definitive higher in former times for reasons of defence. They also serve as a protection against environmental hazards (floods, malaria, etc) and ensure a better ventilation of the house.

In some dryer areas earthen platforms were used instead of piles or stilts, they also usually raised the building above the surrounding terrain, thus giving protection against moist ground conditions. But more importantly, the height of the earthen platform symbolises social status and rank. As piling up earth needs significantly more energy investment than the use of higher piles or stilts, it does not take wonder, that in certain areas this function of status indication has far overtaken the practical reasons for constructing platforms.

However, though the importance of the roof

²⁶ In central Europe it was common practice to store grain in pits which were first burned, then lined with hay and finally sealed with a prop. Food storage pits are also known from prehistoric Oceania in connection with the Lapita-culture (Kirch, 1997)

²⁷ This seems to be valid for most or even all cultures in the world.

28 For additional Information on this topic see Schefold 2003 and for technical terms Domenig 2003.

29 Houses of this construction-type can be found all over the world in traditional architecture, but at the moment we do not know of any present or historic example within Indonesia. However in parts of Taiwan, Hawaii and New Zealand there are examples which are built according to this principle.

30 Archeological evidence of constructions of this kind, mostly still without distinct walls is known from stone age settlements of the Chinese mainland, for example Ban Kao (Chang 1986, 2005, Steinhardt 2002).

shape has survived even under modern urban conditions, piles, stilts and platforms are usually abandoned as soon as houses are designed for "modern" town environments.

The walls, in contrast, have been only of minor importance, or not present at all in former times, but today they are more significant and also their relative height compared to the other two elements have become larger. In the past, often the roof was reaching to the ground or near the ground only leaving a small area of wall exposed (if the wall was not completely replaced by the roof itself). Also usually no windows were present, and even the entrance entrance was often not through a proper door but through a flap or trap-door below the house.

The introduction of windows is quite recent, before that the light was filtering in through semi-transparent wall materials. Modern wall materials are often completely opaque, or the people feel a need to have more brightly lit interiors. The windows and doors are also used as a way to structure the wall surfaces. During time usually also window size has grown.

The proportion of inner spaces tells us much about the way people use it. Interestingly, people in Insulindia spend much of their time outside the house, so usually the inner spaces of vernacular buildings are not designed to make people feel comfortable in the European sense of living comfort. However we find different types of inner spaces with different proportions within the archipelago. Usually the roof space (attic) is also part of the inner living area of houses, and most house types are unicellular anyway.

Structure

The house structure is made up by those parts of the building, which are load-bearing and are responsible for the stability of the house. It consists of elements made of a specific material arranged and connected with the help of a specific technique in a way that they are able to carry the loads affecting them. The dimensions and shape of the elements are determined by the form of and size of the building and the applied structural principle (of course the size and form of the building is also determined by the applied structure, as not all structures can be built in all sizes and to fit all forms). To the structure non-load bearing elements can be attached, for example light wall panels and the like.

Structural Principle

If we examine Insulindian built structures more thoroughly, we find different principles of construction²⁸. all of them are made of a wooden frame, parts of which form the roof and are covered with some form of thatch, and parts of which form the support for the walls, which are usually made of non-load bearing materials like panels of plaited bamboo or thin wooden boarding.

Real differences in building technique are revealed if we examine the way how parts of the buildings are joined together and how the building itself is connected to the ground.

The primary elements of a house (like posts, beams, rafters, etc.) are connected, and sometimes stiffened by secondary members of the frame. The placement of each element, the type of connections used and the stabilising capacity of primary and secondary frame elements determine the overall stability of the whole building.

The easiest way to build a stabile building is to dig two posts into the ground, connect them with a roof ridge and place rafters on this ridge. The end of these rafters can either be placed on the ground (in which case the building is a house consisting only of a roof²⁹) or on a wall-plate supported by posts also dug into the earth. This technique allows to build houses with different roof forms (gabled roof, hipped roof, apsidal roofs)³⁰. The different structural parts can be tied together. As the connections are flexible, the stability of this system is secured by the earth holding the dug in piles in place. A raised platform can be added by either tying beams to the piles in a certain height, or by placing a platform supported by its own piles in the buildings interior space. Interestingly, we find examples for both construction techniques in Insulindia, but we have good reason to believe that the buildings possessing a structurally separated platform are more ancient or "archaic". The technique of binding and lashing itself is one of the most ancient joining techniques, and can be regarded as older than joining by mortise and tenon joints, as for binding together two pieces of wood there is no need to cut pieces out of the wooden parts. This can be a very challenging and energy consuming task, if someone only has stone age tools to work with. Interestingly, as in most parts of Oceania up until the arrival of the Europeans there were no iron tools in use, the building techniques based mainly on lashing have survived. In Indonesia, which was bound into the trade routes from continental Southeast-Asia, the metal age came much earlier and facilitated the change to building techniques utilising mortise and tenon joints. However, even with the arrival of metal tools, only in some regions people changed building techniques fundamentally, and so the "old ways" could survive.

I would like to discern following structural principles for this investigation:

Buildings with earthbound posts

In the Austronesian tradition of rectangular houses the prototype is a roof-house with two dug in main posts connected by a roof ridge. Circular huts or houses with earthbound posts cannot really be found in the Austronesian archaeological record, however in the Papua highlands quadratric or circular buildings with an earthbound post structure and sometimes a central main post seem to be very prominent. Influence on Austronesian housing in Eastern Indonesia can be assumed as prehistoric contact seems to have been extensive in this region. Buildings with earthbound posts can be executed with loosely connected structural members, as the dug in posts give stability. In most cases these systems rely on lashed connections, however mortise and tenon joints may occur, but mostly they are used in small numbers and their positioning does not necessarily include the statically most vital points of the structure.

Platform buildings

These buildings have also a structural system of earthbound posts, albeit the whole building is elevated on an earthen platform. They may have smaller inner wooden platforms, which are structurally separated from the main load-bearing post-structure.



Fig. 29

Mixed platform – frame building

The main load bearing structure are still dug-in posts, but the walls are already executed as a wooden frame and integrated to a certain amount into the main load bearing structure. This very special and unusual transitional building type occurs in certain areas of East-Flores, for example on the island of Adonara. The buildings have earthen floors, however, smaller wooden platforms may be situated within the inner area.



Fig. 30

Platform pile building

This structural type has often been called "false" pile building by researchers in the past, as the main load bearing system (which holds only the roof structure) is still based on dug in posts and separated from the inner living area, which is completely raised on a wooden platform

also supported by dug-in piles. Therefore we can assume, that this structural principle has evolved from the platform buildings or at least is a close relative of them.

As the whole building has a raised floor, we can term all posts "piles". Most connections are still flexible, lashed ones. However, there are some building forms (especially in Eastern Indonesia) where mortise and tenon joints start to be employed and also parts of box-frame systems have been integrated into the structures. These are transitional types, where lashed joints are still executed but a certain part of the building is built with new techniques.

H-frame-pile building

An H-frame pile buildings has posts which are dug into the ground and most usually lashed connections. The main difference to the platform pile building is that not only the roof is supported by the piles, but also the living platform (floor). This is achieved in a way, that the house is assembled mostly from rectangular, H-like frames (the bar connecting the two I I of the H being the floor) covered by a roof. There is no separate structural support for the floor.

As H-frame pile buildings are thus assembled from regular frames, they seem to be more constrained in their ground plan form to rectangular shapes, whereas platform pile buildings have often apsidal and oval forms.

As H-frame buildings are usually found among peoples with strong connection to the sea and settling either over water other extremely near water (Malays, Bugis, Bajau or Sea Gypsies) we may assume that the development of this system was closely connected to maritime lifestyle and settlement. A reason could be, that it is difficult to sink many piles into seabed or the bottom of a lagoon, and therefore the number had to be minimised by attaching both roof and floor to the same construction. Of course this means also smaller houses, but incidentally or not, in many extremely maritime oriented societies (for example the Bajau laut) the household is in effect made up only by the core family (Sather, 1997).

H-frame-stilt building

This building principle is very similar to the H-frame-pile building, but the piles are replaced by non-earthbound stilts placed on stones. This is achieved by making the whole construction system more rigid, mainly by employing mortise and tenon joints, which "stabilise" the structural system.

Box-frame building:

This building consists of a more or less rigid wooden box sitting on top of braced stilts. These stilts are structurally separated from those vertical members (posts, king-posts) which are holding the roof structure. These latter are usually placed on top of the "wooden box" and do not touch the ground. The stilts are braced and stabilised by multiple horizontal rails, which are mortised into the vertical elements. The whole construction is placed on stones. The wooden box itself is also executed with mortise and tenon joints. These box structures tend to be smaller than the other systems and are usually not only used for living houses but also for rice barns. The first archaeological evidence of these structural system is found on the South-East Asian mainland in the Bronze Age, from around

Fig. 29: Erection of a corner post of a platform building with earthbound posts, Navala, Ba Province, Fiji Islands.

Fig.30: Corner detail made of Bamboo of a house on Adonara, Nusa Tenggara Timur, Indonesia.

1500BC onwards (see Higham, 1996). The main regions are Yunnan and Northern Vietnam (here the Dong Son culture should be mentioned, from around 500BC). From Japan clay models dating from the 1st to 6th centuries AD are known showing similar structures (Domenig 1980). It is very likely, that the development of box frame structures can be linked to the use of metal tools. If this is true, we can assume that the technology was available in many parts of the Insulindian archipelago from the 1st and 2nd centuries onward.



Fig. 31



Fig. 32



Fig. 33

Material

The material used for structural purposes includes in the tropical regions different kind of wood felled in the rain forest: different species of Meranti and Teak are highly regarded. In Borneo also the very long lasting and hard Ironwood is available. According to local possibilities and flora there are of course many other tropical woods which are used, albeit to a lesser extent and often only for secondary structural members. Wood available from plants growing in the surrounding of human settlements is also used, the coconut palm and wood of the breadfruit-tree being good examples. Bamboo, which is in fact not a tree but only a large grass, is used widely for smaller structural members. As it is not very durable and susceptible to insect attack, it is usually not used in the main load bearing structure of larger houses. However, very often field huts and small temporary buildings are completely erected from bamboo. Bamboo shingles are also used as a roofing and plaited bamboo is

an excellent and widely used wall material (see more in Dawson 1994).

Technique

The base of construction activity is not only the knowledge about structural principles, but also the knowledge about processing structural members and connecting them. This knowledge is also the key to the development of new structural systems, as these mostly require more precisely executed, stronger and more durable connections. Also the beams, posts and other elements have to be better and more precisely processed. Lashed joints and earthbound post structures do not require more than the barely worked tree trunk itself, whereas the use of mortise and tenon joints usually also implies the use of rectangular cross sections and beams which have plane surfaces and are straight (in most cases at least).

Lashed techniques based on earthbound structural principles are easy to execute with stone age tools, as these tools are not very effective. It consumes much more energy to cut a tree with them than with metal tools. The cut surfaces are not really precise, or when they are made precisely the tools itself are more frequently ruined. Although it is technically possible to make mortise and tenon joints with stone tools (see excavations at Hemudu, Liu 1985, Chang 1986) their manufacture is very energy consuming, so they have been supposedly employed only on some parts of the buildings and in large communities (Hemudu is a comparatively large site with longhouses over 23m in length). With metal tools the possibility arises to process wood more neatly without any disproportionate wear of tools. Although bronze tools are more suited to work not too hard and freshly felled, wet wood (as they still deform strongly when hitting harder parts – see experiences documented by Barth, 2002 during archaeological experiments with bronze adzes) they seem to be hard enough to make effective work possible. So we have to assume that it is no coincidence, that the first depictions of houses, which use mortise and tenon joints, or seem to be structurally very close relatives to present box-frame buildings of the Insulindian vernacular originate from bronze age communities. The first of these are found mainly on the South-East Asian mainland, namely in Yunnan and northern Vietnam. It is also remarkable, that from that time on, there is evidence of houses in the archipelago and even in certain parts of Japan, which are structurally (and in many cases even formally) all very similar. These houses are usually rice barns or storage buildings of some sorts. The question arises whether with the spread of metal working technology, there was also a spread in certain architectural designs or at least in certain architectural structural principles?

A further, not unimportant question is, whether, if there was such architectural transfer, it was maybe a side effect of agricultural developments, as iron ploughs used in wet rice cultivation (and maybe with them some innovations in rice cultivation itself) arrived in the Java region in the 1st to 2nd centuries AD, presumably from the Vietnam area. As the box frame houses depicted on archaeological finds seem to be all storage buildings, a connection

Fig. 31: Toraja carpenter while assembling a box-frame rice barn, central Sulawesi.

Fig. 32: Details of stilt constructions with rails applied in case of box-frame buildings (Ngadha, Flores and rice barn on Bali).

Fig. 33: Comparison of the H-frame structures of Bajau laut houses (left, Togean Islands), an old Bugis house left to decay (middle, South Sulawesi, village of Ara) and a new Bugis house just being built (right, South Sulawesi, village of Ara).

to rice cultivation is possible. However, there is unfortunately no evidence from Insulindia showing Box-frame structures earlier than the 8th century AD.

We do not know when exactly the first structures emerged, which utilised only mortise and tenon joints in their load-bearing structure. The technology was presumably available from the 1st to 2nd centuries AD. However, if we observe the Insulindian vernacular architectural landscape, we still find very many building traditions, which are employing no or nearly no mortise and tenon joints. These structures are usually found in more isolated places, or more in the eastern part of the archipelago. If we move more in eastern direction through Melanesia to Polynesia, the situation basically does not change. Moreover, Oceania as a whole has very distinct lashing traditions, with only a very basic use of mortise and tenon joints. As Oceania was never integrated into the trade networks of the metal ages, they had up until European contact mainly stone tools. This again seems to validate the argument, that lashed connections predate mortise and tenon joints.

Spatial zoning and spatial differentiation according to (work) functions

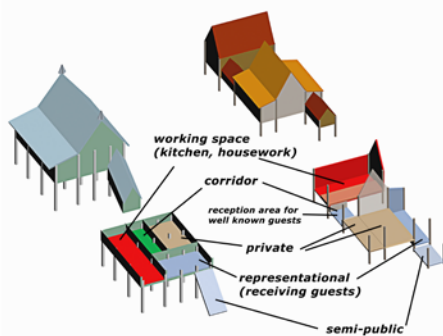


Fig. 34

Usually the majority of archeologically excavated early buildings are unicellular houses. This means they possess no physical partition within their inner space (or at least none so permanent, that it could have survived and be found). This fact is usually confirmed by ethnographical observations: The buildings which are comparable to the excavated findings are usually only temporarily occupied houses or houses involving not very advanced building techniques and do not have any internal physical separations (walls, etc). In Insulindia there are also tribes and peoples who do live in quite elaborately built houses without any inner division or separation. This does of course not mean, that space is not structured in these buildings, only that not walls are employed as markers. Usually we can state, that there is maybe no architecture at all, in which space is not organised and divided according to functions. Only, not everywhere these "zonation" is architecturally evident.

However, a way of demarcating different functional zones in Insulindia is through different heights of internal platforms. The reason for this may be also the special importance of relative height in East and South-East Asian cultures. In Europe we find physical differentiation into separate rooms only from approximately the

13th century (in vernacular architecture³¹). This seems to be connected to heating requirements in winter (the establishment of smoke-free rooms, which could be heated from a second room). However, even though many rural European houses had a two or three room standard constellation (or even more in certain areas) in many cases until the end of the 19th century only one room was used for sleeping by the whole family. This is a situation not unlike the one in Insulindia (up until very recently) with the exception, that here interiors could be technically larger, as they did not have to be heated. However, even so much of the daily routine was and is carried outside the living house or below the roofs of open sheds (or in the shade of the granary). Not only the outside area is structured by platforms (as usually between the piles or stilts of a house little platforms to work on are established) but in very many cases also the inside of a house is structured by parts of different elevation (Acehnese house, Malay house or separate little platforms (Houses in East Flores – islands of Adonara, Solor and Lembata).

However, in some cases a point is reached, where people decide to physically separate areas of the house, mostly out of reasons of privacy. The separation is usually induced by the advent of some major religion. In Bali the impact of Hindu belief and cosmology can be seen, where buildings in a Balinese farmstead are organised by functions and grade of privacy in a higher value-system according to the "sacredness" or "purity" attributed to their respective functions in a polarised space within the rectangular boundary of the farm area (Arismunandar, 2001).

The Javanese urban house is clearly physically divided into several different areas. In this case not only Hindu court architecture, but also the influence of Islam, emphasising the separation of private and public life had an impact. The same influence of Islam seems to have had some impact on Acehnese and Bugis houses, where a wall to separate public and private areas has been introduced.

In recent times also the establishment of rooms and corridors in certain housetypes has started. Whether this was a reaction to changes in lifestyle because of colonial and "western" influence in general, or whether in some cases independent developments have to be accounted for, has to be researched yet.

A special position in this respect hold longhouses, as they are often several houses under one big roof, and so every family is living in an own apartment (usually also divided by walls to some extent).

The use of space within a building is divided according to social requirements and daily workflow. As daily work to a high extent is also gender specific, certain areas of the house or the farmstead do have areas, which are more (or nearly exclusively) frequented by women or men according to their work. As generally most tasks, which have to be carried out within the house are traditionally womens work, the house is usually the domain of the women. This leaves in many cases only the guest area for the men. This fact is also emphasised by the fact, that there are several matrilineal societies in Insulindia, where the house is inherited through the mothers bloodline.

31 The early developments in the Mediterranean area are not mentioned here. Roman houses for example had much earlier a very clear differentiation into a multitude of rooms (this house system was fully evolved by the beginning of the roman empire or maybe already much earlier).

Fig. 34: Spatial organization of the Malay house (right) compared to the Bugis house (left). Semi-public space coloured blue, sleeping quarters coloured brown, kitchen coloured red, and hallways coloured green.

Usually areas of food preparation and everyday food consumption ("kitchen") are situated in the back area of the houses (areas away from the main entrance or the nearest representative public area). In former times these functions seem to have been situated at the main hearth of the living house, only over time they were transferred to annexes or even a different building. Waterson (1990) mentions as reason for this colonial measures for more "hygienic" living standards, especially among hilltribes, but archaeological excavations and comparison with Oceania shows, that separate kitchen buildings or kitchen areas seem to have been a very ancient feature in Austronesian societies. If the meals are taken as part of a festivity, the usually representative "guest" areas of the building are used. They are located usually in the front part of the building, near the entrance (Bugis, Aceh, etc). Sometimes these guest areas are also divided into areas for receiving "official" guests and in areas for the reception of "unofficial" guests (friends). The formal reception area again being more situated near the main entrance, the informal reception area being situated more in the inner parts of the house (for example Malay houses).

During reception often specific places are allocated to at least the head of family and very often also to the members of the family and of course to the guests, according to rank. In Oceania this evolves into a strict hierarchy, which is observed by everyone and where the placement during a reception is a clear and unmistakable representation of social rank.

Within the house usually also the sleeping areas are designated. Unmarried daughters of the house sometimes sleep in the attic or even the storage house – a clear symbolism of fertility, with the rice or corn, which is stored in this part of the building and if planted, will bring new life.

We can therefore summarise, that space within the houses is always structured according to functions. It carries usually also some kind of gender attributes, mostly in connection with the daily work of family members.

Usually at first houses consist of only one core room, but with time annexes and internal divisions are introduced. An important function of annexes is the separation of work functions (like the kitchen area); they have similar purpose like sheds and other outbuildings. They create places where special working tasks can be carried out (for example: workshops, etc). Internal divisions of houses usually have to do with special needs for privacy, be that privacy from the public (separation of guest and internal working and sleeping areas) or the need for privacy within the family (introduction of rooms for family members).

We can observe, that there is a tendency from the unicellular house to a physically divided interior, although this development does not seem so necessary and inevitable as technical development and is mainly controlled by a societies need for privacy.

Special significance of certain architectural elements

In early societies rank of the owner can be expressed through special placement of the house within the community ("head" or strategic

positions, positioning according to rules of symmetry, etc). Rank can be also expressed through monumentalisation, with its first step being a larger, but identical design. The use of better materials can be sometimes also an indicator of status.

However, in many early societies these measures are the only expression of social difference in architectural terms, so it is very difficult for archaeologists to discern houses of higher and lower rank. Only stratified societies, which are already on the verge of being early states or are organised to a high level do show clear architectural differences indicating the social status of their inhabitants.

In Insulindia we encounter societies where architecture is nearly uniform, but we also encounter societies, where there are distinct features indicating wealth and status of the owner.

Special architectural elements are used for displaying these differences. Decoration (carving, attached Objects like buffalo horns and gable finials), painting, architectural elements (stairs, ramps, high platforms), house size and sometimes roof form. A hallmark of Insulindian architecture are in fact its varied roof structures, which are not only used as internal signs, but also as symbols towards outsiders. Thus the most important part of any house is its roof, which can be judged at the fact that it is usually the biggest (highest) and most characteristic part of the building. The shape of the roof is in many cases a source of identity, each people having their own, unique roof style, which allows easily to recognise the ethnic affiliation of the buildings inhabitants. Enormous effort in material and energy is spent to manufacture these huge structures, which sometimes seem to represent the whole house, as the walls with the posts beneath them are either very small compared in proportions, or are even concealed by the overhanging eaves. In some cases, like on Alor or at the Donggo in Sumbawa, there is no wall at all, the house consisting of the attic functioning as living space, which is raised on posts.

House types and their place within an archaeological and historical framework



Fig. 35

As all elaborate insular South-East Asian architectural forms (except buildings developed within the highland Papuan influence zone) originate from the mainland, we should have a closer look at the prehistoric situation in the areas of initial stone age development.

According to Bellwood (2004) agricultural societies were first formed in region between the Yellow and Yangtze rivers. Interestingly there is only sparse evidence of agriculture before the appearance of multi hectare villages at 7000BC. Before these really large villages there seem to be no settlement sites, where the remains of substantial built structures could be documented (what of course does

not mean that there were none at all, only that those buildings were quite ephemeral). However, at 5000BC two main cultural areas can be identified: one millet cultivating area to the north and one rice cultivating area to the south. These two cultural areas have been in cultural contact for some time. From the northern cultural area the Yangshao culture is to be mentioned, as it has been one of the main ancestors of the Han Chinese culture, whereas the southern regions seem to have been a patchwork of different smaller cultural entities, some of them ancestral to South-East Asian and insular South-East Asian peoples. Interestingly, the northern, millet producing cultures lived in roof-houses with sub-level floors dug into the earth, while for the southern cultures from at least 5000BC pile buildings are attested. Even though these two building traditions seem to be completely different, it is possible, that certain similarities in roof form existed (however this topic still needs extensive research). Of course after some time also in roof form a distinctly northern "Chinese" variant emerged, with the so-called "balustrade type" (An Zhimin, 1984) gabled roof as the southern counterpart, which can be witnessed not only on pile buildings in southern China, but also in the whole South-East Asian and insular South-East Asian area. However, in Taiwan, the Philippines, the lesser Sunda Islands and in parts of Java houses with hipped roofs can be found, which in fact do have some resemblance to the neolithic northern Chinese cultures. As cultural contacts are attested, it cannot be ruled out, that the ancestors of the Austronesians who left the Chinese mainland, either brought some common architectural heritage or had received some influence from these cultures. Of course there are also counter-arguments, as Domenig (1980) tries to explain simpler Indonesian roof forms by a kind of architectural convergence, in fact as a simplification or modification of more complicated roof forms. In his theory the Austronesians brought a rather complicated roof form (termed "Kraggiebeldach" in German, a modified form of the southern "balustrade style roof") from mainland China, which evolved further in the archipelago. However, as those houses of the Insulindian archipelago, which have hipped roofs are buildings with earthbound posts (so they are no pile buildings at all!) or platform buildings or platform pile buildings, it may well be worth consideration, whether this was maybe originally also a distinct type of building brought by the Austronesian settlers. Furthermore, as most buildings in Domenig's theory belong to the "box-frame" type, it may be also possible, that this "balustrade style" roof form, on which his theory is based, is of much later origin. As the box-frame technique itself seems to be more closely associated with the bronze age and with metal tools, a second, later influence from mainland South-East Asia (where such roof forms are clearly attested through archaeological findings of house depictions and models³²) might also be possible.



Fig. 36



Fig. 37



Fig. 38



Fig. 39

³² Dong-Son culture (depictions on Heger drums around 500BC), Yunnan (Bronze coffin 500BC and Bronze figures /models 100BC – 1st cent. AD); see Higham (1996).

Fig. 36: Depiction of an aboriginal Paiwan house on a carved object. Taiwan.

Fig. 37: A Toraja barn with an unusually small roof. Did all the Toraja buildings once have a roof like this, or is the building the result of convergent architectural development?

Fig. 38: Rice barn on Bali.

Fig. 39: Storage Building on Madagascar. Note the similarities to Indonesian house designs.



Fig. 40

A third building type, which may well have been the prototype of present Malay, Acehnese and Bugis houses seems to have developed during Austronesian migration into the area. These houses are all pile or stilt dwellings of H-frame structure and could have belonged to rather maritime oriented communities, living near, or partly even over water. The Lapita settlers of Oceania (Kirch, 1997) seem to have carried this building tradition well into Polynesia. These H-frame houses are basically rectangular with gabled roofs, but show much simpler and more regular roof forms than all other building types. Interestingly most of the vernacular houses of Thailand, Cambodia, and southern China also belong to the same type of H-frame buildings, which could suggest following:

A, The building type is an early stone-age heritage and was common in whole South-East Asia. B, The building type was an Austronesian invention and spread with the Malays and other trading people.

Parallel evolution of building types can of course not be ruled out, but as the whole South-East Asian region was always rather closely connected, cultural transfer or some kind of common heritage is more likely. Of course on these topics a lot of further comparative research has to be done to reveal more precise historical aspects, if this is possible at all.

Also a distinct contact zone between the outliers of highland Papuan cultures and Austronesians with impact on the respective Architecture in the lesser Sunda islands region should not be ruled out.

Although attempts have been made to sketch development lines in the Austronesian world, there seem to be no definitive answers yet. Much detail maybe lost forever, but a large archaeological framework with proof of the existence of certain building types in the past is given, so attempts can be made through further comparative studies to get at least in parts a better understanding of house development in the insular South-East Asian area.

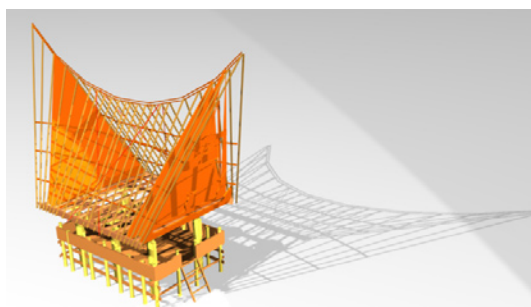


Fig. 41

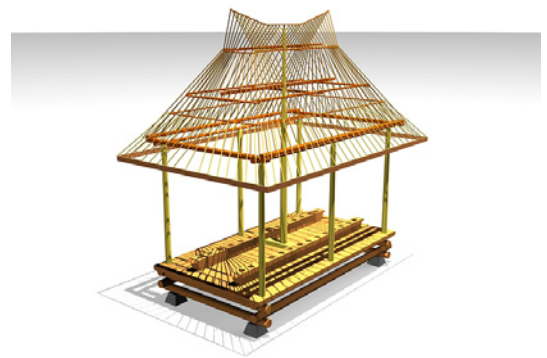


Fig. 42



Fig. 43



Fig. 44



Fig. 45

Conclusion

Is it possible to reconstruct development of traditional house typologies in the insular South-East Asian region? – In my article I tried to draw a larger picture of the present state of archaeological, ethnological and architectural research concerning the development of building types in South-Eastern Asia. In the past some attempts have been made to classify the vernacular architecture or the region, but mainly using separate very defining but still solitary aspects of the buildings.

Fig. 40: House Forms in Eastern Indonesia:

1. Manggarai (Flores)
2. Lio (Flores)
3. Ngadha (Flores)
4. Lamaholot (Adonara)
5. Sumbanese
6. Rotinese
7. Bunaq (Central Timor)
8. Lamaholot (Adonara)
9. Tetum (Central Timor)
10. Ema (Central Timor)
11. Atoni (Timor)
12. Atoni (Timor)
13. Atoni (Timor)
14. East Timorese

Fig. 41: Computer-model of a Toba Batak storage house.

Fig. 42: Computer-model of a Karo Batak rice-husking shed.

Fig. 43: Houses of the Bajau laut, Togean Islands, Sulawesi.

Fig. 44: Traditional Aceh house, Geumpang, Kabupaten Pidie, Nangroe Aceh Darussalam.

Fig. 45: "Archaic"-style Bugis house, South Sulawesi.

At presents archaeological research is definitively able to reconstruct main prehistoric and historic movements of peoples within the area. Statements can be made, which areas (and at approximately what time) have been settled by which larger (linguistic) group of people. Of course lots of detail is missing, and maybe never will be recovered, but the approximate pace, territorial expansion and the continuity of human habitation processes have been ascertained. We know, that there was continuity in settlement by the same peoples, the Austronesians in most parts of the archipelago from neolithic times on. We also know that they expanded rapidly into hitherto uninhabited or relatively sparsely inhabited territories.

This knowledge allows us to apply evolutionary models to their architecture, as it can be assumed that it was subject to transformation processes originating within the Austronesian communities. Of course with time there were also exogene events, which might have had influences on traditional architecture. These include the contact with Papuan cultures, the introduction of metal tools of the bronze and iron age and soon afterwards the more and more intensive contact with Indian and Chinese culture and Religion. We have only clues, which precise effects these developments had on architecture. However, there is hope that more precise statements can be made in future after more thorough work.

In the case of the application of technical solutions, it seems that certain communities have preserved older techniques. Although the antiquity of the techniques seems to be proven, we still cannot draw the conclusion that the buildings utilising these older techniques also have preserved older forms.

A very thorough comparative analysis of building forms is needed to draw definite conclusions. Especially analysis of spatial zonation of certain building types is missing and will be an important task of future research.

I have tried to select certain aspects of Insulindian building culture, which seem to me determinant and particularly important for research. We have to try to understand the local mechanisms of architectural change and which parts of building they alter. If we succeed in doing so, we have a good chance to find out more about the past of vernacular buildings in insular South-East Asia.

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List of Figures

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