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Living in the future – analysis of selected housing environments

Formy zamieszkania ludzi w przyszłości – analiza wybranych koncepcji środowisk mieszkaniowych

Abstract

Futuristic concepts of housing environments show people, how it will be possible to live in the near future. These projects inspire engineers, scientists and researchers who bring modern technologies to life. It seems that technology is the key to solving the problems that humanity faces today. Housing environments need a new interpretation adapted to contemporary people who are looking for a new quality of living. In the article, the author will characterize futuristic visions of housing in the future, based on their location: on land, underground, in the air, under or on water.

Keywords: housing environment, residential complexes, futuristic architecture, the quality of housing in the future, city of the future

Streszczenie

Futurystyczne koncepcje środowisk mieszkaniowych przybliżają odbiorcom, w jaki sposób będzie możliwe zamieszkiwanie Ziemi w przyszłości. Projekty inspirują inżynierów, naukowców i badaczy, którzy wprowadzają do życia nowoczesne technologie. Wydaje się, że technologia jest kluczem do rozwiązania współczesnych problemów ludzkości. Środowiska mieszkaniowe potrzebują nowej interpretacji dostosowanej do współczesnych ludzi, którzy poszukują nowej jakości zamieszkania. W przedstawionym artykule autor scharakteryzuje współczesne wizje sposobu zamieszkiwania w przyszłości, ze względu na ich lokalizację: na lądzie, pod ziemią, w powietrzu, pod lub na wodzie.

Słowa klucze: środowiska mieszkaniowe, architektura futurystyczna, jakość mieszkaniowa w przyszłości, miasto przyszłości

„My interest is in the future because I am going to spend the rest of my life there."
Charles Kettering [10, p. 429]

1. Introduction

The twenty-first century began with a series of groundbreaking and innovative scientific achievements, motivated by faith in human possibilities. On the list of accomplishments that will surely revolutionize human civilization, there is, for instance, the construction of a space station, the discovery of a particle accelerator or the teleportation of proton particles. However, the heyday of humanity's possibilities is not devoid of threats – worsened by social, economic and cultural difficulties. Wars, forced migrations, poverty, degradation of the natural environment and overcrowded cities are just examples of problems that modern civilization is struggling with. In the article, the author will focus on the situation of overcrowding and will present the characteristics of a vision of future housing environments.

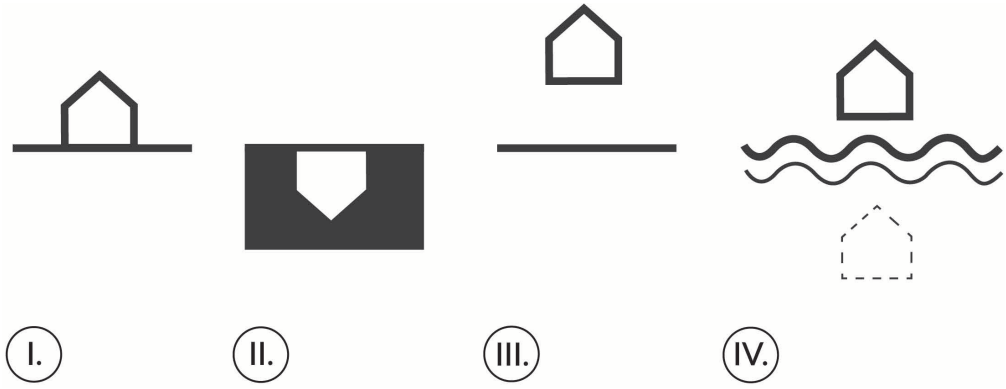

Fig 1. Graphics depicting futuristic concepts of housing environments depending on location: I – habitat on land, II – underground habitat, III – airborne habitat, IV – habitat under or on water (graphics by the author)

At present, the issue of population density in cities is becoming more and more important. Cities attract new residents with the promise of a good job or a vision of a better quality of life. According to United Nations data, in 2016 more than 54.5% of the world's population inhabitedan urban environment [22, p. 1–13]. Urban areas will be relatively concentrated in terms of population density. It is forecast that by 2050, they will be inhabited by over66% of the Earth's population– this means that one in three citizens will live in a city [22, p. 1–13]. The urban community already experiences negative factors such as poor air quality, noise, stress, traffic jams, inefficient urban infrastructure, overpopulation, anonymity or social pathologies [14, p. 99–105]. This situation makes today's urban environment an increasingly difficult place to live. Housing spaces need a new interpretation adapted to today's residents and to neutralize negative factors. How will humanity adapt to living conditions in the future and how will places of residence look like?

In the article, the object of research are selected examples of the concept futuristic housing environments and ideas of how people will live in the future. The thematic scope refers only to conceptual designs, because only such bold visions will allow us to approximate possible scenarios of people's lives in the future. However, the author wishes to emphasize that the presented architectural projects are but a few from among an uncountable number of possibilities. After all, today's decisions determine the appearance of the world in 2050, and that will be the foundation of the life of residents in 2100 [4, p. 9].

The main source of examples of the housing environment in the future are works of architects and designers. The most interesting of these are the futuristic visions of designers like – Zaha Hadid or Vincent Callebaut. In addition, visions of future architecture are also provided by academic centers[1] for example as a part of didactic courses for young students. The theme is also promoted by foundations which organize architectural competitions[2], they present visions of the future formulated by architectural adepts. Another important source focusing on the visual transmission of living in the future is popular-science cinematography[3]. Two issues of the „Housing Environment" scientific journal constitute interesting bibliographic sources regarding the housing situation in the future. The author used non-reactive research, a method of content analysis including the analysis of books, articles and graphics.

2. Futuristic concepts of residential environments

Man inhabits the Earth creating its environment for living on continents and islands (land occupies about 29% of the Earth's surface) [7, p. 11]. This area is currently occupied by about 7.2 billion people and the United Nations organization estimates that by 2100 this number will increase to 11.0 billion [22, p. 1–13]. Today's concepts of futuristic housing environments are looking for answers to the problem of increasing population in urban areas. One of the solutions is to indicate alternative places in which human life will be possible. According to the analysis, concepts of futuristic housing environments can be divided on the basis of their location and natural environment. Housing environments can be designed: on land, underground, in the air on or underwater, as well as beyond planet Earth, i.e. in a spaceship or on another planet[4]. The author will characterize futuristic residential environments depending on their location further in the article.

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1 E.g. Wrocław University of Science and Technology Faculty of Architecture, course "Futorological Architecture".

2 E.g. eVolo Magazine, the organizer of the future skypcerper competition.

3 E.g. *Metropolis* (1927) directed by Fritz Lang. The city of Metropolis is presented as a futuristic urban dystopia.

4 In this article, the author focuses solely on futuristic ways of living on planet Earth. Visions of inhabiting spacecraft or other planets will not be discussed.

2.1. Habitat on land

Modern cities strive to counteract the negative effects of overpopulation by trying to transform into more sustainable and healthy places to live [18, p. 166]. Examples of such actions could be, i.a. the Paris Smart City 2050 project or Sustainable Singapore 2050. According to them, futuristic housing environments will be designed in accordance with the principles of sustainable development, focused on renewable energy sources and a better quality of life for their residents.

The idea of **sustainable settlements** (Fig. 2 – I) is based on the creation of self-sufficient ecological colonies, in which, through the work of residents and harmony with nature, positive social changes can take place. These changes concern positive relationships with other people, self-fulfillment and abandonment of excessive consumption. Sustainable settlements[5] are already being created, inhabited by a community of people who want to change their lives. The community designs buildings made of natural materials available in the immediate area – such as wood, clay, straw, as well as hemp. The idea of sustainable settlements on a larger scale can be seen in the Venus Project by Jacques Fresco and Roxanne Meadows. The organization founded by the authors of the project assumes the improvement of the living conditions of society by adopting sustainable development, effective energy management, natural materials and modern technologies. Housing environments in the Venus Project are focused mainly on multi-family housing, in which intelligent technologies are applied to ensure the greatest possible comfort for residents. There is also occasional single-family housing, designed from repetitive prefabricated modules, ensuring a high level of performance with the possibility to adapt the project to the preferences of future families [9, p. 34–36].

Sustainable urban housing (Fig. 2 – II) is characterized by the search for ecological solutions and attractive new forms of living in cities. Designers are looking for an experimental architectural form in conjunction with the landscape, nature and the relationship with the environment. Buildings feature low-energy solutions and the use of various types of renewable energy to reduce the negative impact of the building on the natural environment [19, p. 305–306]. A conceptual proposal prepared for the authorities of Paris, in which the architect presented an interesting way of transforming the urban fabric while respecting historic buildings can be an example of this. The capital of France features dense development, causing various types of social and housing problems. In addition, life becomes more and more difficult, i.a. due to high pollutant concentrations, smog and climate change. The city authorities decided to take corrective action and transform Paris into an ecological future city by 2050. In 2014, the City Council commissioned the preparation of a project of the redevelopment of Paris according to the requirements of the Paris climate agreement i.a. to reduce greenhouse gas emissions [16, p. 14]. The Belgian architect Vincent Callebaut started researching – he created a vision of a green, sustainable and hyper-ecological city of the future,

[5] The Eko-osada Brzozówka foundation was established in 2015, where in the Cielądz village in the province of Łódz (Poland) is implementing the project of sustainable settlements. More information on the website http://eko-brzozowka.pl.

which includes renewable energy, tall green buildings, hanging gardens, smog-absorbing towers and flat buildings with a characteristic honeycomb structure [23].

Residential towers (Fig. 2 – III) are buildings characterized by considerable height and development density. The popularity of such development projects results from the possibility of constructing a very large number of apartments on a limited plot, comparable in scale to a typical housing estate [25, p. 61].

The concept of residential towers is promoted by the works of the eVolo architectural competition, organized by the magazine under the same name. The competition has been organized since 2006 – its addressees are architects, students, engineers and artists from around the world. One of the examples is the "Adaptive Capacity: A socio-ecological Vertical Community in Tanzania" residential tower, designed by Adrianne Jeevananthan. The conceptual proposal presents an alternative solution for slum dwellers in Tanzania. The author intends to solve the problems of the local population by designing a "vertical village", to provide residents with a higher quality of life. The building will fulfill all the functions necessary for residents, such as places for living, working, recreation and childcare, as well as a healthcare and educational facilties[8].

Fig 2. Graphics showing the Future of housing environments designed on the ground: I – sustainable settlements, II – Sustainable urban housing, III – Residential towers (graphics by the author)

2.2. Underground habitat

Designers of a futuristic residence concepts are wondering how to use the areas below the surface of the earth. Cities are growing mainly towards to the sky, constructors are outdoing themselves in designing buildings meant to be the tallest in the world. What will happen when we start to develop the free area under the surface of cities? It is known that no land can be wasted in the urban structure. It is possible that with this assumption, the authorities of

the cities of the future will want to transfer at least some of the city's functions to the surface of the earth.

One example of a design featuring the idea of transferring housing environments below ground level is the conceptual proposal of developing the main square in Mexico by architects from BNKR arquitecturan. This project goes 300 meters below the central Plaza de la Constitución en Mexico, forming an **inverted pyramid**, which refers to the most characteristic Aztec buildings (Fig. 3 – IA). The "roof" (240 × 240 m) of this underground habitat is completely glazed, developed as a public square serving the residents as a public space. The proposal was created as an alternative to the growing need to increase the city's housing stock. The innovative design additionally fits perfectly into the urban tissue, by following the urban restrictions of the historic part of the main square in Mexico. The city's urban planners introduced a ban on erecting buildings on eight floors. The inverted pyramid „Earthscraper" essentially creates an underground mini-city, in which there will be a centre of culture or commerce outside the residential area [1, p. 527–529].

Another example of a historical vision of life underground is the „depthscarper" project (Fig. 3 – IB), which was designed by Japanese engineers as a possible solution to the problems of earthquakes. The project was inspired by the 1923 Tokyo disaster – an earthquake that ruined the entire city in 10 minutes and caused 142 000 deaths. Japanese scientists, in order to counteract such cataclysms in the future, began research on a structure which can resist the negative effects of earthquakes. The researchers noticed a very interesting phenomenon – underground tunnels and structures suffer a little damage during seismic shocks compared to those on the earth's surface. The designers proposed a **cylindrical structure** of the building with massive concrete walls that will vibrate together as one element during an earthquake. Residents will have access to fresh air and daylight through an opening in the structure. Additionally, to increase the amount of incoming light, a large mirror will be installed on the surface of the earth andilluminate the lowest parts of the structure [15].

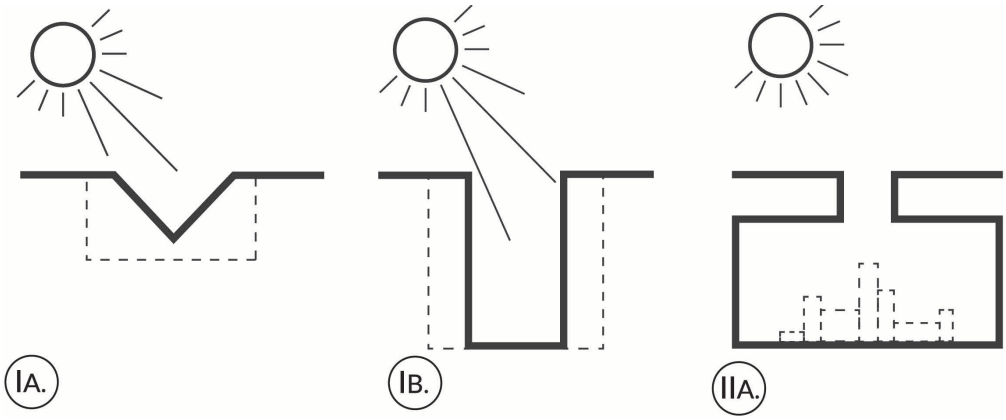

Fig 3. The graphic presents possible ways of designing housing environments below ground level: IA inverted pyramid, IB – Cylindrical structure, IIA – Transferring certain urban functions underground (graphics by the author)

The international organization Associated Research Centers for the Urban Underground Space [12] supports activities aimed at using land under the surface. This organization promotes, i.a. the concepts of **transferring certain urban functions underground** (Fig. 3 – IIA) [3] – an example of such a solution is the project of an underground scientific city in Singapore. Singapore is a city-state with an area of 719.1 square kilometres [20, p. 1], therefore, it is important to use every piece of land rationally on such a limited area. 4,200 people will work in the underground scientific city, and the construction will reach up to 80 m deep into the earth. The project will only use spot lighting in the main atrium of the building, while the remaining part will be artificially illuminated [21].

2.3. Airborne habitat

At present, thanks to the perseverance and strength of the human mind, the eternal dream of flying has become a reality. Airplanes allow free movement of people and goods around the world. Futuristic designers inspired by the human desire to fly, but also the possibilities of modern technology, proposed the idea of flying cities.

One of the first conceptual **flying cities** (Fig.1 – III) was a project of sky-high tensegrity spheres (Cloud Nine) by American architects Buckminster Fuller and Shoji Sadao from 1960. The project presents a gigantic lightweight tensegrity sphere being the main structure that can levitate by heating the internal air above ambient temperature. The proposed structure becomes more stable when it grows, due to the way in whichit distributes stresses on the surface of the sphere. Fuller suggested that the mass of the tensegrity sphere, a mile wide, would be negligible compared to the mass of air trapped in it. Then the air inside this sphere would be heated up to one degree higher than the ambient temperature, and could freely float above cities. He calculated that such a flying structure could lift a heavy weight, allowing "small cities" to be built. The construction of such city can be moored to a chosen place on earth or be freely levitated around the globe [5, p. 190].

2.4. Habitat under or on water

The seas and oceans are still among the least researched areas of the earth's surface. Scientists are constantly discovering new species of animals or unexplored mountain ranges in the deep sea. Water spaces are used to a small extent as a place for human life e.g. on oil platforms or ships. The potential is huge as, in the end, life began in the sea and there are thousands of animals that live in it. This fact is used by designers presenting self-contained housing units, designed underwater and drifting freely above sea waves.

An example of a futuristic concept of living **under the waves** is the Sub-biosphere 2 (Fig. 4 – I) project by Phil Pauley, who specializes in the design of underwater cities. The project consists of a central geometric sphere – a biome, which is designed to control the living conditions in the entire complex, including air and water quality, food and electricity. The biome is surrounded by eight spheres, in which up to 100 inhabitants can live [17, p. 173].

An example of the concept of life **on the water** is a project by architect Vincent Callebaut, which proposed a futuristic concept of a self-sufficient floating city – Lilypad (Fig. 4 – II).

Designed to provide shelter for future refugees due to global warming. According to scientists, the level of the ocean is gradually increasing, absorbing large areas of land. The Maldives, where by 2070 seventy percent of the country's area will be under water, can serve as an example [13, p. 239]. The project operates as an amphibious half-aquatic and half terrestrial city, and is anticipated to being able to accommodate 50 000 inhabitants. The floating Ecopolis will also be in a positive energy balance with zero carbon emission through the integration of all renewable energies (solar, thermal and photovoltaic energies, wind energy, hydraulic, tidal power station, osmotic energies, phyto-purification, biomass) allowing the production of more energy than it consumes [6, p. 304–305].

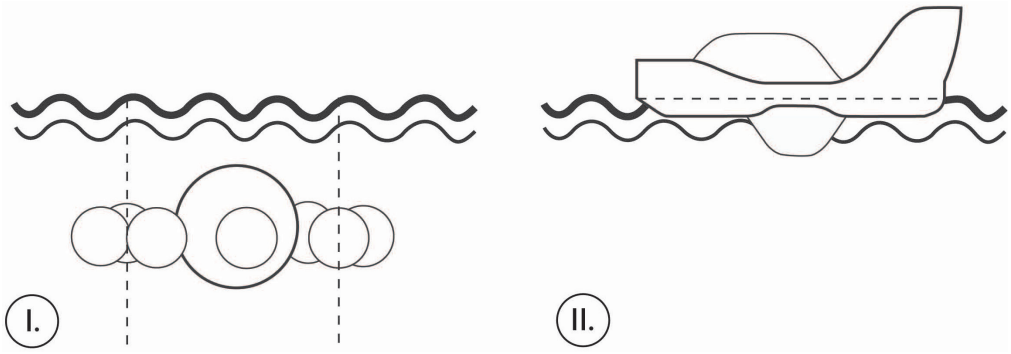

Fig. 4. The graphic presents possible ways of designing housing environments under and on water: I – habitat under water with the ability to float to the surface on sunny days, II – habitat floating on the water surface (graphics by the author)

3. Summary and conclusion

Conceptual proposals of housing environments of the future are, in many cases ahead of the available technical capabilities, representing their authors' far-reaching creativity. The presented examples are a joint attempt to deal with the current housing problems of humanity and life in the city. Most of the examples and analyses mentioned above present solutions for housing problems and overpopulated cities. In addition, most of the discussed projects are looking for human contact with the natural environment. Projects supporting the development of construction taking into account sustainable development and aimed at dealing with the problem of overcrowding in cities and hunger in the world. The characteristics of futuristic housing environments presented by the author and divided on the basis of project location make it possible to systematize the research topic. Each of the presented locations – i.e. on the ground, underground, in the air, on or underwater - brings together projects in which the promoted idea of the designer is the common denominator.

Projects on land have a balanced approach to the way of life of people in the future, regardless of where they live. The growing number of people and society's efforts to improve living conditions lead to the development of an economy that affects the degradation of the

natural environment. Conceptual designs have an educational value and communicate to the public how important it is to respect the natural environment.

Conceptual proposals of projects implemented below ground level combine the idea of using undeveloped land under the city. At present, urban residents feel the high costs of living in the city. Because of this situation, people are choosing smaller and smaller apartments that they can afford. The Japanese "geki-sema", translated as "human locker room", are an example of this. These are rooms for rent in Tokyo, often with dimensions of 2–3 m^2. In this space, young Japanese sleep and hold all their belongings – often, such rooms are grouped and have a shared kitchen and toilet [11, p. 87].

The vision of flying housing environments combines the idea of freedom and the free movement of people on earth. Flying cities will be able to move away from places threatened by a cataclysm, they will eliminate, i.a. problems of earthquakes, whirlwinds or tsunamis. It will also allow access to unlimited solar power, and arable farms could operate all year round. Certainly, the future development of this idea is related to the invention of fast flying cars, flying backpacks and teleportation [2, p. 159]. The very conceptual idea brought with it new opportunities for people as well as potential threats, e.g. during technology failures.

In turn, projects of centers of life above or under the water promote the idea of greater use of the oceans in the fight against overpopulation on earth. This idea is gaining popularity because of climate change. According to the Polish Humanitarian Action, by 2050, due to the heating of the planet, 150 million people may be forced to migrate [24, p. 123]. In light of this situation, the idea of adapting the oceans to serve as an alternative living environment seems rightly justified.

All the futuristic concepts share a common vision of human adaptation to living conditions in the future. According to the presented conceptual proposals, the city of the future is waiting for overpopulation, but it is not always shown in a negative way. Certainly, futuristic concepts today show a small fraction of how a person can live in the future.

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