Non-Standard Forms of Human Residence – The Past and the Future

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Abstract. Since the dawn a man has been taking numerous settlement actions in places even useless for this purpose, for example in areas water- or permafrost-stricken. A perfect example of this in European conditions have become households built in Friesland, on the Scandinavian Peninsula (Lapland) and in the western part of Jutland Peninsula. The scale of the building development, created within it neighbourly relations, as well as used on that occasion materials, techniques and technologies seem to be particularly interesting in the case of so-called negative evolution of the human environment and the disappearance of active-citizen attitudes. For these reasons, research undertakes aiming to assess the usefulness of construction and settlement solutions in the past should be regarded as reasonable.

1. The outline of the problem

Contemporary visions of the human habitat are characterised by an amazing diversity. In particular, this applies to settlements in areas previously considered to be equally as attractive as inaccessible (the wastelands, oceans, orbits, etc.).

Since the dawn a man has been taking numerous settlement actions in places even useless for this purpose, for example in areas water – or permafrost – stricken or even deserts. A perfect example could become the households built in Friesland and in the western part of the Jutland Peninsula, in the Scandinavian Peninsula (Lapland) and in the Middle East. The scale of the building development, created within it neighbourly relations, as well as used on that occasion materials, techniques and technologies seem to be particularly interesting in the case of so-called negative evolution of the human environment and the disappearance of active-citizen attitudes.

2. Non-standard housing in the Netherlands and the Scandinavian Peninsula in the Middle Ages and into the XIXth century

In the Netherlands, in permanently flood-prone areas was established a flood council (Dutch: hoogheemrad), were heaped up dikes (Dutch: dijk) and embankments (Dutch: waterschapp). Whereas, in the less-populated and deprived of natural obstacles areas, turf and clay hills were built (Dutch: terp or wierde). Their height above the sea level reached up to 8 meters and the surface at the summit even to several hectares (4-7). On the hills have been located agricultural and living buildings, temples and cemeteries.
Whereas, in the area of Amsterdam fishermen have been building houses on wooden piles that were covered with tar (Marken Island). Such settlements generally consisted of a few buildings. In the province of Gelderland the houses were usually raised up from clay mixed with a chopped straw. They were covered with straw bundles stacked on wooden beams. These houses also served as shelter for farm animals. In one of the poorest Dutch provinces – Drenthe timber men and peat diggers were living in almost window-less households. In this case main building material was locally excavated peat blocks (Fig. 1.).

Figure 1. The Netherlands. Drenthe. Household made from peat blocks (1926). Source: [6]

Similarly were stored in the Netherlands crops, which in the feudal period was the main medium of payment. For this purpose was used a brick granary (Dutch: *spijker* or *spieker*). It was located on the artificially raised terrain and surrounded by water. In this way, the stored food was protected against rodents and dampness.

At the beginning of the second millennium the population of the Scandinavian Peninsula has reached a high material culture. In the field of architecture an excellent example of it were wooden stromal structures (logs combined with cuts), particularly those built up on pile or piles Lapland (Swedish: *stolpbodar*). In terms of long, raw and snowy winter they served to gather and store seed, clothing, equipment and food, either to live. These buildings were placed on the height equal to the adult human or even greater.

This was to protect stored stocks against wild animals and rodents, snow and dampness. Such settlements generally consisted of at least a few households and what was characteristic for them was that their inhabitants had quite strong neighbourly relations. It was considerably significant in the extremely difficult conditions of the polar winter. In the northern part of the Scandinavian Peninsula such a kind of housing has survived until the turn of the XIXth and XXth centuries (Fig. 2.).
Figure 2. Scandinavian Peninsula. Lapland. Granaries. Source: [4, p. 1] – to the left, [1, p. 67] – to the right.

3. Building and construction of the „raw soil”

So-called „alternative” techniques, technologies and connected with them housing have also appeared in the Middle East countries. They included raw soil building and construction. [...] it has been [since the dawn] and it is still one of the basic materials in almost all cultures of the world, also in Europe. [...] In Central Asia, in the Indus Valley, from the middle of the third millennium BC residential houses were constructed of dried brick. [...] Houses built in technique of compacting further layers of soil or dried brick were raised up to the height of several floors. In Saan the height of the buildings is 5-8 floors [and the wall thickness is often over 1 meter]. In Shibam, in the city where the complex of 500 houses has been preserved, the height of the buildings reaches 13 floors [5, p. 11-13]. They were erected in the shape of mud and clay keeps already in the second century Anno Domini. Also in Syria, traditional mound houses were built from mud brick plastered with clay and mud render (Halab, Sarouj). Washable plasters in bathing rooms were made from the same material, but it was probably enhanced by adding chicken egg protein and salt.

However, the common traditional Middle Eastern housing stayed primitive in terms of hygienic and sanitary conditions; e.g.: Nazareth used to live in modest flat-roofed huts built of the most available building material – limestone blocks and cypress beams [2, p. 42]. In these areas flora was rickety and rare. For this reason, the cypress beams rarely exceeded 3 meters in length and the usable room area in their households was not greater than 9 meters square.

These houses have been arising without any plan [...]. They consisted of numerous tiny rooms that surrounded an open courtyard; residential building was connected with a cowshed [...]. The central space of the courtyard contained usually terrestrial stove to cook and prepare meals and a cistern -carved in a limestone bell-shaped reservoir, where the gutters drained water from the flat roofs of the buildings [2, p. 42]. It was a world without a pharmacy: the average man lived about thirty-seven years, and the oldest woman was about thirty-five. When someone got sick, it was quite likely he would die [2, p. 130].

Raw-soil-based techniques and technologies of building have been used primarily in countries characterised by hot and dry climate, such as Mexico and the United States (Arizona, California, New Mexico) either Yemen and Syria. In Europe, the construction of the raw soil became more prevalent in France (Aquitaine, Languedoc and Midi-Pyrénées).
In Poland to the most common “alternative” techniques and technologies of building belonged those based on post construction. In the fields between wooden beams was usually placed a warp of branches or straw. This warp was then covered with mud layers until the wall reached the desired thickness. On the other hand, in the Mazovia, Great Poland and Pomerania regions the method of compressing the calcified soil mixed with gravel was used to build residential buildings.

Thus, the use of a particular technology to rise up a building came from the availability of building material, architectural culture and climatic conditions. What seems to stand in the way of restoration of some “natural” building methods was an aesthetic and hygienic requirement of contemporary world.

4. Futuristic visions of housing settlement

All of the abovementioned methods of settlement indicated a strong emotional connection between man and his residential area.

In the Middle Ages, travelling was a long-term and quite expensive operation, and for this reason it was undertaken occasionally. The process of movement and migration of the population was usually related to searching for the most favourable living conditions and it led to the establishment of a permanent seat or settlement. In this case the climatic conditions and their variability have become a significant factor.

The civilisation development of societies in the last few decades has brought the revolutionary changes in the cultural aspect. As a result, there appeared a need to find a new form of human living environment in the computer era. In the 80s of the XIXth century, with the arrival of the second wave of industrial revolution, mobility has become a necessity – it resulted from the lack of guarantees of permanent employment.

Paradoxically, futuristic and probabilistic visions of housing concepts have been based on the belief that there is a link between increasing mobility of societies and the acceleration of their civilizational development – [...] utopias of the past have proved to be useless (H. G. Wells) [9, p. 41]. However, it seems that in this case the idea (undoubtedly right one) has outweighed the technical feasibility of its realisation and therefore raised many doubts (H. W. Corbett, 1913).

The issue of mobility and human settlement variability does not seem to be explicit in the age of globalisation. Associated with globalisation the process of „reducing” distance and increasing circulation of information has also led to human over-adaptation and natural environment degradation (e.g.: climate changes).

At the beginning of the second half of the XXth century all the above led to the intensified interest in the concept of deglomeration. In most cases, they were based on ideas to locate extensive settlement in non-urbanized areas or to create the „accompanying” structures close to built-up region. There were propagated parallel vertical or horizontal architectural arrangements, but also mobile and variable one (as requested by the tenant). A perfect example of this could be the design of a spatial truss spread out several dozen meters above Paris and supported by the pylons – Paris spatial (Y. Friedman, 1960). The truss included residential buildings, mass transit roads, commercial and service pavilions and small industrial factories. Most of the inhabitants of Paris would live and find employment above the ground. Non-urbanized areas were allocated to agriculture and recreation. In this way, the population density of urban area would not exceed 100 people per hectare (Fig. 3.).
At the other end of this contemplation there were the Japanese Metabolists. The concept of form and function they replaced with „space” and „variability”, which were supposed to reflect processes occurring in the natural environment. Certainly, this should be treated metaphorically – it would be difficult to consider settlement processes in genetic terms. Metabolists considered it sufficient to develop existing settlement structure in non-urbanized areas. For this reason, the architectural projects of the Tokyo Bay (K. Tange), housing estates on floating islands (K. Kikutake), the agglomeration of the already existing (A. Isozaki) did not arouse as much controversy, as the reminiscence of Paris transformation from the 1920 (P. Maymont) (Fig. 4.).

Furthermore, in Switzerland was born the concept of giant shell-pit structures – Cité Intra (W. Jonas). They provided full insolation of apartments and a relaxation space to their inhabitants, isolating them simultaneously from the inconvenience of city public transport. Equally interesting was the concept of mobile habitat – Cité Moving (Archigram Group). It was based on the conviction of the advantages that result from a nomadic and sedentary lifestyle. It was technically and technologically ultramodern spatial structure that seemed to be a fair copy of the Ark of Noah or Nautilus from the adventure novel Twenty thousand miles of submarine shipping (Vingt mille lieues sous les mers, J. Verne, 1870).

In recent centuries, the process of doubling among population has been performing at shorter and shorter intervals. This allowed us to assume that in the middle of the XXIst century the Earth would fight with catastrophic overcrowding. The most difficult situation would appear in cities – especially in those where spreading and expansion process is already out of control. Space deficit and in consequence overcrowding of inhabitants could be just as dangerous as the lack of access to stock and drinking water.
Searching for solutions in this field has brought two different theories of global range – *Ecumenopolis* (C. A. Doxiadis, 1968) and *Arkolopolis* (P. Soleri, 1968). In both cases was proposed reorganisation of urban areas. In the case of *Ecumenopolis*, it was about creating amorphous sustained structures covering the whole Earth. The above would create a network of „urban corridors” that might provide a well-organised built-up space and protect the natural environment. The origins of „urban corridors” were settlement centres of industrial era – *Dynapolis*. By „absorbing” new areas they had been gradually transformed into cities with several million inhabitants – *Dynametropolis*. There were urban centres similar to those that exist today. Cities with more than 10 million inhabitants have been called *Dynametropolis*. At the time of the emergence of modern technologies and IT services were created independent economic and social centres – *Megalopolis*. The higher level of these centres' development would become *Globopolis* – sustained structures in the global range, and then – *Cosmopolis*, the settlement in aerospace (Fig. 5.).

![Figure 5. „Living trees” – on the left and tower-city for 25 thousand inhabitants (Gabriels) – on the right. Source: [7, p. 131] – on the left, [7, p. 132] – on the right](image)

All this above was supposed to prevent a spontaneous urbanisation. It appears, however, that the *Ecumenopolis* theory was formulated *post factum*. Namely, it coincided with the intensifying urbanisation process on the east coast of the United States, from Buenos Aires to Rio de Janeiro areas, as well as in China, Japan, and South Korea. In these last three countries was built a 1 500-kilometre-long „city corridor” bringing together nearly 50 million inhabitants from three urban agglomerations (Beijing-Seoul-Tokyo). The duration of the air travel between those cities did not exceed an hour.
Contrary to Ecumenopolis theory was the idea of Hyper-building – the transformation of the horizontal settlement into the „human hive” (Arcosanti, 1970). This concept has been based on the criticism of land over-absorption resulted by the human settlement operations so far. The vertical area of the building would not exceed the 10th part of the area. This would allow to reduce the pedestrian course or even eliminate the vehicles movement. In this way the human civilisation effort could be optimize. The concept of Hyper-building was based on both – energetic and raw materials balance. Since then the man has not meant to be a burden for the self-regulating nature [8, p. 63]. Hyperbuildings were determined as a reflection of the natural and wildlife structures. This idea has been rebound, inter alia, in the Los Angeles and San Francisco redevelopment designs and in aero spatial residential projects.

The fascination with ideas to colonise space, which was initially present only in science-fiction literature, gained in the second half of the XX century the real shape. The experience of space station exploitation and manning expeditions has shown that the future of such ventures will be related to the colonisation of other planets. The first space flights, and in particular the human landing on the moon, revealed the difficulties in disability of adjusting to weightlessness and the danger of cosmic rays. Equally important was the complete dependence of space missions on Earth supplies. Consequently, preparation for the cosmic colonial expedition began firstly in the United States and the Soviet Union. In the Krasnoyarsk Bios-3 research complex, the Russians conducted ten half-year manning experiments (1965-1984). These studies have been developed by Americans. In the mid-80s in the desert near Oracle in Arizona they began an experiment called Biosphere 2. There was created an isolated from the environment special lab team. On the area of nearly 1,5 hectares there were upraised several ecological systems. It resulted from the conviction of a need which was nothing more than ability to cultivate plants in extra-terrestrial conditions and consequently would allow people to survive on alien planet. A two-year experiment involving 8 participants (1991-1992) was conducted at the Biosphere 2 facility.

In turn, members of the Martian Society raised a prototype of colonisation camp on the Canadian Devon Island (Mars Society, 2000). There was built a two-storey residential building and a laboratory.

5. Summary
The concepts presented in this study seem particularly interesting in the context of the so-called negative evolution of human life environment. This applies in particular to the crowding process of urban residents and to, associated with it, disappearance of neighbourhood relations either the atrophy of natural environment.

Striving to reduce the negative effects of the human civilisation development will require in the future a variety of activities in the way of settlement methods. Changes will also have to occur in the households building procedure because ecology and the society’s development are inseparable components of the same process.

References
[1] Barucki T., Architektura Szwecji, (Swedish Architecture), Mała Encyklopedia Architrktury, Arkady, Warszawa 1989.
[2] Bruce B., Jezus: dowody zbrodni. Śledztwo w sprawie śmierci najgłębszego człowieka wszech czasów, Carta Blanca, Warszawa 2011.
[3] Doxiadis C. A., Architecture in Transition, First edition, Oxford University Press, 1968.
[4] Näsström G., Svensk Funktionalism, (Swedish Functionalism), Lundgrens Söners boktryckeri, Malmö 1930.
[5] Kelm T., Długosz-Nowicka D., Budownictwo z surowej ziemi. Idea i realizacja, (Construction of raw earth, ideas and realiations), Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2011.
[6] Plaggenhut, Drenthe, Geheugen van Nederland,
http://www.geheugenvannederland.nl/nl/geheugen/view?identifier=SFA03%3ASFA0010120 02, access 2017-03-20.

[7] Schmiedel H.-P., Wohnhochhäuser, Band 1, Punkthäuser, Berlin, VEB Verlag für Bauwesen 1967.

[8] Styrna-Bartkowiczowa K., Szafer T. P., Ekologia środowiska mieszkaniowego. Studia nad kształtowaniem architektonicznym biotopu człowieka. Wydawnictwo Polskiej Akademii Nauk, Wrocław–Warszawa–Kraków–Gdańsk 1977.

[9] Wells H. G., A Modern Utopia, The Floating Press 2009.

[10] Zumpe M., Wohnhochhäuser, Band 2, Scheibenhäuser, Berlin, VEB Verlag für Bauwesen 1967.