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CREATING THE NETWORK OF KNOWLEDGE LABS FOR
SUSTAINABLE AND RESILIENT ENVIRONMENTS

STUDY ON THE NEEDS, CONSTRAINTS AND POSSIBILITIES FOR DEVELOPMENT OF NEW STUDY PROGRAMME IN THE FIELD OF SUSTAINABLE AND RESILIENT ENVIRONMENTS

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STUDY ON THE NEEDS, CONSTRAINTS AND POSSIBILITIES FOR DEVELOPMENT OF NEW STUDY PROGRAMME IN THE FIELD OF SUSTAINABLE AND RESILIENT ENVIRONMENTS

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Summary:

The study presented in this document falls within the scope of the **Work Package 1.2: Analysis of needs, constrains and possibilities for curricula development at the University of Banja Luka, Bosnia and Herzegovina**. It includes next chapters:

1. general introduction with explained common need for study programmes (extract from the application),
2. review and analysis of national regulations in terms of higher education and the level concerned, as well as comparison with the application proposal,
3. sustainability and resilience at national state in the fields: regulations, practice, existing study programmes, gap detection, comparison with the application proposal,
4. consideration of national qualification framework and comparison with the European standards in higher education,
5. institutional capacities in terms of development of study programme (institution description, staff capacity, equipment, space (premises), relevant knowledge base at lower levels of education - bachelor and master studies, existing teaching methodology, virtual mobility practice, etc.),
6. educational material in national language about Sustainable and Resilient Environments - availability, scope, subjects, etc.,
7. results of the survey done among students and working professionals (presentation of the survey sample, number of questioned persons and interpretation of results. The survey includes assessment of the knowledge about Sustainability and Resilience, critical issues recognition, actual practice review, etc.),
8. **conclusions and discussion with accented direction and conditions for curriculum development and foreseen contribution to the fields Sustainability and Resilience.**

The aim of the study is to set objective base for curricula development.



1. General introduction

The original idea for the project titled CREATING THE NETWORK OF KNOWLEDGE LABS FOR SUSTAINABLE AND RESILIENT ENVIRONMENTS (acronym KLABS) was born from educational and research activities and related awareness about the complex existing conditions. Project formula is research-oriented, meaning that the methodology for its development is based on realistic problem definition or, in another words, need for the project.

Indeed, the included region, that is Western Balkan, today is faced with significant challenges in the fields of sustainable development and adaptation to climate change; these challenges are visible in both urban and rural built environments, where the second are often undeservedly more underestimated.

Sustainability and resilience are two separate, but strongly interrelated concepts. The development process and its main credo by which the needs of present generation must be met in a way which will not compromise the ability of future generations to meet their own needs today is compounded by manifestation of past unsustainable actions in society - the climate change. Increased pressure on the environment thus doesn't origin just from the population, their activities or technology, but as well from the nature itself. Therefore, the sustainability - preservation or upgrade of the possibilities for future generations, and the resilience - development of adaptive capacity of the social environments to the climate change consequences, need to be studied concurrently.

Despite the scientifically proved facts, the measures to achieve sustainability and resilience in practice are rarely applied in subject Region. One of the main reasons for the current state is the lack of knowledge. "Malpractice" leaves significant and permanent damage in the environment and contributes to the increment of environmental, but as well social and economic risks.

In regard to the said, the project intends to contribute to the preparedness for coping with, managing and shaping the conditions of growing complexity. Through capacity building, the project aims to create the base for equipping the professionals with new competences and skills necessary to respond to the recognized needs of today's society and job market.

The overall broader objective is to support the modernization of higher education in WB Region by implementing strategic approach in the development of **innovative platform for the delivery of knowledge about sustainable and resilient environments.**

To define the form and scope of knowledge delivery, foreseen by KLABS project, the current state in higher education sector in included Western Balkan countries was studied. It was concluded that the separate study programmes related to sustainability are rare and mostly focused on energy aspect, while the programmes which would include comprehensive education on both sustainability and resilience do not exists at all.

The two topics are in overall rarely present in existing university curricula and are mostly delivered to the students in a form of isolated theoretical classes; this separation from the curriculum backbone reflect negatively on knowledge integration and its practical application in professional work and real life situations. Additionally, the past generations of students didn't get any in-institutional education in subject themes. Finally, to understand the two concepts and their complexity one must own the sufficient broader professional knowledge and skills.

All these considerations led to the conclusion that incorporation of the themes of sustainability and resilience into existing study programmes would not bring completely satisfying results, although would certainly help to develop knowledge base.



This is why KLABS project proposes the introduction of new postgraduate study programmes Sustainable and Resilient Environments. By doing this, the possibility to gain the knowledge opens not just to graduated students, but also to all working professionals who completed their studies long time before the terms sustainability and resilience were introduced at all, and they are therefore considered as important and large target group to be impacted by project.

2. Review and analysis of national regulations in terms of higher education

On the national level in Republic of Srpska (B&H), **Law of higher education** is a roof document in terms of regulations in the higher education (HE) area. This document stipulates principles and goals of higher education, levels concerned, establishment, organization and work of HE institutions, quality assurance, educational activity, rights and obligations of academic staff and students, financing and all other relevant issues in HE. Other documents operating under the Law of higher education that give closer regulations about the establishment of new study programmes are: **Statute about conditions for establishment and implementation of higher education institution and about procedure of determination of compliance with requirements (form here now just Statute), Statute of University of Banja Luka and Guidelines for development of study programmes.**

Within those regulating documents two legitimacy about new study programme are distinguished: accreditation and licensing of study programme.

Accreditation of the study programme implies to validation of the existing studies that are implemented at least three (3) years in a row.

Obtaining new study programme license (permission for study execution) includes next obligations, documents and steps (Article 16 of the Statute):

- Application for licensing should be submitted not later than 31.12 of the running year for the study program that will begin in the next academic year,
- With application, Elaborate about justification of introduction of new study programme is needed – Elaborate specifies academic/scientific/professional title obtained on the end of studies and all relevant information about studies,
- Submit study programme with prove about majority resemblance with at least three study programmes that are already run on accredited HE institutions in Boulogne declaration signatory countries,
- Prove about institution's staff available for new studies,
- Teaching plan with the staff responsible for classes sustention on the new programme,
- Prove of availability of premises and teaching material for the new studies.

Ministry of education and culture is responsible for license issuing. Committee for licensing, established for this very purpose, is giving opinion about application for new study program within 30 days from the application date. Usually, there is comments and suggestions for improvement of documentations submitted and whole process can extend up to 6 months, in are occasions longer.

Specialist studies are not recognized in national regulations in new programme that follows Bologna Convention even though existed before and many specialist are produced from the UBL. Even though statistics say that on UBL, from the establishment until now, is promoted 700 specialists, more than masters (650) or doctors (300), in legal framework (i.e. Law for higher education, Law for labour) is very little given about exact position of holder of specialist diploma. Specialist status is not clearly recognized on labour market or in academic/scientific institutions. Exception is in field of medicine.

Considering the level and type of studies (postgraduate specialist or master), under the national regulation, it is possible to organize only master studies. According to **Law on titles acquired by completion of higher education** master studies brings 60 ECTS for two semesters (one year). Title obtained is master in subjecting field. Abbreviated title is MA. In the **Book of Rules about List of professional, academic and scientific titles** (Article no2) it states that it is possible to add subfield in the title, e.g. Master of Architecture – Energy efficiency in Building.

Areas, Fields and discipline of education are defined in the **Book of rules about areas of education** (2014) and the relevant ones are shown in the Table 1.

Table 1. Excerpt from the Book of rules about areas of education (2014)

	Area of education		Field of education		Discipline of education
5	Engineering, Technology and Construction	5.3.	Architecture and Civil Engineering	530	Architecture
				531	Civil Engineering
				532	Urbanism
				533	Geodesy
				534	Interdisciplinary programs and qualifications that include architecture and civil engineering

According to the Law on higher education and Standards and Guidelines for Quality Assurance in Higher Education in B&H, UBL has prepared and adopted in 2011 **Guidelines for the preparation of the new and improvement of the existing study programs in the UBL (further Guidelines)**. These Guidelines gives overview of structure of new curricula, explains important issues for their preparation, quality assurance and procedures for licencing. **The Guidelines** do not give strict regulation and rules, but is more set as framework of recommendations. However, there are some normative connected to teaching plans and programmes that are defined under other Laws (named above) and summed up in the Guidelines. Those that corresponds to second level of studies, i.e. master studies are:

- Courses should be organized in two semesters, each valued with 30 ECTS,
- All courses are organized in one semester only and programme curricula contains no more than 5 courses per semester, except in very special cases – explanation is that to copious courses jeopardizes flexibility while too fragmented could disturb comprehension of the problem unity,
- Each course cannot be valued less than 3 ECTS and more than 10 ECTS,
- Weekly student’s load is 20-25 classes,



- Programme curricula has clearly specified percentage of subjects (percentage of all number of subjects in curricula):
 - Basic subjects 10%
 - Professional subjects 20%
 - Sub-professional subjects 20%
 - Complementary subjects 5%
 - General subjects 5%
- On the second level of studies (postgraduate – master) at least 25% of curricula should be elective course, not including final thesis,
- Minimum number of students for elective course is 5,
- In semester where is expected to have student’s mobility, dominant elective courses should be envisaged.

3. Sustainability and resilience at national state

a) National laws, regulations and practice

At the Republic of Srpska (RS) level there is a number of regulations issued by relevant Ministries of Government of RS that should be brought in connection with sustainability and resilience. They are briefly listed here with short review of relevant topics and how they are addressed.

Law on spatial planning and construction (building), issued by Ministry of spatial planning, civil engineering and ecology on several places mention climate change (without resilience) and energy efficiency by means of sustainability. For example, Article 3 says that general principle of sustainable development should ensure such spatial use without endangering future generations. Article 11 says that one of the major principles for spatial planning and building is to apply climate change and energy efficiency using renewable energy and building energy efficient buildings. Article 90 states that during design process, building and major reconstruction of objects energy efficiency should be incorporated with the usage of new technologies and materials, renewable energy sources, automatic systems for energy savings etc.

The regulations issued from the same Ministry in context of sustainability and resilience are **Law for nature protection, Law for environmental protection, Law for air protection, Regulation of the gradual elimination of substances that deplete the ozone layer and Strategy for nature protection of RS.**

Law of waters issued by Ministry of agriculture, forestry and water management regulate integral water management and it is in coordination to EU Water Framework Directive (EU 80/778/EEC). This law specifies production of Strategy for water management which should regulate of actions and



plans for, both surface and ground- water pollution protection according to WFD and Council Directive Integrated Pollution Prevention and Control (IPCC 96/61/EC). This document, named **Strategy for Integral Water Management of RS 2015-2024** is in his draft version yet and to be adopted soon. In this draft version, amongst other documents, Convention on Climate Change and Agenda 21 (with about 2500 various recommendations for global sustainable development) are listed as documents taken as recommendations and guidelines during Strategy preparation. Throughout the document climate change impact assessment and corresponding resilience are highlighted in all water sectors together with principles of integral and sustainable management. General recommendation is necessity for quantification of climate change in water sector by means of future projection so the proper adaptation and resilience program could be prepared.

On the level of **Spatial plans** for Municipalities within RS, integral approach for planning in order to meet sustainability and resilience to climate change specifically is mentioned as a basis for development of Plans. However it is not implemented during its production. Focus in those Plans is usually on existing infrastructure and developments without concrete actions and guidelines to convert them under principles of best management practice.

In conclusion, in entity's laws and regulations pool there is much effort to provide sustainable and resilient development in the all relevant sectors. However, it seems that mechanisms and actions for implementation are missing. This is clearly seen in current practice for urban, environmental and infrastructure planning and design in which elements of sustainability and resilience (S&R) are not fully (or not at all) implemented.

Therefore, consciousness about needs for sustainable development in order to provide uncompromised resources for future generations is present. Needs for addressing resilience is specifically highlighted in water sector. From this point it is obvious that national stakeholders are willing to change the current practice and go more for a sustainable future and resilient solutions. Gaps between idea and realization is clearly lack of knowledge and frameworks that will serve to better and consistent implementation toward S&R principles. To bridge the gap there is need to provide the broader knowledge that will be shaped to fit the national specificity and from that platform to educate professionals in relevant sectors altogether with new generations of students. **This way, equipping existing and new professionals with new competences and skills necessary to respond to future needs and constraints, as envisaged by KLABS activities, may provide necessary knowledge base for bridging from point of recognized problems to mechanisms of consistent implementation.**

b) Existing study programmes

On University of Banja Luka there are 16 Faculties and one High school with wide range of study programmes in various fields. However, even though topics such sustainability and/or resilience is recognized and somewhere noted within the courses no specific programme is devoted to that subject.

Recently, Faculty of Architecture, Civil Engineering and Geodesy (FACEG) started new joint/combined Master and PhD programme about energy efficiency. Programmes are specifically oriented towards



sustainable buildings that should serve to educate generations of experts and provide basis for more resilient and sustainable development of urban spaces in the future.

Joint master academic studies titled "Energy Efficiency, Renewable Energy Sources and Environmental Impacts" are developed within activities on TEMPUS project ENERESE (Tempus project 530194-2012 ENERESE), coordinated by the University of Novi Pazar. This master program provides education of professionals with great importance for the region and the Republic of Srpska, and represents an expression of modern trends in energy recommended by the relevant European institutions to our country. This master program is designed for students at Faculty of Mechanical Engineering and FACEG (with 240 ECTS achieved), or related, similar study in structure and content - with the required previous knowledge in the scientific field of energy efficiency in buildings.

Scientific fields relevant in this master study program are:

1. Architecture and urban planning

- a. architectural construction, installation, construction technology, environmental engineering and management in architecture,
- b. architectural design,
- c. urban and regional planning protection of heritage, physics and materials architecture;

2. Civil Engineering

- a. building structure,
- b. construction materials,
- c. management in the construction industry;

3. Mechanical Engineering

- a. gas appliances,
- b. heating and air conditioning,
- c. automation systems,
- d. thermo-technical systems,
- e. environmental protection - the technical aspect.

After successful completion of the second cycle study program Energy efficiency in buildings - a period of one year of study and achieved 60 ECTS, which, with the first cycle studies is 300 ECTS - acquires the academic title of master of engineering, depending on the field of education of candidates on the first cycle. In addition to diplomas benefits are in academic title Master of Mechanical Engineering - Energy Efficiency in Buildings or Master of Architecture and Civil Engineering - Energy Efficiency in Buildings.

FACEG is one of four parties, together with Faculty of Mechanical Engineering, Faculty of Technology and Faculty of Electrical Engineering, that started new **joint PhD programme for Energy efficiency titled "Renewable energy resources and ecological engineering"**. Programme is product of project named CREDO which is funded by TEMPUS - the European Union's programme which supports the modernization of the higher education in the EU's surrounding area. CREDO's goal is to advance capacity in education, research, innovation and exploitation of knowledge in the area of Renewable Energy and Environmental Technology in Bosnia and Herzegovina, Kyrgyzstan, Moldova and Ukraine through cooperation with European Universities within a framework of a Doctoral Programme.



University partners in this project are: Royal Institute of Technology, Sweden, Tallinn University of Technology, Estonia, TU Delft, The Netherlands, Barcelona Tech UPC, Spain, University of Sarajevo, Bosnia and Herzegovina, University of Banja Luka, Bosnia and Herzegovina, Kyrgyz State University of Construction, Transport and Architecture, Kyrgyzstan, Osh Technological University, Kyrgyzstan, Technological University of Moldova, State Agrarian University of Moldova, National Technical University of Ukraine, Kiev Polytechnic Institute, Ukraine, National University of Water Management & Natures Resources Use, Ukraine.

In some of the basic programmes existing on FACEG there are several courses that tackle sustainability and resilience subjects (see Table 3). Nonetheless, sustainability and resilience is not directly addressed.

Table 3. Existing courses related to sustainability and resilience

Course	Study programme	Semester	Description/relevancy	Learning methodology
Ecological engineering	Civil Engineering Geodesy	III B*	Protection and environmental management with the elements of sustainable development	
Spatial-territorial sustainable development	Architecture	III B*	Basic principles of sustainable development in urban and suburbs areas	Interactive through debates on concrete spatial plan, essay about findings
Bioclimatic (ecologically acceptable) architecture	Architecture	IV B*	Introduction to ecologically acceptable architecture and urbanistic design	Oral presentation, visiting lectures, students work and present. under regular consultations
Road drainage	Civil Engineering/ Hydrotechnics	II M**	General principles of road drainage with elements of sustainable urban drainage practice	Oral presentation, working example on specific road section to apply learned outcomes

*B-Bachelor level

**M-Master level (program will be implemented first time in school 2016/17 year)

Good examples of knowledge relevant to S&R subject used and implemented in lower levels of studies are:

- Within course “Architectural design 3” in school 2013/2014 year students, under the leadership of course’s teacher and assistants, developed a project called Responsive house



where 9 experimental models of houses “responsive” to flood risk in flood prone areas are developed. Designs offers prefabricated, usually modular houses that present flexibility, identity, functionality, cost effectiveness and applicability in this very special purpose (resilient to floods);

- Four FACEG staffs was part of the project team in realization of the project named “Interactions of flood management and innovative spatial and urban planning”. The principal objective of this project was to create conditions for strengthening national human

resources’ capacities in the area of integrating environmental sustainability and innovative methods of strategic (spatial and urban) planning and their efficient implementation in practice primarily in the area of flood management and improvement of urban areas’ resilience to negative impacts of climate changes and extreme weather conditions.

- In 2013, FACEG together with *Vienna University of Technology, Institute of Urban Planning and Urban Design* and *Carinthia University of Applied Sciences, School of Civil Engineering & Architecture*, have organized and participated in the educational academic project titled *Urban Regeneration of a Brownfield Area in the City of Banja Luka - Rudi Čajavec*. Within this project students from all three Universities elaborated different concepts for the regeneration and sustainable development of the former industrial area of Rudi Čajavec (8 ha) in a central location of the city of Banja Luka.

4. Consideration of national qualification framework

National qualification framework is defined and regulated by: The Framework for Higher Education Qualifications in Bosnia and Herzegovina (2008), Standards and Guidelines for Quality Assurance in Higher Education in Bosnia and Herzegovina (2007), Law on the titles acquired by completion of higher education (2014), Basics of qualification framework in B&H (2011).

In the field of higher education in Bosnia and Herzegovina there are three levels of education: the first, the second and the third cycle. According to qualification framework in B&H there are two types of postgraduate studies: master as the second cycle of higher education and doctorate as the third cycle. For implementation of the KLABS project in the University of Banja Luka relevant qualification level is Master. This Master is equivalent with level 5A of ISCED and level 7 of EQF.

All three cycles of the B&H framework for higher education qualifications reflect and expand upon the ‘Dublin Descriptors’ adopted by Ministers of Education under the Bologna Process, following a decision of ministers to adopt a higher education system that is essentially based on three cycles. The Dublin Descriptors are generic (non-subject specific) statements of the typical expectations of achievements and abilities associated with qualifications that represent the end of each Bologna cycle. They are built on the following elements: knowledge and understanding, applying knowledge and understanding, generic cognitive skills, making judgements, communication skills and learning skills, learner autonomy accountability and working with others.



The BiH descriptors provide more detail than the Dublin Descriptors and are intended to be read with reference to each other. They describe the knowledge, skills and abilities associated with typical end cycle qualifications e.g. Bachelor's Degree, Master's Degree, and Doctorates. These descriptors are not meant to be prescriptive or exhaustive and need to be cross-referenced with other external reference points including national and international academic or professional subject specific guidance materials.

Qualifications that signify the successful completion of the second cycle (60-120 ECTS credits) are awarded to students who:

- have demonstrated a systematic understanding and mastering of knowledge in their field of study/discipline that is founded upon, and extends and/or enhances, that is typically associated with

Bachelor's level, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context;

- can apply their knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study;
- apply conceptual thinking and abstraction with a high level of proficiency and creativity, which will enable the:
 - critical evaluation of current research and academic work at the forefront of the discipline,
 - evaluation of different methodologies, development of critical opinion and the raising of alternative solutions;
- have the ability to integrate knowledge and handle complexity, and formulate judgements with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgements;
- can communicate their conclusions, and the knowledge and rationale underpinning these using appropriate language(s), to specialised and non-specialised audiences clearly and unambiguously;
- are able to take their own knowledge to a higher level, deepen the understanding of their field of study/discipline and continuously develop their own new skills through individual learning and self-development;
- have the learning skills to allow them to continue to study in a manner that may be largely self-directed and autonomous;
- have acquired interpersonal and teamwork skills appropriate to a variety of learning and employment contexts and also demonstrate leadership and/or initiative and make a contribution to change and development.

5. Institutional capacities in terms of development of study programme

Faculty of Architecture, Civil Engineering and Geodesy (FACEG) comprises of three study programmes: Study programme of Architecture, Study programme of Civil Engineering and Study programme of Geodesy. Programmes are organized on bachelor level with 4 years studies and 240 ECTS and master level of 1 year in length and 60 ECTS of student’s credit. PhD program, besides combined studies mentioned in chapter 3, does not exist yet. Organization of the study programmes on FACEG is shown in Table 2.

On each department every year number of 40 students is enrolled in bachelor study programmes, whereas 15 on budget and 25 on self-financing.

FACEG is located on two distant premises, old and new University Campus on modest 2000m² (4 classrooms, 4 practice rooms, 1 computer room and library with reading room). New faculty building, designed under the principle of passive and intelligent building is under construction. There will be for the purpose of classes: one amphitheatre with approx. 170 places, 3 smaller amphitheatres with 56 places, six 30 places classrooms, 4 drawing rooms, ten 20 places classrooms, 2 classrooms/labs, 2 workshop rooms, 1 atelier, 64 places library with reading and media room. It is expected that with the end of KLABS project we will move into our new premises.

Table 2. Study programmes and departments on FACEG, UNIBL

Level	Bachelor 240 ECTS	Master 60 ECTS	Joint master 60 ECTS	PhD
Study programme	Departments/programmes			
Architecture	Architecture	Architecture	Architecture and Civil Engineering - Energy efficiency in buildings	Technical Sciencies in the Field of Architecture and Civil Engineering Renewable energy resources and ecological engineering
Civil Engineering	Constructions	Constructions Hydrotechnics		
	Hydrotechnics Road engineering	Road engineering Organization and technology of construction Geotechnics		
Geodesy	Geodesy	Geodesy		

FACEG has special scientific, expert and business contract with Institute for urbanism, civil engineering and ecology of Republic of Srpska in which premises we keep our three labs: lab for geotechnics, lab for examination of asphalt and concrete.

Advantage of FACEG is existence of three compatible, tied but diverse study programmes which provide various experts in fields of architecture, civil engineering and geodesy. New study program which will be developed under KLABS is envisaged to properly interconnect those three study programmes and use all the relevant knowledge of all three in order to address issues of



sustainability and resilient building environment. With regard to those subjects, existing knowledge about spatial and urban planning, infrastructure (roads, drainages and water distribution systems), GIS systems and its usage in various fields of civil engineering and geodesy is planned to be incorporated into new studies.

Corresponding (to new study programme planned to be developed) staff capacity are professors, associate professors and senior teaching assistants from all three programmes as follows: Urban planning and design experts – 8 people, GIS experts – 3 people, Climate change experts – 2 people, Environmental modelling experts – 3 people.

Existing teaching forms are: lectures –majorly oral presentation (power point presentations, smart boards, regular chalk boards etc.), exercise - practicing with student either in small groups or one to one consultation, workshops, excursions and independent work and practice. Majority of courses has final elaborate that is actually concept design relevant to the subject which prepares students for practical work. Besides that, lot of excursions and field trips to construction sites (i. e. highway construction sites, dams, water distribution systems, buildings construction sites etc.) in the nearby area are organized altogether with visits to existing labs and national measuring services (i.e. hydro meteorological service).

Virtual mobility practice has not been yet implemented on FACEG, only classical mobility whereas only small number was incoming students and/or staff and majority of mobility is realized by outgoing students and in lesser extent staff.

6. Educational material in national language about sustainable and resilient environment

In Faculty's library there are number of books and proceedings on national language that cover topic of sustainability and/or resilience. The complete list is given in table 3.

Table 4. Complete list of relevant literature related to sustainability and/or resilience on national language present in library of FACEG

No.	Reference list
1	Održivost i grad; Milica Bajić Brković. Arhitektonski fakultet Univerziteta u Beogradu, 1999.,144 str.
2	Održivi razvoj turizma u Evropskoj uniji i Srbiji; Marija Maksin, Mila Pucar. IAUS, Beograd, 2010., 375 str.
3	Održiv razvoj ljudskih naselja zemalja u tranziciji; Miodrag Janić. Jugoslovenski institut za urbanizam i stanovanje, Beograd, 1997., 324 str.
4	Održivi grad i njegovo okruženje; Nenad Spasić, Marija Maksin Mičić. Institut za arhitekturu i urbanizam Srbije, Novi Beograd,2006., 134 str.
5	Održivi razvoj planskih područja Srbije; Marija Nikolić, Radomir Mlobabić. Institut za arhitekturu i urbanizam Srbije, Novi Beograd, 2004., 200 str.
6	Održivi razvoj banjskih i turističkih naselja u Srbiji; Mila Pucar, Boško Joksimović. IIAUS, Beograd, 2011., 335 str.



No.	Reference list
7	Prostorno teritorijalno održiv razvoj i LEAP; Milenko Stanković. Banjaluka, 2004., 164 str.
8	Solarna energetika i održivi razvoj; Jasmina Radosavljević, Tomislav Pavlović, Miroslav Lambić. Građevinska knjiga, Beograd, 2010., 388 str.
9	Ekološka Kuća; Vesna Kosorić. Građevinska knjiga, Beograd, 2008., 209 str.
10	Bioklimatska arhitektura; Mila Pucar. Posebna izdanja IAUS br. 45, Beograd, 2006., 245 str.
11	Održivi grad i njegovo okruženje 2; urednici: Nenad Spasić, Božidar Stojanović. Posebna izdanja IAUS br.49, Beograd, 2006., 134 str.
12	Održivi grad i njegovo okruženje; urednici: Nenad Spasić, Marija Maksin-Mičić. Posebna izdanja IAUS br.48, Beograd, 2005., 134 str.
13	Novi teorijski i metodološki pristupi u izgradnji strategije održivog regionalnog razvoja. Primer Zlatiborskog regiona; urednici: Miodrag Vujošević, Ksenija Petovar. IAUS, Beograd, 2008., 196 str.
14	Klimatske promjene i izgrađeni prostor. Politika i praksa u Škotskoj i Srbiji; urednici: Mila Pucar, Branka Dimitrijević, Igor Marić. Posebna izdanja IUAS br.70, Beograd, 2013. 516 str.
15	Optimizacija arhitektonskog i urbanističkog planiranja i projektovanja u funkciji održivog razvoja Srbije; urednik: Nađa Kurtović Folić. Tematski zbornik radova, Fakultet tehničkih nauka, Novi Sad, 2014., 590 str.
16	Prostorno planiranje, regionalni razvoj i zaštita životne sredine; urednik: Nada Milašin. Posebna izdanja IAUS br.26, Beograd, 1995., 174 str.
17	Metodologija strateške procene uticaja prostornog plana rudarsko-energetskog kompleksa na životnu sredinu; urednici: Božidar Stojanović, Tamara Maričić. Posebna izdanja IAUS br. 56, Beograd, 2008., 179 str.
18	Neki aspekti održivog prostornog razvoja Srbije; urednici: Mila Pucar, Nenad Spasić. Posebna izdanja IAUS br. 58, Beograd, 2009., 262 str.
19	Obnova Prištine u uslovima održivog razvoja; urednik: Borislav Stojkov. IAUS, Beograd, 1996., 210 str.
20	Životna sredina i održivi razvoj; Mira Đukanović. Elit, Beograd, 1996., 310 str.
21	Bioklimatsko planiranje i projektovanje, Urbanistički parametri; Mila Pucar, Milan M. Pajević, Milica Jovanović Popović. Zavet, Beograd, 1994., 131 str.
22	Ruralni turizam i održivi razvoj Balkana; urednici: Ljiljana Čomić, Ilija Rosić. AEERT Kragujevac, 2003., 421 str.
23	Održivi razvoj planinskih područja Srbije; urednici: Marija Nikolić, Radomir Malobabić. Posebna izdanja IAUS br. 42, Beograd, 2003., 200 str.

From the above list, majority of literature is about sustainable development, environmental protection in design, bioclimatic design and about climate change in built environment. By type there are books, books/special editions of Institute for Urbanism and Architecture of Serbia and proceedings from thematic conferences.

7. Survey results

a) Student's survey

Survey is conducted in order to investigate student's interest in the new postgraduate study programme (master or specialist) with framework theme of Sustainable and resilient environment. Respondents were students of third and fourth year of studies and absolvents. Survey was Google type of online survey, formed in three sections, in 9 questions.



Number of 32 students was surveyed in total, of whom 18 of Architecture, 6 of Civil Engineering, 9 of Geodesy and one student of Spatial Planning (study programme on Faculty of natural and mathematic sciences). The first two questions referred to their interest in the new postgraduate study programs and their motivation for attending such studies.

In general, majority of respondents were interested in postgraduate study program, and so that 64.5% of respondents were interested in master degree and 38.7% for specialist studies, while only 12.9% said they were not interested in the second cycle of studies in general.

Students of architecture are the most interested for the master degree, while the Civil Engineering and Geodesy students are equally interested in master and specialist degrees. As the main motivation for attending these studies they checked the acquisition of new knowledge (64.3%), among others offered answers.

Following two questions were related to specific topics about their knowledge in the field of sustainable development and understanding the term resilient environment. As seen in Figure 1 students could not confirm with certainty the knowledge or understanding about any of these areas, so for both questions most common response was *partially knowledge/understanding* (54.8%). However, 41.9% of students declared *familiar with the principles of sustainable development* while only 16.1% *understands the concept of resilient environment*.

When it comes to questions in the field of climate change responses are somewhat different. Although the majority of respondents declared partially familiar with methods of analysis of climate change and predictions of their impact in the planning and design of urban systems, there were more of those who do not know this method at all (35.5%) compared to those who claim to be familiar with it (19.4%). In this sense, 43.3% of respondents do not know *the techniques and processes for active involvement of citizens in the processes of design and planning*.

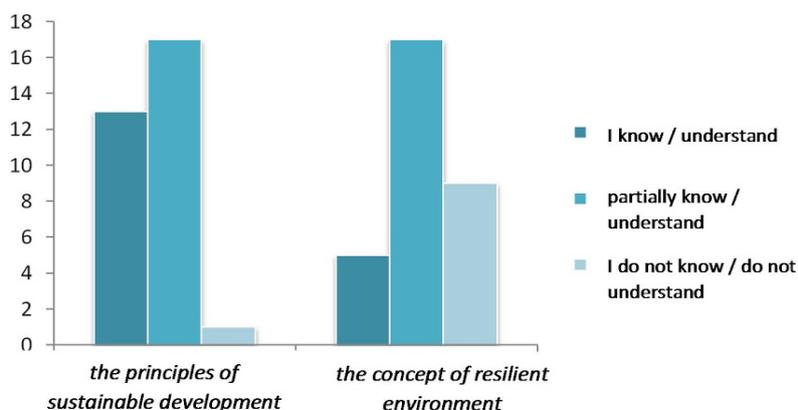


Figure 1. Survey results about knowledge in the field of sustainable development and understanding the term resilient environment

On the other hand, most students claim to *know and use GIS as one of tools for planning and design* (38.7%), that is 100% of the surveyed Geodesy students, while, compared to students of other departments, most architecture students offered answers to *know GIS, but does not know how to use it* (35.5% of all respondents), or that they are *not familiar with this tool at all* (28.8% of all respondents).

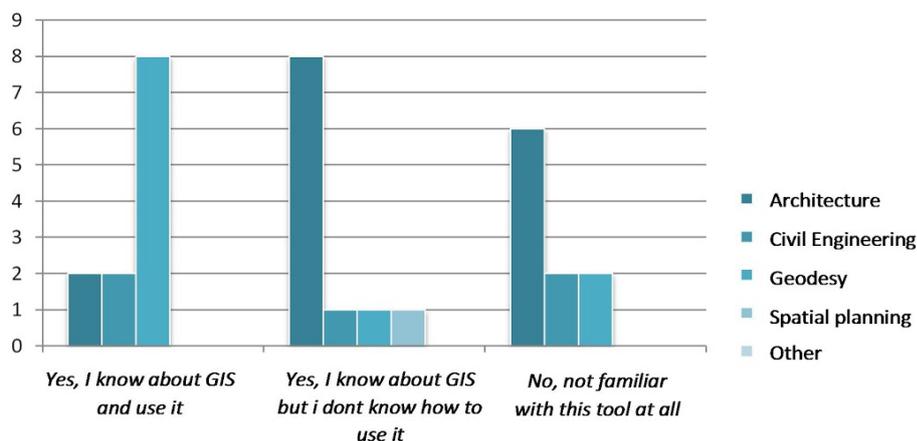


Figure 2. Survey results about knowledge and use of GIS tools

In the final, students had the opportunity to express their opinion on the previous questions and set priorities according to their importance in the planning and design of sustainable and resilient environment. Respondents gave precedence to *analysis and prediction of climate change impacts techniques* (38.7%), as well as *techniques and processes for active citizen participation in the processes of sustainable design and planning* (38.7%), all in relation to *the principles and processes of sustainable urban design* (22.6%). No one offered an additional response as another important topic in thinking, designing and planning a sustainable and resilient environment.

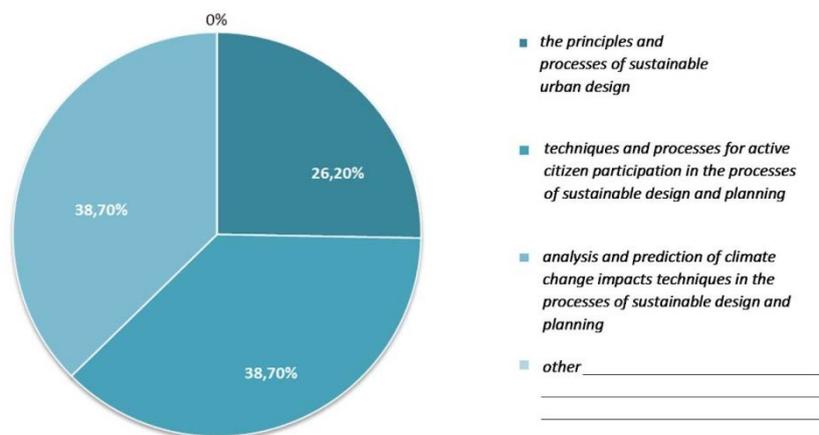


Figure 3. Survey results about important topics related to sustainable and resilient environment

b) Professionals survey

Besides survey of students, relevant information from the professionals employed in local stakeholders companies are obtained in form of survey/interview conducted also in Google survey form. Total of six (6) professionals, 5 from the field of architecture and urbanism and one from the field of physics and meteorology, answered on specific questions about potential new study programme. All of the interviewees consider that new study programme in a field of sustainable and resilient environment is completely justified and necessary with the reasons shown in the Figure 4.

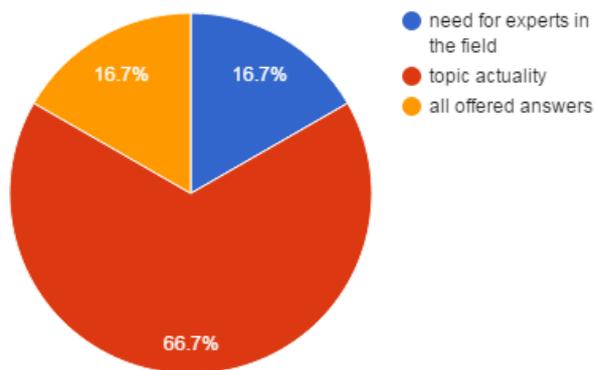


Figure 4. Survey results about reasons for establishment of new study programme

Opinions about type of study programme are divided equally between master and specialist. All of the interviewees think that is very important to apply principles of sustainable development in urban

planning and design. However, majority of them think that those principles are not present in current practice.

When asked about knowing the climate change analysis and impact assessment in urban planning and design, majority is familiar with the subject and also think that is not implemented in current practice.

GIS tools are also recognized as very important but mostly it is not used in the practice, especially in urban planning and design.



8. Summary and conclusions

The overall broader objective is to support the modernization of higher education in WB Region by implementing strategic approach in the development of innovative platform for the delivery of knowledge about sustainable and resilient environments.

In conclusion, in entity's laws and regulations pool there is much effort to provide sustainable and resilient development in the all relevant sectors. However, it seems that mechanisms and actions for implementation are missing. This is clearly seen in current practice for urban, environmental and infrastructure planning and design in which elements of sustainability and resilience (S&R) are not fully (or not at all) implemented. Equipping existing and new professionals with new competences and skills necessary to respond to future needs and constraints, as envisaged by KLABS activities, may provide necessary knowledge base for bridging from point of recognized problems to mechanisms of consistent implementation. This is also justified with the survey results that shown lack of knowledge in subjecting topic and high interest for knowledge expanding.

Specialist studies are not recognized in national regulations in new programme that follows Bologna Convention even though existed before and many specialist are produced from the UBL. Therefore, considering the level and type of studies (postgraduate specialist or master) UBL can develop only master studies with the title master in subjecting field (MA). For implementation of the KLABS project in the University of Banja Luka relevant qualification level is Master. This Master is equivalent with level 5A of ISCED and level 7 of EQF.

Within national regulations two legitimacy about new study programme are distinguished: accreditation and licensing of study programme. Accreditation of the study programme implies to validation of the existing studies that are implemented at least three (3) years in a row. Therefore, during the project implementation only licencing of study programme is relevant.

In order to obtain licence for new study programme that should start in next school year, end of the current year is final deadline. However, due to potentially extended procedure it is better to apply earlier (i.e. in November) to assure proper timing for entrance examination that is necessary for student's enrolment into master studies.

While developing study programme the next should be accomplished:

- resemblance with at least three study programmes that are already run on accredited HE institutions in Boulogne declaration signatory countries,
- not to resemble more than 35% with existing study programme of the same level on UBL,
- programme should provide consistency with previous levels (i.e. with first cycle),
- study programme should belong to one field of education with min 51%.

From the all of the above, new master programme could be organized in the field of urban planning and design. Advantage of FACEG is existence of three compatible, tied but diverse study programmes which provide various experts in fields of architecture, civil engineering and geodesy. New study program which will be developed under KLABS is envisaged to properly interconnect those three study programmes and use all the relevant knowledge of all three in order to address issues of sustainability and resilient building environment. With regard to those subjects, existing knowledge about spatial and urban planning, infrastructure (roads, drainages and water distribution systems),



GIS systems and its usage in various fields of architecture, civil engineering and geodesy is planned to be incorporated into new studies.

Lack of recognition of multidisciplinary professionals on the market at national level will probably be constraint for developing multidisciplinary master study at FACEG. Therefore, idea is to organize studies with the final title obtained e.g. Master of Architecture – resilient urban planning and design where students from other departments can enrol after successful completion of entrance exam.

However, on study programme of Architecture integrated 5 year studies are under preparation. This means that in next several years master as individual will not be necessary. Nevertheless, it can be offered as an optional programme for the final year of new integrated studies.



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