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INTERDISCIPLINARITY O SUSTAINABLE CONSTRUCTION Lecture notes from the presentations of professional scientific papers

Professional Undergraduate Study Program of SUSTAINABLE DEVELOPMENT -SUSTAINABLE CONSTRUCTION

Course: SUSTAINABILITY OF ARCHITECTURE

IMPRESSUM

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Jasmina Ovčar, dipl. ing. arh. i urb., Senior Lecturer

Jasmina Ovčar, *dipl.ing.arh. i urb.* (Graduate Engineer of Architecture and Urbanism), was born in 1966. She graduated in 1989 from the Faculty of Architecture, University of Zagreb, receiving her Master's Degree in Architecture and Urbanism. From 1990 to 2014, she worked as a design engineer and certified architect in Čakovec, coordinating the preparation of technical documentation and conducting expert supervision alongside architectural design work.

Since 2012, she has been teaching as an external associate at Međimurje Polytechnic in Čakovec in the Undergraduate Study Program of Sustainable Development – Sustainable Construction, and since 2014 she has been a full-time lecturer in a number of architectural courses. In 2017, she received the teaching title of a senior lecturer, and she now teaches final year students in the course of Sustainable Development.

She is a member of the Croatian Chamber of Architects and an active member of the Croatian Green Building Council.

The core of her scientific interest and work is the research of contemporary trends in architectural design - sustainable construction in the context of sustainable development, focusing on low-energy and passive houses, energy saving and environmental protection. She has published 19 professional papers within this subject field as well as presented her research papers at six international conferences and seminars. As part of the Erasmus exchange of teaching staff, she also held a public lecture at the Faculty of Design in Trzin, Ljubljana.

She was a member of the technical team working on Research Projects of the Polytechnic of Međimurje in Čakovec (2015-2018) and of the project team at the aforementioned Polytechnic as part of the EU project "Center of sustainable development" (2019-2021). Since April 2021, she has been a member of the national management team in the BIMzeED project (EDucate for zero energy buildings using Building Information Modeling) of the Faculty of Civil Engineering, University of Zagreb, and the North-West Croatia Regional Energy Agency (REGEA).

AUTHOR

Prof., Sc.D., Robert Plejić, dipl. ing. arh.

Professor, Sc.D., Robert Plejić, *dipl. ing. arh.* (Graduate Engineer of Architecture), was born in 1954 in Split. After graduating from the Split Classical Gymnasium in 1972, he enrolled at the Faculty of Architecture, University of Zagreb, from which he graduated in 1977 and obtained his doctoral degree in 2003. Working as a design engineer in a number of architectural offices in Split, he has delivered a number of urban and architectural projects, also realizing some awarded tenders. From 1997 to 2009, he was Head of City Services for Spatial Planning and Environmental Protection of the City of Split. From 2009 to 2019, he worked at the Faculty of Civil Engineering, Architecture and Geodesy, University of Split, as a professor and Head of the Department of Theory and History of Architecture and Art, and from 2010 to 2014 as Vice Dean - Head of the Architecture Study Program. He has published a number of articles, reviews and essays in books and professional publications.

Review excerpt:

"The topics pertaining to sustainable construction in the context of sustainable development are here systematically and innovatively presented to the academic, professional and general public, representing a kind of promise to raise awareness of the importance and need for a more responsible understanding of the category of sustainable and energy-efficient architecture in response to the modern-day needs as well as the future challenges.

e high pedagogical standards and attached references, the script is a valuable tool for students in that it provides the effort, incorporating a number of different participants in sustainable construction processes - from architects tors, and professionals dealing with the preparation and management of documents, to financiers and investors."

REVIEWER

Assist. Prof., Sc.D., Dražen Arbutina, dipl. ing. arh., College Professor

Assistant Professor, Sc.D., Drazen Arbutina, *dipl. ing. arh.* (Graduate Engineer of Architecture), was born in 1970 in Zagreb. He graduated from the Faculty of Architecture in Zagreb in 1996, where he was employed as a demonstrator, part-time assistant, and later junior assistant in teaching, professional and scientific work until September 2000.

In 2006, he received the title of Senior Lecturer at the Zagreb University of Applied Sciences.

As an assistant professor, he is currently a course director and/or lecturer in a number of courses in the Undergraduate Professional Study Program of Civil Engineering and the Graduate University Study Program of Civil Engineering at University North in Varaždin. He was awarded a doctoral degree in 2009, upon defending his dissertation titled "The Architecture of Zadar from 1918 to 1944", under the mentorship of Professor, Sc.D., Ivan Juras, *dipl. ing. arh.*

In 1999, he was entered in the Directory of Certified Architects of the Croatian Chamber of Architects. From 2014 and 2016, he was a member of the Board of Directors at the Croatian Institute for Spatial Development. Since 2013, he has also been a member of the Main Committee for Arts of the Council of Polytechnics and Colleges in the Republic of Croatia. Since 2015, he has been performing the duty of the head of part-time Undergraduate Professional Study Program of Civil Engineering at the Civil Engineering Department of the University of Applied Sciences in Zagreb. He is also President and Secretary of the Croatian ICOMOS Committee.

Review excerpt:

"These lecture notes, se valuable contribution in a specific professional refle students in the analysis o of architecture in the field For the course of Susta systematic overview of p field of architecture and o

serving as supplementary literature to the course of Sustainability of Architecture, represent an interesting and in the form of a systematic overview of presentations as part of professional lectures, which is not a mere collage of eflections or results of professional activities. It is, in fact, an overview of different concepts and elements relevant to is of architectural achievements, ensuring that the basic professional requirements, set today in terms of sustainability field of individual housing construction, are met.

ustainability of Architecture at the Undergraduate Professional Study Program of Sustainable Development, this of presentations will serve as an interesting and valuable basis for further studies of the subject of sustainability in the and civil engineering in general."

ACKNOWLEDGEMENT

...to all the dear people, experts, and friends who have helped me to see my ideas from different standpoints, both professional and human, to raise them to the level of verified professional scientific works, to develop further in my profession, and to learn and prove that architecture does not exist for itself alone, but is (and should be) in the service of man. The contribution of those who have recognized my zeal and ambition to see, within the framework of sustainable development, the possible benefits of applying interdisciplinary approach to architecture, which can be combined with a number of seemingly incompatible areas of related but not so close professional fields - is invaluable.

...to my family - for their understanding, patience and support during my many an hour spent in front of the screen. I am especially grateful to my daughters, Dora and Jana, for reading through all of my papers and presentations, offering wellintentioned critique and constructive suggestions as well as helping with the graphic design and creating the lecture notes in digital form.

Another big thank you goes to my friend Gilly, who has read the English version with great interest, providing the text with a touch of modern-day English.

Special thanks to...

Mirjana Trstenjak, mag.oec., dr.sc. Mihaela Mesarić, prof.geol. i geog., Marta Turk, mag.ing.arh. i urb., Luka Vrbanec, bacc.ing.evol.sust., Mario Mikulan, dr.med.; psychiatrist, psychotherapist, Goran Sabol, mag.ing.geoing., Dora Ovčar, mag.iur., Gorana Gregl, univ.bacc.ing.arch.,for their thoughts, reflections, research, and creative work in helping me to bring to light the professional scientific work which is the backbone of the papers presented within Lecture Notes on the INTERDISCIPLINARITY OF SUSTAINABLE CONSTRUCTION.

Together we are better, smarter and stronger!

Lecture Notes on the INTERDISCIPLINARITY OF SUSTAINABLE CONSTRUCTION is a selection of scientific work presentations given by the author as part of professional and scientific conferences in Croatia in the period between 2015 and 2021. It stems from the author's strivings to present sustainability of architecture and construction in a concrete and concise way, dealing with subjects of architecture in synergy with various professional fields. The professional scientific papers were prepared in collaboration with colleagues and friends who think and act sustainably, and had shown their enormous zeal in the process of developing and elaborating the author's ideas.

The questions of housing, urbanism, tourism, respect for architectural heritage, waste management, post-earthquake reconstruction, etc., cannot be addressed from a single professional standpoint - to achieve sustainability, the needs of modern man must be looked at from both interdisciplinary and multidisciplinary approaches.

The graphic design of the presentations is meant to be visually intriguing and is to present the basic assumptions, research, analyses and conclusions in the simplest possible way.

"If you can't explain it simply, you don't understand it well enough." (Albert Einstein)

These lecture notes are primarily intended for students of the professional undergraduate study program of Sustainable Development, subject of Sustainable Construction, at the Međimurje Polytechnic in Čakovec, and they assume the basic understanding of the course titled Sustainability of Architecture. The aim is to expand the perspectives and worldviews of students and encourage them to think and form attitudes about the sustainability of architecture. If, by any chance, the notes pique the interest of the general public, they will truly surpass their purpose.

Jasmina

FOREWORD

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TREE HOUSES AS A NEW FORM OF TOURISM IN LOWLAND RIVER AREAS -THE MURA RIVER EXAMPLE

1





INTERNATIONAL CONFERENCE 14 – 15 April 2016

Tree Houses as a New Form of Tourism in Lowland River Areas -The Mura River Example

Jasmina Ovčar, mag.ing.arh.i urb.

Mirjana Trstenjak, mag.oec.

dr.sc. Mihaela Mesarić, prof.geol.i geog.





- 1. INTRODUCTION OBJECTIVES, METHODS AND HYPOTHESIS OF THE RESEARCH
- 2. DESIGN AND CONSTRUCTION OF TREE HOUSES LIVING HIGH
- 3. TREE HOUSES ALONG THE MURA RIVER IN MEÐIMURJE COUNTY
- 4. SURVEY RESPONDENTS' INTEREST IN THE ROBINSON CRUSOE TOURISM IN CONTINENTAL AREAS
- 5. CONCLUSION



Objectives:

- 1. To determine if there is a possibility of constructing tree houses along the Mura river in Međimurje County.
- To determine if these houses could be used to develop selective forms of tourism, mostly in the 'Robinson Crusoe' style.

Methods:

An analysis of relevant theoretical and empirical literature, a survey and a field research.



Initial hypothesis:

Survey respondents show interest in taking a Robinson Crusoe holiday in the tree houses of riverside forests.





-In addition to living in a tree, the users of the tourist offer would provide for themselves by carrying out the daily tasks based on the offer of the local population and rural homesteads.

-The construction of architecturally and structurally designed and **minimalistically furnished tree houses/huts** needs to be incorporated into the selected site.

NNOVATION TECHNOLOGY EDUCATION MANAGEMENT



- Careful choice of good, solid, and healthy trees.
- Choosing a **site** where construction is allowed.
- In line with the **spatial plans** of the area.
- Respect for **micro-location** in terms of nature protection.







- A tree house has to be constructed in accordance with the tree measurements, and the construction itself should be safe and solid.
- The tree's branches should be solid, spreading **1.5-2 m above the ground**, never in state of decay.
- It is of utmost importance not to damage the tree.



- Small houses (6 - 10 m²).

- Developing the main project and obtaining a building permit in accordance with the provisions of the Building Act (OG of the Republic of Croatia 153/15).

- Ancillary buildings (a single storey up to 50 m²) on the building plot where the main structure is planned, according to the <u>Ordinance on simple and other construction</u> works and works (OG of the Republic of Croatia 79/14), without the building permit but in line with the main project.



INNOVATION TECHNOLOGY EDUCATION MANAGEMENT INTERNATIONAL CONFERENCE 14 – 15 April 2016

Modern residential architecture strives to meet all man's

needs within four functional groups:

- 1 communication rooms
- 2 relaxation rooms
- 3 dining rooms
- 4 hygiene rooms



- The intention behind the idea of a tree house is to offer accommodation by meeting only the basic requirement – to provide a place to rest.

- Struggle for survival.
- Protection from the physical and chemical conditions of the environment.
- Essential living conditions.
- Radical reduction of human needs.
- "Escape" to the tree.
- Common oak and European hornbeam forests.
- Preferably the house does not come in contact with the tree anywhere, having its own load-bearing system.
- A single house per tree.







Analysis of the area suitable for constructing tree houses:

- Relief limitations mudflats.
- Analysis of the flow regime of the Mura river.
- Habitat map analysis and on-the-spot checks.
- Selection of the most suitable forest habitat types.

The most suitable site area along the Mura river:

Mixed forests of common oak and European hornbeam protected from flooding by embankments.



Common oak (Lat. Quercus robur L.)



European hornbeam (Lat. Carpinus betulus L.)





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Mixed forests of

common oak and European

hornbeam







Cartographic background: DOF 5, Geoportal DGU



The aim of the survey was to examine the potential behaviour as well as the interest of respondents in continental Robinson Crusoe tourism.

Target population:

- Students of two secondary schools,
- Students and teachers/professors at the Polytechnic of Međimurje in Čakovec.

A total of 275 respondents. The survey was conducted in the second half of January 2016. The questionnaire was completed anonymously, on average taking 4 minutes per respondent.



- 89.40% of respondents were aged 18 to 30.
- 80.40% of respondents could *imagine their summer holidays* far away from the seaside or the city, in a forest in Continental Croatia, *alongside a river in a rural area*.
- 55.80% of respondents would take a *friend*, whereas 29.10% would go with a *partner*.
- 85.66% of respondents would be ready to spend their *holiday away from the modern technology* to experience a new and different type of socialising and lifestyle as well as to feel a sense of freedom.
- 86.00% of respondents would be prepared to *take part in teamwork activities* and joint effort to meet their basic human needs within the Robinson Crusoe community.

4. SURVEY RESPONDENTS' INTEREST IN THE ROBINSON CRUSOE TOURISM IN CONTINENTAL AREAS - RESULTS OF THE CONDUCTED SURVEY

The majority of respondets (44.7%) stated that the main motive for living in a tree house in the 'Robinson Crusoe' style was to experience *a genuine holiday*, whereas other motives (*adventure*, experiencing something new and return to nature) are represented in equal, smaller shares.





5. CONCLUSION

The approach to the project should be minimalist, in accordance with the shape and size of the tree.



YES



Decorating and furnishing should not be too extravagant, nor should the tree house be too large.





5. CONCLUSION

- There is an evident possibility to construct tree houses along the Mura river in Međimurje County – the most suitable sites are the common oak and European hornbeam forests.

- Individual approach when designing at a specific site – depending on the requirements of the micro-location.

- The structures (**tree houses**) can be used to develop selective forms of tourism, mostly in the 'Robinson Crusoe' style.

- The most suitable sites along the Mura river can be found in Lower Međimurje – the region of Murščak and east of Goričan.





INTERNATIONAL CONFERENCE 14 – 15 April 2016

THE HYPOTHESIS HAS BEEN CONFIRMED:

"Survey respondents show interest in taking a Robinson Crusoe holiday in the tree houses of riverside forests."

The full article has been published in Conference Proceedings 4th International Conference Innovation, Technology, Education and Management April 2016, Sveti Martin na Muri UDK:640.4:338.48 CROSBI profil 37618; ID 809862 authors: Jasmina Ovčar, mag.ing.arh.i urb., MirjanaTrstenjak, mag.oec., dr.sc.Mihaela Mesarić,prof.geol. geog.

2

REVITALIZATION OF THE RACECOURSE SPORTS AND RECREATION CENTRE IN ČAKOVEC





INTERNATIONAL CONFERENCE 14 – 15 April 2016

Revitalization of the Racecourse Sports and Recreation Centre in Čakovec

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Jasmina Ovčar, mag.ing.arh.i urb., lecturer

Međimurje Polytechnic in Čakovec



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- 2. HISTORY OF HORSE BREEDING AND EQUESTRIAN SPORTS, AND THE BEGINNINGS OF THE RACECOURSE IN ČAKOVEC
- 3. HORSE BREEDING AND EQUESTRIAN SPORTS IN MEÐIMURJE COUNTY TODAY
- 4. A MODERN RACECOURSE AN URBAN ARCHITECTURAL SOLUTION FOR THE FUTURE BUILDING COMPLEX OF THE SPORTS AND RECREATION ZONE AS PART OF THE RACECOURSE IN ČAKOVEC (IN STAGES)
- 5. CONCLUSION



INTRODUCTION

Directorate for the Protection of Cultural Heritage, Conservation Department in Varaždin:

'Today's area of the racecourse was once a military racecourse as part of a large barracks complex built in the 2nd half of the 19th century. The current General Urban Plan has incorporated the barracks complex with the block of former officer houses into the 3rd protection zone of the historical urban area of Čakovec. With the planned arrangement, the racecourse area would remain a predominantly undeveloped land, with a smaller part of the construction planned exclusively to remain in the function of the racecourse. Although this area is not protected by the current Act on the Protection and Preservation of Cultural Property, nor by any other higher order plan, i.e. the current General Urban Plan, the racecourse area is important for the architectural heritage of Čakovec as part of the former barracks...'



INTRODUCTION — EXCERPT FROM THE GENERAL URBAN PLAN OF THE CITY OF ČAKOVEC – PLANNING AREA AND ITS PURPOSE

According to the General Urban Plan of the City of Čakovec, the selected plot is located in the east zone and intended for sports and recreation facilities (code R2), i.e. the sports and recreation zone.





HISTORY OF HORSE BREEDING AND EQUESTRIAN SPORTS MANAGEMENT AND THE BEGINNINGS OF THE RACECOURSE IN ČAKOVEC





GALLOP AND TROTTING RACES

HURDLE RACES

VAULTING

NNOVATION TECHNOLOGY EDUCATION MANAGEMENT



HORSE BREEDING AND EQUESTRIAN SPORTS IN MEÐIMURJE COUNTY TODAY

Hurdle and dressage riding 10 active equestrian clubs in Međimurje



Riding schools All age groups,

different levels of prior knowledge, sports school trips



Off-road recreational riding Development of sports tourism



The society of People with Dystrophy, Cerebral Palsy and Other Physical Impairments - about 500 members





HORSE BREEDING AND EQUESTRIAN SPORTS IN MEÐIMURJE COUNTY TODAY

Međimurje cold-blooded horse

THE ASSOCIATION OF THE BREEDERS OF THE AUTOCHTHONOUS HORSE 'MEÐIMUREC':

Strives to preserve the critically endangered small population of the autochthonous horse breed as well as the native heritage.




The Modern Racecourse - SHOWING THE CURRENT SITUATION





The Modern Racecourse — A SCHEMATIC VIEW OF THE DEVELOPMENT OF THE MODERN RACECOURSE



Old buildings of the former racecourse

- Reconstruction and adaptation to suit the modern needs
- Preserving the tradition of equestrian sports in Čakovec and its surroundings

Basic facilities of a modern racecourse:

- gallop and trotting trails
- arenas for dressage and showjumping
- horse grazing field
- horse accommodation units
- commercial facilities
- farming facilities





The Modern Racecourse – STUATION

OUTDOOR SPORTS FACILITIES

- gallop trail
- trotting trail
- exercise manège for dressage riding warm-up area 80m x 60m
- racing manège for dressage riding 20m x 60m
- exercise manège for showjumping warm-up area 80m x 60m
- racing manège for showjumping 80m x 60m
- longeing circles
- horse walker
- paddocks (for both single and group use)

CLOSED SPORTS FACILITIES

- reconstructed existing stable
- a building with accompanying facilities
- a new stable (replica)
- a new barn with modern stalls and a covered riding arena
- shopping and catering facilities





Construction Stages - STAGE 1



STAGE 1

-Revitalization stage could, independently of the following stages, make the racecourse function again by incorporating almost all types of riding – riding school, therapeutic, sports and recreational riding.

-Reconstruction of the old stable – it is proposed to construct larger stalls for eight horses and the entrance and exit doors in two places; within the area of another, accompanying building a toilet facility is planned for riders as well as an office space and a community room, with the possible addition of an area for several-day stay of coaches or referees.

-Accompanying infrastructure (paddocks, exercise manèges, longeing area, hayloft, food storage room, bedding, manure pits, etc., and fencing the entire space of the racecourse complex).



The Modern Racecourse — RECONSTRUCTION OF THE EXISTING BUILDING OF THE OLD STABLE AND CONSTRUCTION OF THE REPLICA (STAGES 1 AND 2)

The existing building of the old stable

- The reconstruction envisages eight stalls for accommodating horses and an ancillary room for the saddlery.

External dimensions of the building are within the dimensions of the existing 6m x 40m, the existing height of the cornice is also kept.

- Two new entrance and exit doors are made on the west side, towards the outdoor sports arenas.



EASTERN FACADE



The Modern Racecourse — Reconstruction of an existing building with accompanying facilities

Reconstruction of the existing building with accompanying facilities, external dimensions 15m x 8m

- community room
- toilet facilities
- office space





SOUTHERN FACADE



NORTHERN FACADE





Construction Stages - STAGE 2

STAGE 2

-A new stable – replica of the existing old stable from STAGE 1, within the frameworks of the same dimensions and aesthetics, to accommodate additional eight horses and provide a saddlery -Accompanying facilities of the old building from STAGE 1 fully meet the needs of an additional new stable.

-Infrastructure, including the paddocks, riding arena, warm-up area, longeing area etc., fully meets the needs of the capacities increased by the construction of a new stable.

-The most cost-effective part of the entire investment because the additional capacities of the racecourse for eight horses make use of all that has already been realized in STAGE 1.





Construction Stages — STAGE 3



STAGE 3

-The picture shows the development path towards the **modern sport and recreation racecourse centre.**

-The floor plan of the **new stable is circular in shape with modern stalls** for accommodating horses (additional 12 horses), each providing access to the balcony.

-The necessary accompanying facilities include a **room for isolation and minor veterinary procedures,** for which three isolated stalls are foreseen.

-Most of the floor plan is a **covered riding area** so that even in bad weather the horses can be kept in training.

-Above the stable, there is a gallery offering a view of the covered riding arena and a refreshment area next to a small coffee bar.



The Modern Racecourse — A NEW STABLE WITH MODERN STALLS AND A COVERED RIDING ARENA

A covered riding area



SOUTHERN FACADE



WESTERN FACADE





The Modern Racecourse — 3D VISUALIZATION OF A COVERED RIDING ARENA





Construction Stages - STAGE 4

STAGE 4

-The **shopping and catering facilities** would provide additional content in the final stages.

-The building complex could become a gathering place for equine, sport and nature enthusiasts.

-There is a possibility of providing a **tourist offer** that is not directly related to horseback riding and horse breeding, but every visitor could gain insight into the events at the racecourse and perhaps find a new challenge, hobby, sport or simply a place they will visit more often due to the pleasant environment and interesting events.

-A way to **popularize** the sport in question.

-By gaining insight into the events at the racecourse, visitors are provided with an opportunity to become interested in this particular lifestyle.





The Modern Racecourse – SHOPPING AND CATERING FACILITIES





CONCLUSION

The tradition of equestrian sports in Međimurje County

- + nurturing the **autochthonous breed** of the Međimurje cold-blooded horse
- + existence of private clubs for horse grooming and riding schools
- + therapeutic riding
- + developing a new tourist and sports offer based on equestrian sports
- + enabling all populations to **spend time with horses** and take part in various **sports activities** related to horses
- + the possibility of holding competitions at the racecourse
- + returning equestrian sports to the City of Čakovec and the County of Međimurje





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= the investment in revitalization and reconstruction of the Čakovec-East sports and recreation zone to turn it into a modern racecourse building complex is justified.

The full article has been published in Conference Proceedings 4th International Conference Innovation, Technology, Education and Management April 2016, Sveti Martin na Muri UDK:72:798 CROSBI profil 37618; ID 1094501 authors: Jasmina Ovčar, mag.ing.arh.i urb., Marta Turk, student of Arhitektonski fakultet u Zagrebu

3

INITIAL CONCEPT OF A CONTEMPORARY PASSIVE HOUSE BASED ON THE PRINCIPLES OF THE HISTORIC LEGACY OF THE DUGOUT





INTERNATIONAL CONFERENCE 4-5 April 2018

Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout

Jasmina Ovčar, mag.ing.arh. i urb., v.pred.

Međimursko veleučilište u Čakovcu

Luka Vrbanec, bacc.ing.evol.sust.

MEÐIMURJE-INVESTA d.o.o. Čakovec





- 1. THE HISTORY OF HOUSING
- 2. DUGOUT THE IDEAL PROTOTYPE OF CONTEMPORARY PASSIVE HOUSE
- 3. SUSTAINABLE PRINCIPLES OF DESIGNING
- 4. CONCEPTUAL SOLUTION OF CONTEMPORARY DUGOUT
- 5. CONCLUSION

Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - the history of housing







Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - dugout - the ideal prototype of contemporary passive house





- reconstruction of the neolithic dugout, layout and cross section

NNOVATION

- partially buried in the ground and the other part above the surface

- the part buried in the ground is where it is staying in the evening and overnight as this is where the country keeps the warmth comfortable for sleeping

- their impact on the environment was not harmful and very frequent examples of materials used by older, abandoned buildings for the new construction

Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - dugout - the ideal prototype of contemporary passive house



NNOVATION





- a residential complex in Switzerland consists of seven dugouts situated next to an artificial lake; living rooms are located in the south and sleeping rooms in the north; in the middle area are situated the bathroom and the stairs connecting the upper part with the burial; natural light through the roof windows Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - sustainable principles of designing



- Iocation selection
- orientation
- shape of the building
- thermal zoning
- glazing and protection from summer overheating
- ventilation
- heating

Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - sustainable principles of designing; location selection



- proper positioning of a passive house to the sides of the world is one of the key factors in obtaining as much heat as possible from the natural energy source – Sun

- the most favorable orientation of the building is north-south, with a deviation of up to 20 degrees to the south-east or south-west; according to the position of the building it is necessary to conduct a good analysis and selection of the location of the parcel

- it is desirable to place the building in hilly and uneven spaces

- the problem of hilly terrain turns into an advantage and is solved so that part of the house is designed as buried in the ground

- the terrain is uneven in shape and different heights, and demands various types of excavation and filling work, to settle the part of the ground for access to exit on the terrace or to the yard

Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - sustainable principles of designing; orientation



- a favorable orientation of the window openings on the south facade of the building, due to higher thermal gains and lower thermal losses (in winter)

INTERNATIONAL

CONFERENCE

4-5 April 2018

NNOVATION

ECHNOLOGY

EDUCATION

MANAGEMENT

- the north side is closed - covered with earth; good insulation properties, reduced thermal losses, and winnings are not counted as there is no direct solar radiation

- the great importance of the angle of the solar rays in the passive dogout, the analysis of the angle of the solar rays in the summer and winter period

- in the summer period there is no thermal overheating becouse designed eaves and the steeply influenced by the Sun's air Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - sustainable principles of designing; shape of the building







- -the main task of the passive house is to reduce transmissible losses to the possible minimum
- -transmission losses occur on the outer surfaces of the building, so the shape of the building is very important
- -the building needs to be as simple as possible in the floor space, volume and design
- the outer surface should be as low as the volume of the building; this relationship between surface and volume is called "the shape factor"

Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - sustainable principles of designing; thermal zoning NNOVATION TECHNOLOGY EDUCATION MANAGEMENT



- a house divided into two parts (buried and unburied), which is in context with the principle of thermal zoning as one of the basic principles of designing a passive house

- the cold zone is north-oriented and buried, and the warm zone is southoriented, unburied, sunny

- cold zone: auxiliary rooms, utility rooms, communication spaces

- warm zone: living room, dining room, workroom, children's rooms and bedroom for parents



ECHNOLOGY Initial concept of a contemporary passive house EDUCATION based on the principles of the historic legacy of the dugout MANAGEMENT - sustainable principles of designing; glazing and protection from summer overheating



- with the object on the heat balance of the building, it is necessary to take into account the great need for heat rays in the winter, but also protection from the same in the summer period

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CONFERENCE 4–5 April 2018

NNOVATION

- shades, blinds, balconies, eaves etc. are used for protection against summer heat

- it is particularly suitable and aesthetically interesting to protect the natural deciduous trees that in summer protect against the direct entry of the Sun's rays, while the winter foliage falls and Sun's rays can penetrate through the windows

Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - sustainable principles of designing; ventilation

NNOVATION Technology Education Management



- every building, although the passive , must have air ventilation - the introduction of fresh air into the house and the removal of CO2 and other harmful substances outside the building
- -in the interior of the building, 25 to 35 m3 of fresh air per person should be introduced every hour
- -due to the assumption that the passive house are not losing energy through the windows, the passive houses smust always be fitted with fresh air in the room, using artificial ventilation equipment
- -to achieve as many as possible heat loss, in a passive house is a mandatory system of controlled ventilation by returning the heat of the waste air (recuperation)



Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - sustainable principles of designing; heating





- in a passive houses instead of a classic heating system, the so-called " thermal heating" is necessary

- in passive houses for heating the air it is recommended to use a heat pump and for the heating of sanitary water combination of heat pump and solar energy converters

- a heat pump is a device that takes the heat of the environment and raises it to a higher temperature level

 in the context of sustainability for preheating the heat of earth, rocks or water can be used



ECHNOLOGY Initial concept of a contemporary passive house EDUCATION MANAGEMENT



- the proposed conceptual solution presents a passive house of a planar shape of an equilateral triangle

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- the shape factor of the house is 0.59 m^{-1} , according its plan view of the triangle and the simple volume of the triangular prism at a height of 6.00 m

- the upper floor (+3,00 m) represents the entrance to the building; the configuration of the terrain is adapted to the possibilities of forming the entry floor

- at the upper floor there is an entrance area with a windshield and holl, a bathroom, a bedroom, a working room, and a children rooms

- total net floor area 104.22 m2

Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - conceptual solution of contemporary dugout - GROUND FLOOR PLAN

- the total net area of the ground floor is 76.37 m2
- on the south side the ground floor is shortened and covered with the upper floor to prevent summer overheating
- the ground floor is 0,00 m and it has the entrance from the upper entrance floor (+3,00 m) or directly from the courtyard on the south side, from 0,00 m
- on the ground floor there are living areas, dining room, kitchen, and utility rooms



NNOVATION

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4-5 April 2018



- the roof floor plan is +6,00 m

NNOVATION

- the roof plan shows the project solution of the way of illuminating indoor, underground rooms through light domes on the roof of the building, designed as mobile domes for the purpose of natural ventilation

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4-5 April 2018

- on the roof surface it is possible to set solar collectors and the panels od photovoltaic cells

- the construction and all the flat roof isolating layers are designed to be covered by earth's surface and grass, like a green roof; apart from the aesthetic impression, the green roof has an energetic role (like a dugout)

Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - conceptual solution of contemporary dugout - ROOF FLOOR PLAN



- from cross section A-A, it can be seen that the designed building was partially inbuilt and incorporated into the existing configuration of hilly soil

- the buried part of the building has significantly less heat losses, and the necessary light of the secondary rooms is obtained from the lighthouse on the roof of the building

- ventilation of the entire building is designed according to the passive house standards, ie with the recuperator, without the need to open the windows

- a designed solution offer the auxiliary living space in the buried part of the building







- northeastern and northwestern facades of a partially buried building in the hill offer the possibility to fully open facadeson the other sides – the great windows areas

- the layout of the space at the glazed external walls provides for the main premises of the building - living room and rooms (parental, working, children's)



Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - conceptual solution of contemporary dugout – SOUTH FACADE



- the house is completely open from the south side, designed with huge glass areas, which presents potentially big heat gains but possible winter losses or thermal overheating in the summer period

INTERNATIONAL

CONFERENCE

4-5 April 2018

NNOVATION

- a higher floor has been designed with a fitting that has the purpose of adequate protection from summer overheating

- in further elaboration, it is necessary to calculate the justification of such a large surface area, considering to the potential thermal losses in winter Initial concept of a contemporary passive house based on the principles of the historic legacy of the dugout - conclusion



- a project of a contemporary family passive house - dugout are obtained with aesthetic expression, incorporating into a natural terrain configuration and a favorable shape factor resulting from a compact planar shape of a triangle with a point oriented to the north, buried side, while a whole page extends towards the south and the source Sun's rays

- the design solution fulfilled all the basic principles of designing a contemporary passive house

- in comparison with the architectural heritage of the distant history of mankind and construction, it is concluded that these same principles were empirically used in the first dugouts

- restoring nature in terms of building accommodation, adapting to nature, considering the principles of designing low-energy buildings, using natural energy resources for heating and cooling purposes, using natural or even recycled materials, are the basis for sustainable building as an integral part of sustainable human development.





The full article has been published in Conference Proceedings 5th International Conference Innovation, Technology, Education and Management April 2018, Sveti Martin na Muri UDK:728:67 CROSBI profil 37618; ID 1094504 authors: Jasmina Ovčar,mag.ing.arh.i urb., Luka Vrbanec, bacc.ing.evol.sust.
SUSTAINABLE DEVELOPMENT – PERSONAL AND INSULAR

4



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Sustainable development – personal and insular

Jasmina Ovčar, mag.ing.arh.and urb., senior lecturer Polytechnic of Međimurje in Čakovec

Mario Mikulan, M.D. psychiatrist, psychotherapist Poliklinika Živa d.o.o. Varaždin



MIC - Vis, 2018 Mediterranean Islands Conference September 19th - 22th 2018, The Island of Vis, Croatia

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VERN'



The hypothesis is:

"There is a desire and need for personal emotional development and spiritual growth, which would be met through a health tourism programme, based in the Adriatic islands, using "Robinson" accommodation in the form of modern, self-sustainable, dugout caves."

Three research methods are used:

- analysis of relevant theoretical and empirical literature,
- survey methodology,
- field research method.



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Everyday life of the modern man:

- overloaded by information, events, noise and obligations
- is occupied by the material and intellectual world, leading to self-neglect
- neglects himself and needs to focus more on his own awareness and growth



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How and where can personal growth techniques be most effective?

- in natural environments,
- in places free of noise and the demands of everyday life.



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Our project proposes a new form of health tourism:

- primarily intended for middle aged and elderly people,
- for people in need of change who are searching for something new,
- which aims to help participants escape their current routines and unhealthy living patterns and to develop new ones.



The program includes benefits for the participants and the islanders including:

- guidance and support by experienced therapists,
- the formation of small sustainable centres,
- the development of new island communities to support the needs of the program,
- the scope for repeat visits,
- a new form of island living,
- regeneration and new jobs on the islands.



The project is designed to be low impact:

- the sustainable infrastructure satisfies the accommodation and food requirements,
- sustainable construction which respects natural characteristics and use of natural renewable energy sources,
- the goal is to achieve exclusivity, not to focus on mass tourism.

"Less is more" is not just an expression in art but also in the ability and beauty of quality living.



Cross-section of the modern dugout

- choise of location is key,
- south-facing orientation,
- an earthen box around the house,
- high quality thermal insulation of the house and ventilation,
- reflective surfaces around the window,
- a view of nature,
- renewable energy sources





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renewable energy sources from nature



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An example of a partially buried dugout with openings for letting in the sunlight and air facing the south. The existing soil configuration is fully respected, and intervention in the space is minimal.

The house is only visible from the south side, while all the other views are in line with the existing nature. Perfectly hidden and embedded in the Mediterranean environment of the magical hills of Vis, one of the most beautiful Croatian islands, the modern Issa Grotto / Hill House is an ideal example of a combination of tradition and modern sustainable architecture.

The project is the work of the Zagreb architectural studio PROARH.





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A design for a buried holiday house on the island of Pag. The plot is located away from existing paved roads and infrastructure so the house is off grid and must be self-sufficient. The terrain is typical karst, rich in indigenous healing herbs.

The project is th work of the studio SODA Arhitekti.





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Survey research *"Sustainable development – personal and insular"* was conducted electronically via the Internet through the "google forms" application (*https://www.google.com/intl/en/forms/about/*), through e-mail and Facebook social network.

Period:	seven days, 15 th -22 nd July 2018.
Questionnaire:	15 questions filled out anonymously
Time:	up to five minutes
Responds:	145 respondents, all of which were included in the
	statistical analysis of the data obtained



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106 female (73.1%) 39 male respondents (26.9%)

Age:

Gender:

22.8% younger than 25 years of age29.0% 26-40 years of age48.2% older than 41 years

Education:49.0% with bachelor's degrees25.5% with associate degrees25.5% have completed secondary education

Salary:29.0% of the respondents have a salary higher than 8,000 kn43.4% in the range of 4.000,00-8.000,00 kn27.6% remaining part receives less than 4,000 kn or have no
income of their own



f Vis

VERN'

Question 5:

"Can you imagine spending your summer holiday in a quiet, natural island landscape away from all forms of pollution including noise and crowds?"

The responses to question 5 are shown in Figure 1.





Question 6:

"If you were able to choose between a holiday in a tourist resort/ hotel or a peaceful holiday in a small settlement in the countryside with environmentally sustainable, modern facilities, which would you choose?"

The responses to question 6 are shown in Figure 2.





VERN'



Question 12:

"Can you imagine relaxation and personal development becoming your new way of maintaining physical, mental and spiritual health?"

The responses to question 12 are shown in Figure 3.





Question 13:

"Are you interested in guided group meditation, yoga and other forms of guided work, by trained therapists/ teachers/ facilitators, for the purpose of personal growth and development?"

The responses to question 13 are shown in Figure 4.





Personal development – field research "Pelješac"

- in May 2018 an experimental study with a selected group,
- eight volunteers (selected by therapist-teacher) spent seven days on the peninsula Pelješac,
- a group of people **aged 50-65**, **male and female**, who are engaged in personal development,
- the purpose was to demonstrate how **separation** from the demands of everyday life can encourage self reflection,
- **the location** was a small, rural, natural environment away from urban areas, close to the sea and out of the tourist season



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All members of the experimental group experienced the following benefits:

- it encouraged them to work more on themselves and seek new experiences,
- they looked inwards and focused on self development,
- it emphasized the value in taking a break from routine and everyday life,
- it demonstrated the importance of choosing an environment which is quiet and in touch with nature.



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The Ghost Cave (Titova špilja), is located on the island of Vis, just below Hum (*Sveti Duh*), the highest peak of the island.



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A prototype of modern stone dugouts:

- incorporated into the natural landscape,
 - modern interior which meets today's needs,
 - indigenous materials,
- proper orientation of the opening,

- plants,
- minimal intervention in the area,

- a beautiful view of the sea.





"It's not by accident that the pristine wilderness of our planet disappears as well as our own inner wild natures" (*Estes, 2006*).

Island characteristics provide maximum potential regarding **sustainable** development.

Sustainable building elements such as earth, stone, air, sun, water, sea, wind, are also essential elements for life.

Energy does not arise or disappear. It lives and is fluent in terms of building and using energy resources, as well as in the human body, mind and soul.

It is the **synergy of man and nature** that the visitors will experience through this new form of island health tourism.



The hypothesis has been confirmed:

"There is a desire and need for personal emotional development and spiritual growth, which would be met through a health tourism programme, based in the Adriatic islands, using "Robinson" accommodation in the form of modern, self-sustainable, dugout caves."

As the most suitable choice, the islands of the southern Adriatic archipelago have been selected due to their **isolation**,

beauty,

naturalness,

favourable climate,

soil configuration,

protective greenery,

peacefulness.

VERN'

It is also a space that offers a view of the horizon, where the beginning and the end are seen, **somewhere where there is an earthly paradise.**



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VERN'

The full article has been published in Book of Proceedings MIC-VIS, 2018. 2nd Mediterranean Islands Conference 19-22 September 2018., The Island of Vis, Hrvatska ISBN 978-953-7964-77-1; ISBN 978-953-8101-04-5 CROSBI profil 37618; ID 1094509 authors: Jasmina Ovčar, mag.ing.arh.i urb, Mario Mikulan, M.D. psychiatrist, psychotherapist

In silence...



5

FOUR SEASONS - THE BACKBONE OF CONTINENTAL TOURISM IN NORTHWESTERN CROATIA

International Scientific Conference

Economic and Social Development

Globalization and Challenges of the Modern World: Regional Development

53rd International Scientific Conference on Economic and Social Development and 6th ITEM Conference - "Innovation, Technology, Education and Management" *11-12 September, 2020 – Čakovec / Sv. Martin na Muri, Croatia*

International Scientific Conference

Economic and Social Development

Topic: FOUR SEASONS - THE BACKBONE OF CONTINENTAL TOURISM IN NORTHWESTERN CROATIA

Jasmina Ovčar, mag.ing.arh.and urb. senior lecturer, Polytechnics of Međimurje in Čakovec

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1. MAN – A BIOLOGICAL BEING

- the change of seasons symbolizes development and change in man's life,
- the need for re-establishing the connection with nature and taking part in its changes,
- there are five categories of tourists family people,
 idealists, autonomous individuals, hedonists and conservatives,
- the idealists are particularly interesting in this context they are "sensitive to justice, demonstrate responsible behaviour, flexibility and tolerance, and enjoy sports and outdoor activities. They prefer rural areas and do not like to spend a lot, mostly booking holidays in the countryside at reasonable prices and with the opportunity to participate in rural life"



The life cycle of a tree throughout the four seasons in northwestern Croatia

- the life cycle of a tree throughout the four seasons captured by the human eye represents complete experience of the time and mood specific for each stage in tree's life - the very same energy that fuels human lives,

- interesting in every season - could be used in cooperation with the domicile population through voluntourist activities,

- a new type of tourism could awaken the continental tourism of northwestern Croatia known as 'Four Seasons'.

2. THE POTENTIAL OF EXISTING RESIDENTIAL HOUSING OF CONTINENTAL CROATIA

- in Međimurje County a great number of old and abandoned rural homes have been discovered,
- looking for modern housing, owners often leave their own or inherited houses – investing in old houses is not popular because of the relatively high financial costs,
- it is impossible to force the owners to renovate these houses, but it is necessary to protect them from falling out of use and further decay, which is our moral and legal obligation (*NN RH*; *Zakon o zaštiti kulturnih dobara*).

Existing residential housing of Međimurje County – abandoned and neglected

- these old houses represent a valuable historical architectural heritage of Međimurje,
- the traditional buildings built 100 years ago with their harmoniously balanced dimensions and measurement standards, characteristic spatial organization and interior details,
- these similar small, cosy homes cry out:

Fix me up and use me!

- the idea is to utilize autochthonous residential houses, reconstructed and adapted in order to be rented out as holiday homes.



Examples of reconstructed and adapted residential houses

- several beautifully reconstructed and renovated houses remodelled by the owners primarily for their needs – as holiday homes,
- the renovations have been done while keeping with the tradition of the *Međimurje cottage*,
- it is necessary to preserve such heritage and share it with people,
- the best way of presenting a certain era and its specific residential style can be done through tourism.



3. A PROPOSAL FOR RECONSTRUCTION AND ADAPTATION OF A TOURIST HOUSE

• "Međimurje cottage"

an old house, walls coated with clay mixed with straw – when this layer is dried, the walls are smoothed and painted with white lime,

the roof made of straw,

- frames of windows and doors painted in brighter colours, such as red, blue or green,
- small *cottages* have a kitchen, only one room and a barn, while larger ones have two rooms divided by a kitchen,
- the hall and kitchen floors are earthen, while the floors in the rooms are made of oak.
Reconstruction and adaptation of a tourist house for 4-8 people

(Source: Author's own project documentation archive)

GROUND FLOOR PLAN

1-entry space

2-living room

3-kitchen + sanitary block 4-bedroom

- reconstruction and adaptation of the old *Međimurje cottage* to turn it into a tourist house for 4-8 people,
- the interior is organized to keep up with the needs of modern man with minimal construction work,
- ganjek has been transformed into the entrance space, prva hiža designed as a living space (with the possibility of creating additional sleeping area for 2 people), kuhnja becomes a small kitchen block with a mini-bathroom including a shower, a washbasin and a toilet. Komora is envisaged as a sleeping space for 2-4 people,
- below *komora* there is a basement space that can be used for food storage, or a storage for bicycles, sports equipment or garden tools.



Reconstruction and adaptation of a tourist house for 4-8 people

(Source: Author's own project documentation archive)

ATTIC FLOOR PLAN

5-bedroom (gallery)

- *Međimurje cottage* is a family house with a cold attic;
- for tourist needs, but also because of the attractiveness of the attic space, the project intends to demolish one part of the ceiling structure while the second part becomes additional sleeping space for 2 people, with a gallery looking down to both sides of the ground floor,
- the **staircase** is located **in the living room**.
- open space visually and aurally, offers a complete experience of shared living together with all its users.



4. A SURVEY OF THE INTEREST IN THE PROPOSED TOURISM OFFER

the survey was conducted electronically – via Google Forms, email and Facebook in the period from 10th January to 2nd February, 2019.

(https://www.google.com/intl/en/forms/about/),

- a questionnaire composed of 15 questions filled in anonymously,
- the task itself took no more than five minutes and all obtained data were later included in the statistical analysis,
- of 150 respondents in total;

28.7% male and 71.3% female

19.3% up to 25 years of age,19.3% between 25 and 40 years of age,57.3% over 40 years of age.

Analysis of the answers to question 4; reasons and motivations to travel





4. What do you expect when going on journey?

a) seeing something new

b) relaxing and enjoying the nature

c) getting away from everyday life

d) meeting new people, spreading the worldview

Analysis of the answers to question 5; desirable destinations of travel



a quiet, secluded place

tourist resort – mass tourism

a small settlement which offers the possibility of tourist partaking in the activities of the local population – voluntourism

5. Which destination would you prefer for your trip?

a) a quiet place

b) tourist resort – mass tourism

c) a small place with the local population that provides the possibility of inclusion of tourists in their activities as volunteers

Analysis of the answers to question 7; expectations from the tourist destination



organized and guided activities during stay

a free choice of offered activities,

place full of peace and quiet, and an opportunity to relax, with absolute freedom when choosing activities in line with own preferences and desired time to do them

7. What do you expect from a tourist destination?

a) secured and well-organized organization of various activities during your traveling

b) a free choice between offered activity options

 c) place full of peace and opportunity for relaxation and absolute freedom of choosing activities depending on your own affinity and in the time of your choice

QUESTIONNAIRE

What's your reaction to the picture of the autochthonous house as a holiday accomodation?

a) it would be nice to spend a vacation in such a home
b) it would be nice to occasionally come to this house and get rid of the routine

c) I do not know what to do in that house

d) such a house would never be a choice for vacation and travel

QUESTIONNAIRE

These photos provide an insight into the nature surrounding us, which often goes unnoticed. What kind of feeling do they induce in you?

a) it would be nice experience to spend one season in such an environment

b) they invite me to come every season and enjoy the beauty, charm and products of spring, summer, autumn and winter

c) they leave me indifferent

Analysis of the answers to question 15; interest in a tourism offer that includes accommodation in an autochthonous house with repeated visits in accordance with seasonal changes





15. Can you imagine a vacation in a small indigenous home and inclusion in a new group of people and their activities as your new way of "refreshing" the physical, mental and spiritual health that you would practice four times a year?

a) YES

b) NO

5. VOLUNTOURISM* AND ITS POTENTIAL

- the possibility for tourists to get to know the destination better through everyday life of the domicile population,
- -* they work as long as it makes them happy and they can give up at any time....
 - the interaction between the locals and the tourists may benefit both – the tourists are presented with new challenges and opportunities, developing new skills, broading their horizons, meeting new people, having fun and relax, while the local community finds new inspiration and breaks the routine,
 - it is important to distinguish voluntourism from exploitation. The purpose and goal of voluntourism must never be about gaining profit from tourist's work.

**voluntourism* – a way for tourists to get to know the destination better by being involved in the activities as volunteers and thus playing an important part in the local community. sports (football, basketball, handball, chess, archery, hiking, etc.)
 culture and art (music, folklore, visual arts, etc.),

- an ecological organization,

hunting and mushroom picking clubs,
 voluntary fire brigades,

- agrarian society,

- association for integrated **fruit production**, - **astronomical** society,

- association of **innovators**, - **nautical** club, - **yoga** society,

geographic association,

- association for creative work with children and young people,

- club of computer game aficionados,

- society for the coexistence with nature,

- society for biological dynamic management,

- environmental school,

- animal protection association,

- and many, many more.....

In Međimurje there are 283 registered associations and societies of various interest groups;

6. CONCLUSION

- the specific characteristics of the climate might be interesting to those who live in milder or more severe climates,
- the abandoned and derelict houses would be renewed, gaining a new purpose and being restored to life, thus preserving the spirit of a particular place and time,
- voluntourism represents a branch of modern tourism chosen destination would be 'a new temporary home' for tourists who expect to return to the same place, but in a different season,
- it creates continuous interpersonal relationships between tourists and locals while giving tourists opportunities to learn more about the destination,

.... through the tourist programme....

"FOUR SEASONS – THE BACKBONE OF THE NORTHWESTERN CONTINENTAL TOURISM"

International Scientific Conference

Economic and Social Development

AND LAST BUT NOT LEAST



The articles do not have purpose for themselves – the main goal is to make some investors show the interest for the topic so they have to be achived in a real sector.

While we are speaking about "Four Seasons" – my investor is on the way from Bahrain to Croatia...

6

ISLANDS – PROTECTED OASES AS A RESULT OF QUALITY WASTE MANAGEMENT



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Mediterranean Islands Conference

16 - 19 September 2020



ISLANDS – POLLUTION OASES AS A RESULT OF QUALITY WASTE MANAGEMENT

1. INTRODUCTION

- Islands differ greatly in their socioeconomic and physical characteristics, but they all have one thing in common they are physically separated from other land masses.
- This can restrict the flow of materials, organisms or information, but it also represents the island's ability to solve some of its problems on its own, such as e.g. waste.



Image source: https://croatia.hr/en-GB/Destinations/Islands

- Mediterranean islands are undoubtedly characterized by several specific problems that become especially visible during the summer – arriving tourists increase the population on an island and thus the amount of municipal waste also rises.
- The idea of traditional municipal waste management, which mainly relies on the disposal of waste in landfills, is at odds with the limited availability of island space and is not a solution to the problem in a sustainable way.





2. WASTE MANAGEMENT

- On many small remote islands across Europe and around the world, indiscriminate waste disposal has often been common and resolved in an open combustion manner and sometimes by collecting debris in a remote corner of the island.
- **EXAMPLE ON A PICTURE:** Greek island of Santorini where municipal waste was thrown over a high cliff for many years

Image source: https://atasteofancientroutes.wordpress.com/2014/10/22/santorini-the-good-the-bad-and-the-ugly/

2.1. EXAMPLE OF NEGATIVE WASTE MANAGEMENT

Island of Thilafushi in the Maldives

- The island of Thilafushi has a total population of 330,000 but has about 800,000 tourist visits each year
- The Maldives archipelago is considered one of the most beautiful holiday destinations in the world and of the 1,200 islands in the group, only 200 are inhabited, and half of them are marked as resorts.
- This results in pressure on the environment which is enormous and waste management is simply not adequately planned.
- The result is an open landfill with over 300 tons of rotting waste every day and an island that is increasingly threatened by rising sea levels, which is an obvious sign that something needs to be done.



Image source: https://www.oceanwildly.com/post/2018/07/05/thilafushi-trash-island-is-a-toxic-secret-in-maldives

2.2. EXAMPLE OF POSITIVE WASTE MANAGEMENT IN ISLAND COUNTRIES Iceland - a European island nation with developed sustainable waste management

- Waste management in Iceland is organized in such a way that local authorities determine how domestic and industrial waste is collected in their community and adopt regional waste management plans.
- The Ministry of Environment and Natural Resources determines the national policy on waste management and waste prevention for the state as a whole, while the Environment Agency is responsible for the implementation of the law on waste management.
- Waste treatment in Iceland aims to:
 - minimize its production and optimal use of resources through waste prevention measures,
 - reuse of everything possible,
 - recycling of waste materials,
 - use of waste for energy production and final disposal in a way where other ways of waste disposal are not possible

2.2. EXAMPLE OF POSITIVE WASTE MANAGEMENT IN ISLAND COUNTRIES Iceland - a European island nation with developed sustainable waste management

- Iceland was the first country to introduce a recycling cost collection system for all disposable beverage packaging, such as plastic bottles
- The fee is charged on your disposable beverage packaging to encourage its recycling by returning the fee to consumers who return the packaging themselves
- For this purpose, the company Recycling Ltd. was established which operates 60 packaging return facilities throughout Iceland where consumers can sell their packaging

Japan - technological advances capable of conducting a dialogue with waste

2.2. EXAMPLE OF POSITIVE WASTE MANAGEMENT IN ISLAND

- Waste collection in Japan is carried out at the "municipal level", which means that each city and city district has its own completely different system.
- For example, as many as 23 administrative districts of Tokyo have a different system and principle of waste management.
- In the 1960s, with its population growth, Japan was forced to find a solution for its waste, otherwise, it would "sink under its own weight of waste".
- Japan produced 43,981,000 tons of mixed municipal waste in 2015 (approximately 356 tons per capita), which ranks it 8th in the world (source: WorldBank Group).
- In contrast to western countries, where in most cases waste is taken for recycling, in Japan only 20.8% of waste is recycled, while all other waste is incinerated, mostly with the help of a fluidized bed incinerator.



3. SUSTAINABLE DEVELOPMENT ON THE ADRIATIC ISLANDS – COAST PROJECT

- The COAST project was developed with the support of the UN Development Program (UNDP1), in cooperation with ministries, and with the support of the Fund for Environmental Protection and Energy Efficiency.
- The most important goal of the project: to explore and recommend models of development of Croatian coastal areas, which will not affect biological and landscape diversity, but also the reduction of natural and cultural identity.
- As part of the project, the spatial plans of the county and the plans of the settlements of Vis and Komiža analyzed the decisions made on the purpose and use of areas, and accordingly analyzed the spatial pressures and their consequences.

Image source: https://www.goolets.net/explore-island-vis/

THE ISLAND OF ZLARIN

- "For Zlarin without plastic" was the 2018 initiative launched by the Association "La Revolution Albatros".
- The goal of the initiative was to make Zlarin first Croatian island without disposable plastic.
- To achieve that, the island of Zlarin doesn't have any trash cans so visitors must take all their waste, that they brought (made) to the island, back with them.
- Composting and life with less waste are promoted and the local community is encouraged to purchase a home composter and to convert organic waste into compost which serves as food for flowers and gardens.



Image source: https://www.livecamcroatia.com/en/news/island-zlarin-vs-one-time-used-plastic/

4. WASTE MANAGEMENT



Figure 1. Scheme of municipal waste management system Source: Waste Management Plan of the Republic of Croatia 2017-2022. According to Figure 1., the first step in the entire system is to ensure the implementation of waste prevention measures by establishing Centers for reuse and providing the necessary equipment for home composting

Furthermore, the focus in the municipal waste management system should be on the system of separate collection of municipal waste through the provision of the necessary infrastructure for municipal waste separation:

- at the waste generation site,
- through recycling yards,
- in public areas,
- through the implementation of regulations for special waste categories
- Separately collected biowaste is transported for material recovery to plants for biological treatment of separately collected biowaste for the purpose of production of compost or digestate and biogas
- Collected paper, cardboard, metal, glass and plastic are transported to plants for sorting separately collected waste (sorting plants) in order to increase the value or quality of separately collected waste and prepare waste for recycling.

CIRCULAR ECONOMY – A STEP TOWARDS GENERATING LESS WASTE



Figure 2. Circular economy model Source: Waste Management Plan of the Republic of Croatia 2017-2022. Circular economy is all about retaining value. The better the integrity of the product is preserved, the more value is retained.

All products are manufactured in a way so they can be disassembled and materials can either be broken down by nature or returned to production.

The goal is to throw nothing away and to reduce the need for purchasing new commodities, while production and transportation is best achieved with renewable energy.

Life cycle thinking – 3 key principles 1.No waste 2.Value is maintained 3.Consider economic framework conditions

In other words, circular economy represents a development path from raw material to recycled raw material, where the entire process of production and use, reuse and repair is realized along the way, with minimal residual waste.

It is a path of the right attitude towards waste, which significantly reduces the amount and burden of waste and behaves in accordance with sustainable development.



CONSLUSION

- The amount of waste on islands is very often greater than what the island can process, due to the limited availability of land for disposal and insufficient financial resources.
- As a result, solid waste on small islands is still typically managed worldwide by open land and water disposal and incineration in pits with recycling in some locations.
- The various materials contained in municipal waste can potentially have a high economic value as a secondary raw material.
- Locals need to understand the importance of recycling, their role in the overall waste management system and in health and the environment in general.
- The primary selection program must be easy to understand and accessible and include:
 - promotions,
 - education,
 - continuous dialogue with representatives of public authorities and utility companies
- Islands, separated from the mainland, can significantly influence the generation of municipal waste primarily through the adoption of new life habits and in line with sustainable development.

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isk, akvatori Pašmanskog kanala Island (Lover's Island), Croatia

OBSERVANCE OF ARCHITECTURAL HERITAGE IN URBAN-ARCHITECTURAL AND LEGAL-ECONOMIC SUSTAINABLE DEVELOPMENT OF TOURIST CITIES



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VERN'

OBSERVANCE OF ARCHITECTURAL HERITAGE IN URBAN-ARCHITECTURAL AND LEGAL-ECONOMIC SUSTAINABLE DEVELOPMENT OF TOURIST CITIES

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VERN'

1. INTRODUCTION

Ownership should be binding!

- the historical route has left a mark on the architectural heritage,
- the town of Vis has another side one that demonstrates
 a lack of investment in the renovation of buildings,
- some of the owners are negligent and simply do not care,
 while the problems seem unsolvable by the local communities,
- the legislation has not been addressing the issue of unresolved relations, nor in any other way motivating families to resolve the issues themselves or the new owner(s) to take responsibility for the maintenance, renovation and reconstruction of buildings.

- the preserved historical structure of the town; typical sloping roofs, mostly small floor areas of buildings, etc.

J

Kut Harbo

Poluotok Pirovo -Mamma Mia High.

irovo Beach

INA INDUSTRIJA NAFTE dd

Vis, HR - Ancona, I

Mist

Pokret Za

- urbanistically speaking, a very well-preserved and spatially planned and maintained town should definitely solve the issue of abandoned and derelict houses.

VILLA NEVENKA

Guesthouse Bellevue



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A satellite image of the town of Vis MIC - Vis, 2020 Mediterranean Islands Conference September 16th - 19th 2020, The Island of Vis, Croatia

Objective, methods and hypothesis

1.1.

The aim is twofold;

1) to detect and register abandoned and neglected buildings, analyze the spatial plan of the town and the protected areas in the center.

2) to study the existing legal framework within which the problem of the owners' lack of responsibility can be addressed.

The methods include:

- the method of direct observation,
- analysis of the current situation and spatial plans,
- analysis of the reasons for inadequate maintenance and investment in specific buildings,
- analysis of theoretical and empirical literature,
- studying the legislation
- The hypothesis is assumed.....and it will be proven!



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1.2. Legal Framework

....analyses the possibilities of solving the existing problems and protecting the architectural heritage of the historic core of the town as well as the specific buildings within it:

- Spatial Plan of Vis, (Official Gazette of the Town of Vis 01/10 and 02/17),
- Conservation Basis for Spatial Development Plans of the Towns of Vis and Komiža (*Ministry of Culture of the Republic of Croatia, Directorate for the Protection of Cultural Heritage – Conservation Department in Split, 2003*),
- Islands Act (Official Gazette of the Republic of Croatia 116/18, 73/20),
- Decree on the Regulation and Safeguarding of the Protected Coastal Areas (*Official Gazette of the Republic of Croatia 128/04*),
- Act on the Protection and Preservation of Cultural Goods (*Official Gazette of the Republic of Croatia 69/99*), which includes the Monument Annuity,
- Act on Ownership and Other Real Rights (*Official Gazette of the Republic of Croatia 91/96*).





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VERN'

URBAN TISSUE OF THE TOWN OF VIS

Every city has its soul and every soul its body. The soul of the city is reflected in its urban tissue, which speaks through shapes, colours, structures, smells, and tastes.

In this context, the urban tissue is a strong factor in attracting and bringing back all the visitors and tourists.



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AEBN.

buildings, narrow streets, street lighting, deep shadows, small windows with shutters...

Stone

Urban tissue

of the town of Vis

...and terraced parts often vegetated with the eyecatching wild Mediterranean plants provide the visual identity and fragrant atmosphere.
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NEBN.



"Arrival in Vis ... I stand here and admire Nature. An orange tree growing in the middle of an abandoned house in the town of Vis. Nature always renews itself."

(Leichhard, 2018).

Unlike buildings, which one has to renovate.



2.1.

A preserved historical row of buildings in the center of Vis

- a wonderful combination of small narrow
 Dalmatian streets makes no impression of abandonment and lifelessness,
- a sense of peace, quiet, spirituality and serenity,
 with the impression of distinctiveness and
 mysteriousness of life that takes place behind
 the thick stone walls,
- history has left behind not only the buildings but also the spirit of the place,
- part of the spirit is certainly reflected in the architectural heritage that is carefully preserved and maintained.

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NEBN.



Urban street of Vis

Vis became an urban settlement in the 16th and 17th century. In the period of 18th and 19th century, and in the beginning of current one, is when the construction of urban houses began. Street rows were created with houses on both sides with a \checkmark number of stylish details.



NEBN.

A street in the historic core of Vis

The town of Vis, with its unmistakable charm and relaxed atmosphere pervading its streets, simply enchants. The typical urban tissue of the historical core is dominated by narrow alleys with stone houses leading to the waterfront.



2.2.

Derelict buildings in the urban tissue of the town of Vis

neglected houses present a
problem by themselves – especially
in urban areas,

searching for the answer usually
led to unresolved property relations
or unrealistically high sale prices.

Possible solutions:

Conservation conditions:

- the introduction of a special kind of tax on houses that are not in function,
- so....the owners might come to renovate or sell the houses.

- regulate the reconstruction and renovation of such buildings under special conditions,
- quite demanding on the new owner, so it
 is necessary to regulate that they are
 ready to either invest or sell.







The preservation of architectural heritage cannot be left to individuals, but must be a regulated system to which the individual must adapt and act accordingly.



AEBN.





Orthopanic images

The first image shows a truncated structure, with several defective parts not having been replaced by new ones, which results in nonfunctional and non-constructive tissue, with a very poor aesthetic condition.

The second image shows the correct functional and constructive sequence of all 32 components, which results in an aesthetically acceptable condition.





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NEBN

... it is nice to see a healthy smile... it is also nice to see an orderly urban structure and tissue of a city with its "nice smile"

- the neglected urban tissue is a mirror of the city and its inhabitants, just as an individuals dental status reflects their health,
- both the city and the smile comprise the common components of function, construction and aesthetics,
- both require willingness, knowledge, financial
 capability, time, sacrifice but above all, desire.





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3. RECONSTRUCTION AND RENOVATION OF DERELICT

HOUSES

The expertise of architecture starts from the assumptions:

- listen to the vision of investors,
- follow the spatial plans,
- follow the special conservation conditions,
- use indigenous materials

...some houses that are several hundred years old have been renovated and turned into genuine villas in traditional style, with a completely modern purpose.



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4.

CONSERVATION CONDITIONS AND RECOMMENDATIONS ENTAILED IN THE SPATIAL PLAN OF THE CITY OF VIS

Houses several hundred years old are often found in a decrepit condition, with only a 'skeleton' of the outer walls and a ruined roof remaining, so;

- a complete renovation is needed,
- in the process of adaptation the respect of traditional construction and preserve is also needed,
- each construction must be well planned and designed, which can be achieved through specific spatial plan conditions as well as special conservation conditions.

Spatial plan of the town of Vis; Land purpose and use plan

(Official Gazette of the Town of Vis; No. 01/10 and amendments No. 02/17)

AEBN.



The map marks the borders of the protected historic core of Vis and other protected historical sites in the town.





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5. LAW REGULATIONS

- 5.1. Islands Act
- **5.2. Decree on the Regulation and Safeguarding of the Protected Coastal Areas**
- **5.3.** Act on the Protection and Preservation of Cultural Goods
- **5.4.** Act on Ownership and Other Real Rights
- 5.5. Monument Annuity

5.1. Islands Act

(OG of the Republic of Croatia 116/18, 73/20)

Articles 3 and 4; regulate the manner in which island assets can be used and exploited, and in which the development policy can be directed towards overcoming the restrictions to which islands, as areas with development specifics, are subjected.

Article 12; The Ministry continuously monitors the development of the

islands and evaluates it at least once every three years.

Article 20; Investment on islands in competitive and innovative sectors that are environmentally, spatially, economically, technologically and socially sustainable is to be encouraged.

Article 22; The regulation of the cadastre and land registers – with the aim of sustainable development of the islands. The regulation and adjustment of the cadastre and land registers on the islands is considered a priority and of strategic importance. The Ministry, in cooperation with the Ministry of Justice and the State Geodetic Administration, will prepare and adopt the State Programme for the Regulation and Adjustment of Cadastres and Land Registers on the Islands.



5.2. Decree on the Regulation and Safeguarding of the Protected Coastal Areas

(OG of the Republic of Croatia 128/2004)

The renovation of the existing buildings is a priority, since it allows the development of the area without additional burdening of the environment.

The only logical and **sustainable policy of urban management is the use of existing resources** in all areas of development, including construction.

Thanks to regulation and sustainable thinking, many old and ruined buildings, even those within the urban tissue, will find a faster path to restoration.

It is necessary:

- to preserve the natural, cultural, historical and traditional values of the coastal and hinterland landscape;
- to rehabilitate valuable and endangered areas of natural, cultural and historical heritage;
- **to not plan new construction areas** of settlements **or their** interconnection;
- to restrict construction in the existing construction areas of the settlement and the remote unbuilt construction areas (outside the settlement) along the sea shore;
- to plan residential, commercial and other buildings so that the purpose, position, size and design respect the existing spatial values and characteristics.



5.3. Act on the Protection and Preservation of Cultural Goods

(OG 69/99, 151/03, 157/03, 100/04, 87/09, 88/10, 61/11, 25/12, 136/12, 157/13, 152/14, 98/15, 44/17, 90/18, 32/20, 62/20)

Articles 12 and 14: Numerous abandoned houses that make up the wealth of urban and architectural heritage are the ones that could deservedly, but only on the basis of professional evaluation of the Ministry of Culture, be on the list of the Register of Cultural Goods of the Republic of Croatia.

Article 17; In order to assure protection against not seeing the importance of local communities, the Act leaves an additional possibility for this goods to be recognized as particularly valuable and protected by a local representative body (county, city, municipality), thus giving the local government the autority to assess justification and deserved status of the goods that are of local importance.

Article 108; Funds for the maintenance and preservation of cultural property must be provided by the owner. However, given the status of the building and the position within the protected area, the Republic of Croatia provides numerous exemptions and privileges, thus trying to compensate for the additional liability and limitations imposed on the present owner in relation to the usage of their proprietary goods. However, precisely because of that, the Republic of Croatia has the right to deny them an apology for not fulfilling their obligations. AEBN.



5.4. Act on Ownership and Other Real Rights

(OG 91/96, 68/98, 137/99, 22/00, 73/00, 129/00, 114/01, 79/06, 141/06, 146/08, 38/09, 153/09, 143/12, 152/14)

Article 30; The owner has, among other things, the right to own, use and dispose of their property.

Article 31; Every owner, in exercising their right, is obliged to contribute to the common good and to act with regard to general and other people's interests that are not contrary to their right.

Article 32, Paragraph 2; The right of ownership may be limited by special laws declaring things of interest to the Republic of Croatia.

From the perspective of protection of urban treasures from the negligence of their owners, it is worth mentioning the legal institute of sequestration (late Latin *sequestratio*) – a temporary seizure of property management; separation. In law, a temporary measure, the establishment of the management of a particular thing in order to protect the interests and security of the state, nature, cultural monuments, human environment or human health.

Perhaps sequestration is the legal solution we are looking for as well as a powerful weapon to preserve the heritage when it comes to neglect by inaccessible or negligent owners, most often as a result of unresolved property relations, or due to financial inability to invest.



5.5. Monument Annuity

In order to provide funds for investment in the restoration of cultural heritage, as well as to preserve its permanence, the obligation to pay a monument annuity has been introduced - a form of income from direct or indirect economic exploitation of architectural heritage that is collected for the purpose of investing in the restoration of cultural heritage for the permanent preservation and protection of its monumental characteristics.

In tourist places on the Adriatic coast, a combination of business and tourist activities located in the historically important core of the city is commonly observed.

Doing business in buildings in the protected core of the city certainly provides extra profits, from which the collection of monument annuity is expected.

The role of society is to work together to ensure the preservation of architectural heritage by regulating the possibility of helping and co-financing those who are unable to invest.





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The hypothesis has been proven:

"In the historic centre of Vis, there are neglected, abandoned and dilapidated buildings that need to be restored and made functional. There is also a legal framework for addressing the issue of ownership and the obligation of investing in such buildings, but also offering a solution in the form of sequestration, which would temporarily take away the right to manage the property in order to protect the interests of preserving the architectural heritage to ensure the necessary restoration."

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REVITALIZATION OF UNDERDEVELOPED AND ABANDONED REGIONS AS WELL AS THOSE HIT BY EARTHQUAKES THROUGH THE PROJECT OF A SUSTAINABLE RURAL SETTLEMENT WITH THE 'OKTODOM' MODEL HOUSE

8



KONFERENCIJA ZA RAZVOJ RURALNOG TURIZMA

#RRT2021

REVITALIZATION OF UNDERDEVELOPED AND ABANDONED REGIONS AS WELL AS THOSE HIT BY EARTHQUAKES THROUGH THE PROJECT OF A SUSTAINABLE RURAL SETTLEMENT WITH THE 'OKTODOM' MODEL HOUSE

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Sisak, 24 November, 2021

• There is a possibility of designing and building sustainable housing units, i.e. family houses, in accordance with the current legislation and spatial plans of the Republic of Croatia with the possibility of multiplying the designed standard solution for the purpose of creating sustainable housing communities as well as sustainable rural settlements.

- There is **an interest group of people** who would like a more peaceful life in such small-sized communities not far from larger urban centers, with the purpose of achieving new qualitative values of life that are unattainable in urban areas.
- There is a possibility of using (co-)financed construction funds and potential sites owned by the Republic of Croatia that could be intended for the proposed type of construction in order to encourage settlement in the area of special state concern.

construction of the **OKTODOM** house could represent the beginning of a new society and the process of awakening and going forward

the designed **OKTODOM** housing units of about 100 m² might prove intriguing to people of a similar worldview

a **SUSTAINABLE HOUSING UNIT** of like-minded individuals is formed

residents of the SUSTAINABLE HOUSING UNIT start to spread their influence outside their own backyards

development towards a SUSTAINABLE RURAL SETTLEMENT

- shape: reduced circle, compact, organic
- natural materials
- green roof
- collects and uses rainwater
- compactness of the building
- size and orientation of the opening
- ventilation losses
- overheat protection
- passive solar heating
- thermal mass
- prefabricated construction
- energy concepts
- energy standard of the building close to zero
- nZEB Standard
- (according to the European Directive)

SUSTAINABILITY ELEMENTS OF THE "OKTODOM" HOUSE

LEGEND:

•1 - DOORWAY	7.6 m ²
•2 - LIVING ROOM	33.5 m²
•3 - KITCHEN	8.1 m²
•4 - STORAGE	3.1 m²
•5 - ANTEROOM-1	1.4 m²
•6 - BATHROOM-1	8.4 m²
•7 - BEDROOM-1	12.5 m²
•8 - ANTEROOM-2	1.4 m²
•9 - BEDROOM-2	9.2 m²
•10 - BATHROOM-2	2.8 m²
•11 - BEDROOM-3	11.2 m²
•12 - TERRACE	23.5 m²
•13 - WOODSHED	7.5 m ²
•14 - UTILITY ROOM	5.6 m²

 Indoor area: 	
•gross = 122.4 m ²	
•netto =	99.2 m²

GROUND FLOOR PLAN



- the south-side incidence angle of the sun's rays is favorable both in summer and winter.
- in winter, solar heat sources are used to heat the space.
- summer overheat protection: pergola greenery in front of the terrace roof overhang

CROSS SECTION





NORTH-FACING FACADE

EAST-FACING FACADE

SOUTH-FACING FACADE

WEST-FACING FACADE







A = 3.34 ha

- 12 residential plots within a space of 210x200 m
- created by multiplying plots with housing units, circularly around the communal space
- 48 residents

HOUSING COMMUNITY

-green area on the construction land -agricultural land



- A = 25 ha
- 5 housing units
- created by multiplying housing units along the road
- 240 residents, possible to expand

RURAL HOUSING ESTATE



- created by multiplying the rural settlement
- around the formed center with larger population and public areas
- 2000 residents, with the possibility of expansion

A=180 ha

A rural housing estate has the potential to become an urban one. The proposed urban housing estate is a highly interesting and practical solution that offers the possibility of living a good-quality life within one's own plot. However, significantly increased housing density and compactness of housing communities is not in line with the idea of sustainability, which has been set as an imperative; through the proposed solution, close contact with nature is lost. Therefore, the urban type of settlement in the context of this project is a utopia rather than a recommendation, even though it is an indicator of the great development opportunities arising from the designed housing community.

URBAN HOUSING ESTATE



Large south-facing glass walls let in the sun during the cold months, which has a direct effect on the heating of the interior.

Designing an extensive green roof through simple landscaping with self-sustaining and mostly low-growing plants that require minimal maintenance.



The technology of prefabricated straw panels is unique because it provides a structural, load-bearing element w a double frame and the main insulation of the building, all at the same time. The load-bearing wooden hoop, in addition to its loadbearing characteristics, also has an extremely valuable aesthetic quality resulting from the visibility of the load-bearing structure in the interior. The wood itself exudes warmth and its visible structure indicates its naturalness.

In construction which includes passive solar heating, it is very important to implement thermal mass.





A chart from Pollinate's research, prepared for the Forest & Wood Products Australia, which describes the positive impact of wood as a type of material in terms of being a greater source of satisfaction, motivation and relaxation to the individuals using such space.


insulation type	λ, W/mK	thickness, cm	price, EUR/m2	price EUR	
bale of straw	0,045	30	3,63	1453	
cellulose	0,045	30	18,31	7325	
expanded polystyrene	0,038	24	20,35	8139	
stone wall	0,038	24	23,55	9418	

The table shows the values of thermal conductivity coefficients λ , obtained by calculation. The wall thickness corresponding to the heat transfer coefficient U = 0.15 W/m2K is shown in the third column, whereas the fourth column shows the price in euros applicable in Austria in case of each individual material used for an average house of 150 m2.

If one third of the straw produced in Croatia is used in construction, which would amount to 270,000 tonnes a year, it could be sufficient to build about 13,500 passive houses (average area of 150 m2) a year.

STRAW

DAILY WATER ABSORPTION

Clay is one of the best materials suitable for wall finishing thanks to its excellent hygroscopic properties.



📕 lime plaster	1.1
brick	1.2
gypsum plaster	2.6
wood transverse to fiber	2.8
plasteboards	2.9
concrete ceiling slab	5.9
wool insulation	6.5
light clay	11.3
wood longitudinal to fiber	18.7 g/m2/dan

Clay maintains the humidity of the room at about 50%, which prevents the development and transmission of viruses, bacteria and mold, creating a healthy and comfortable living space.

CLAY

THE DESIGNED HOUSING COMMUNITY AND RURAL SETTLEMENT is sustainable in all segments:

- sociology
- economy
- energy
- construction
- environment
- health care
- waste management
- food

•



THE SUSTAINABLE SYSTEM OF THE "PERMACULTURE FLOWER"

Contributing to the development of the social community:

+ construction + waste + water + economy + social aspect + food + energy

= ethics

By definition, a set of principles for moral behaviour of a society or social group based on fundamental social values such as kindness, honesty, duty, truth, humanity, etc., expressed in specific human actions within the rules, maxims and civilizational principles of a society. (Croatian Encyclopedia, 2021).



HYPOTHESIS

0

- There is a possibility of designing and building sustainable housing **units,** i.e. family houses, in accordance with the current legislation and spatial plans of the Republic of Croatia with the possibility of multiplying the designed standard solution for the purpose of creating sustainable housing communities as well as sustainable rural settlements.

• There is an interest group of people who would like a more peaceful life in such small-sized communities not far from larger urban centers, with the purpose of achieving new qualitative values of life that are unattainable in urban areas.

• There is a possibility of using (co-)financed construction funds and **potential sites** owned by the Republic of Croatia that could be intended for the proposed type of construction in order to encourage settlement in the area of special state concern.

The survey on the topic of "Revitalization of underdeveloped and abandoned regions as well as those hit by earthquakes through the project of a sustainable rural settlement with the 'OKTODOM' model house" has been conducted as described below:

- anonymously, electronically, and online via Google Forms, e-mail and Facebook,
- over the period of one month, from 1st to 31st August 2021,
- the questionnaire comprised 22 short and specific questions for which five minutes sufficed,
- the research included 165 respondents from the territory of the Republic of Croatia,
- the questionnaire was not distributed to the Facebook pages of interest groups that might contribute to the unrealistic results of the research.

ANALYSIS OF THE SURVEY QUESTIONS HAS GIVEN THE FOLLOWING RESULTS:

74.5 % respondents of female gender

24.5 % respondents of male gender

* * * * * * *

62.4 % aged 40 to 60
23.6 % aged 25 to 40
7.3 % aged 18 to 25
6.7 % under the age of 18

63.0 % post-secondary or university education 26.7 % secondary education

10.3 % MSc or DSc

59.5 % of respondents represented a family of three to six members29.7 % a family of two members10.8 % one member of the household

69.7 % no child in the family is under the age of 14 17.6 % one child 12.7 % two or more children

46.1 % of respondents could not arrange their permanent job to work from home
32.1 % could do so partially
21.8 % could easily do business in such a way



Diagram of the answer to question 13 from the survey questionnaire:

"Would you be willing and ready to replace your current way of living with a new one in the presented sustainable family house, situated in a small rural sustainable settlement near a city?" Diagram of the answer to question 14 from the survey questionnaire:

"Would you be interested in owning your own vegetable garden, orchard, keeping animals for company or food within your own eco-farm yard, thus achieving self-sustainability of your family as well as contributing to the development of the housing community?"



no

Diagram of the answer to question 15 from the survey questionnaire:

"Would you be interested in contributing to the sustainability of the housing community with the ecological fruits of your labour and exchanging goods and services within your community and rural settlement, in accordance with the "barter" principle?"



INTERESTING FACTS FROM FURTHER ANALYSIS OF THE SURVEY QUESTIONNAIRE

as many as 96.4% of respondents consider themselves as environmentally conscious

for 89.1 % distance from a small town maximum 30 min by car

for 66.1 % distance from a bigger town/city maximum 30 min by car for 24.2 % it is acceptable to drive up to 1 hour to a bigger town/city

18.2 % of respondents would be willing to set aside more money for a sustainable house31.5 % would be willing to set aside the same amount as for a classic construction... others say that they are in no position to finance the construction of any kind of house on their own

42.4 % of respondents are interested in having their family members actively participate in the construction of their own home, guided by professionals; they find it a great opportunity to contribute, have fun and be creative during construction works, as well as an opportunity to raise children
4.4 % are not sure but find the idea interesting

15.2 % of respondents would like a turnkey construction

61.8 % of respondents would accept monitoring of the use and maintenance of the new sustainable houses for the purpose of professional and scientific contribution to the development of sustainable construction and sustainable living
32.7% are not sure, while only 9 respondents would not agree to it at all

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HYPOTHESIS

• There is a possibility of designing and building sustainable housing units, i.e. family houses, in accordance with the current legislation and spatial plans of the Republic of Croatia with the possibility of multiplying the designed standard solution for the purpose of creating sustainable housing communities as well as sustainable rural settlements.

• There is **an interest group of people** who would like a more peaceful life in such small-sized communities not far from larger urban centers, with the purpose of achieving new qualitative values of life that are unattainable in urban areas.

• There is a possibility of using (co-)financed construction funds and potential sites owned by the Republic of Croatia that could be intended for the proposed type of construction in order to encourage settlement in the area of special state concern.

When looking for the ideal site, the following criteria have been established:

Sisak

Novi Grad

Rudice

Google

Petrinja Mošćenica

Taborište

Pokupsko Gornja Bučica

- Sisak-Moslavina County
- area affected by earthquake
- area of special state concern
- within the green marked area on the map with the information on geohazards, special conditions and restrictions for the reconstruction of Sisak-Moslavina County (Department of Geology and Geological Engineering, Faculty of Mining, Geology and Petroleum Engineering in Zagreb)
- shape and size that allows the construction of several housing communities
- favorable terrain configuration in a slight slope to the south
- along the road through which the existing plumbing and electrical infrastructure passes
- maximum 5 km from an existing paved road
- close to an urban environment, i.e. not far from a small town with a school, clinic, post office, and market
- good traffic connection with a regional center (Zagreb, Karlovac, Sisak)
- not near the local cemetery

kovica

abovac

- away from unfavorable facilities such as transmission lines, industry, mines, large agricultural crops (pesticide use), expressways and busy roads
- minimum distance from a pipeline should be 500 m



SISAK-MOSLAVINA COUNTY – potential sites for sustainable rural settlements



ANALYSIS OF THE POTENTIAL SITES

- analysing the liquefaction susceptibility map
- analysing the potential of state-owned sites, as this would be the fastest and best way to respond to the needs of creating new settlements
- analysing areas that are under special state concern according to the Law on Areas of Special State Concern (Official Gazette 86/08)

SUNJA; 32 ha of arable land, where a housing estate is planned according to the current Detailed Arrangement Plan of Bečko residential area; with amendments to the DAP, it would be ideal for building 4 designed housing communities; distance from Sunja is 3 km, from Sisak 30 km, and from Zagreb 82 km.

2 – **BREST POKUPSKI**; 83 ha of pasture; the plot on which the refugee settlement of Mala Gorica was located, still with dilapidated prefabricated buildings and infrastructure remaining from the refugee settlement; along the road connecting Petrinja and Zagreb; the plot is very large but most of it is unusable due to the high-voltage transmission line that passes through it, which makes the idea of constructing a sustainable settlement inapplicable; 4-5 housing communities could be built; distance from Petrinja is 7 km, from Sisak 13 km, and from Zagreb 47 km.

3 – ŽAŽINA; 19 ha of barren soil; facilities of the former barracks have remained here; the site is surrounded by forests and fields, and it is connected to the Petrinja-Zagreb road; near a cut-off distributary of the Kupa River; the plot is on a slight elevation, 20 m above the level of the river distributary; a potential plot for one or two housing communities upon demolition of existing buildings; distance from Petrinja is 12 km, from Sisak 12 km, and from Zagreb 44 km.

4 – PERNA; this group of cadastral parcels includes pastures of a former calf fattening farm in social ownership; over two hundred hectares of land stretch across the southern slope with a slight incline, surrounded by uncultivated agricultural land and woods to the north; Topusko with its spa, health resort, ambulance, and primary and secondary schools is in the immediate vicinity; a potential site for 5-6 housing communities; distance from Vrginmost is 5 km, from Sisak and Karlovac 55 km, and from Zagreb 79 km.

5 – **BRNJAVAC**; in the immediate vicinity of Vrginmost, on the hills with a slight slope; the coverage of the site includes several cadastral parcels within the cadastral municipality of Brnjevac, of which several are larger, from 16 to 41 ha; two sources of drinking water; excellent traffic connections with Karlovac are a great advantage of the site, which might be suitable for 6-7 housing communities; distance from Vrginmost is 3 km, from Karlovac 35 km, from Sisak 60 km, and from Zagreb 70 km.

6 – TURČENICA; northwest of Glina, it is surrounded by state forests and abandoned agricultural land; a source of drinking water; it consists of much smaller cadastral parcels within the cadastral municipality of Turčenica, owned by the Republic of Croatia, among which smaller parcels are privately owned, the purchase of which would provide us with a complete site for 3-5 housing communities; distance from Glina is 9 km, from Sisak 45 km, from Karlovac 56 km, and from Zagreb 65 km.

7 – DONJA TRSTENICA; two larger cadastral parcels within the cadastral municipality of Donja Trstenica, of a total of 75 hectares with several smaller cadastral parcels attached to them; ten kilometres northwest of Glina but with a traffic connection (macadam) to the road that directly connects the Municipality of Gvozd and Zagreb; hilly terrain; a potential site for 6 housing communities; distance from Vrginmost is 18 km, from Glina 17 km, from Sisak and Karlovac about 55 km, and from Zagreb 57 km.

- Is there a possibility of designing and building sustainable housing units, i.e. family houses, in accordance with the current legislation and spatial plans of the Republic of Croatia with the possibility of multiplying the designed standard solution for the purpose of creating sustainable housing communities as well as sustainable rural settlements?
 - Is there **an interest group of people** who would like a more peaceful life in such small-sized communities not far from larger urban centers, with the purpose of achieving new qualitative values of life that are unattainable in urban areas?
- Is there a possibility of using (co-)financed construction funds and potential sites owned by the Republic of Croatia that could be intended for the proposed type of construction in order to encourage settlement in the area of special state concern?

THE ANALYSIS HAS CONFIRMED ALL THREE HYPOTHESES.

Sources:

- conceptual architectural and urban design, January 2021; copyright work by Jasmina Ovčar, mag.ing.arh.i urb., and Gorana Gregl, univ.bacc.ing.arch.

- photos from a private collection and FB public groups.

- professional scientific paper by Ovčar, J. and Gregl, G.;

"Revitalization of underdeveloped and abandoned regions as well as those hit by earthquakes through the project of a sustainable rural settlement with the 'OKTODOM' model house", to be published in the Proceedings of the 2nd International Scientific Conference for Rural Tourism Development held on 25th and 26th November 2021 in Sisak, titled: "Sustainable and Responsible Rural Development", organized by Vimal Academy and the Tourist Board of Sisak-Moslavina County.

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Tree houses, presented as a new form of tourism around lowland rivers; small accommodation facilities on remote islands that might offer retreat into solitude and individual getaway; analysis of the current state of abandoned and devastated urban buildings of the Adriatic islands (by proposing the legal and economic aspect of approaching their reconstruction and restoring to function); analysis and proposals for quality waste management on the Adriatic islands potentially considered as protected oases; use of adapted and converted autochthonous Medimurje houses as part of yearround tourist offer through four seasons; proposing the concept of a modern passive family home based on the historical heritage of the dugout house; revitalization of the racecourse sports and recreation center in the town of Čakovec; and finally, the current question of revitalization of underdeveloped, abandoned and earthquake-affected areas of Sisak-Moslavina County - all these topics occupy an architect's mind, offering creative solutions, possibilities and proposals. By involving other professions in the analysis and finding of solutions to the questions asked, the problems are brought to the foreground, they are more coherently expressed and perhaps closer to being recognized.

Given that projects are not, nor should they be, a purpose and goal in themselves, the basic intention is that future investors, local self-government and state apparatus recognize the potential for sustainable development in the very ideas expressed in these presentations. Some of the proposals have already gone through the stage of recognition and initial investments, some have evolved into widespread commercially used products, while others are yet to be realized. In the meantime, creative minds will continue to deliver new professional and scientific work, in an effort to achieve the highest possible level of sustainability. :)