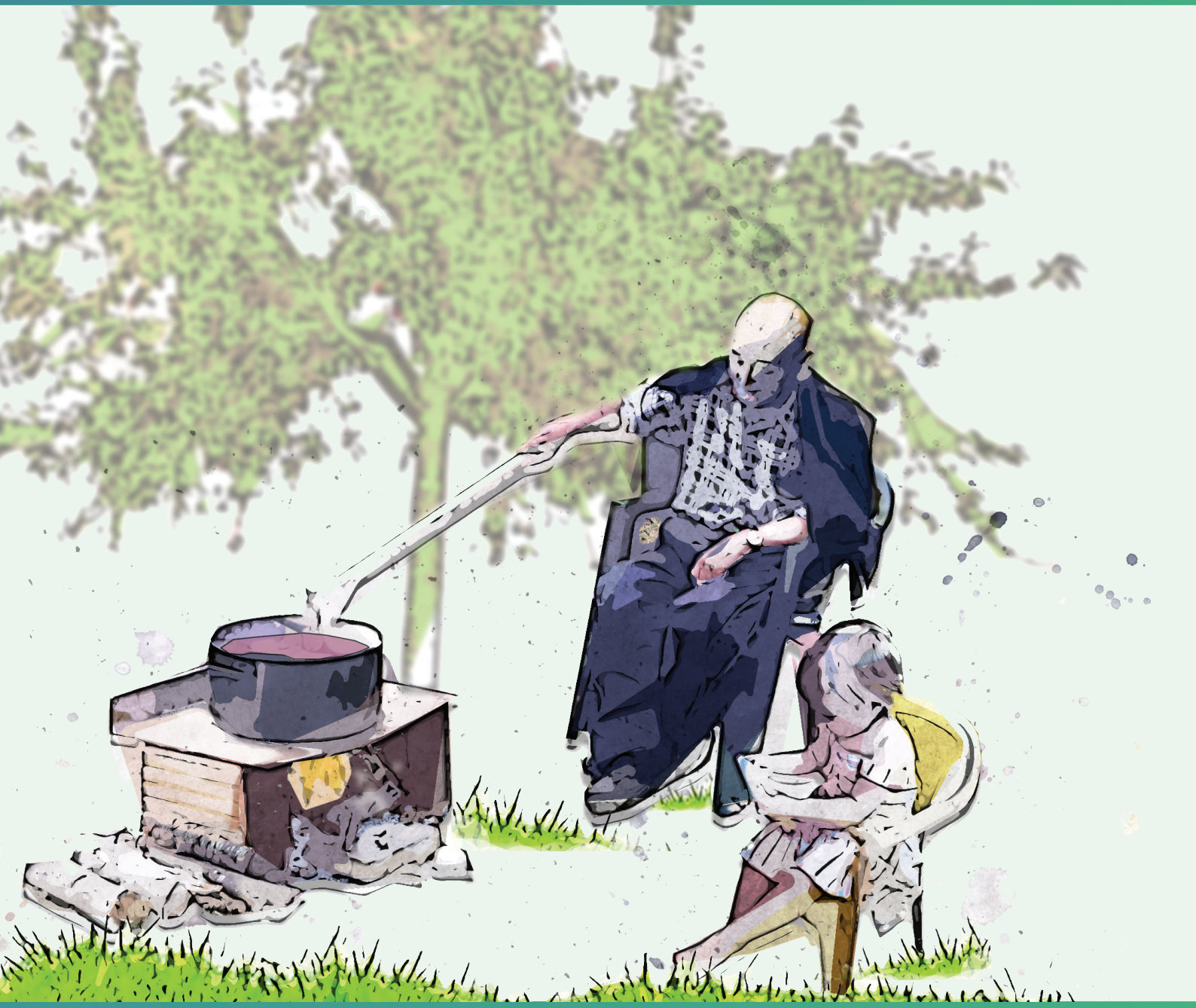
C.A. FONDEKO I UNIVERSITY OF SARAJEVO I FACULTY OF SCIENCE



THE STATE OF TRADITIONAL KNOWLEDGE OF BIODIVERSITY IN BOSNIA AND HERZEGOVINA

Barudanović S., Ballian D., Macanović A., Đurić G., Hatibović E., Kolčaković M., Savić D.

Barudanović Senka, Ballian Dalibor, Macanović Armin, Đurić Gordana, Hatibović Ena, Kolčaković Mersiha, Savić Dalibor

THE STATE OF TRADITIONAL KNOWLEDGE OF BIODIVERSITY IN BOSNIA AND HERZEGOVINA

Sarajevo, 2024

UNIVERZITET U SARAJEVU
PRIRODNO-MATEMATIČKI FAKULTET

FONDEKO

THE STATE OF TRADITIONAL KNOWLEDGE OF BIODIVERSITY IN BOSNIA AND HERZEGOVINA

Original title: Stanje tradicionalnih znanja o biodiverzitetu u Bosni i Hercegovini

Authors:
Prof. dr. Senka Barudanović
Academician Prof. dr. Dalibor Ballian
Dr. sc. Armin Macanović
Prof. dr. Gordana Đurić
Mr. sc. Ena Hatibović
Dr. sc. Mersiha Kolčaković
Doc. dr. Dalibor Savić

Reviewers:
Academician, Prof. emeritus dr. Mirko Pejanović
Dr. sc. Zsolt Molnár
Dr. sc. Dragan Brenjo
Dr. sc. Dario Kremer

Publishers:
C. A. Fondeko
University of Sarajevo, Faculty of Science

Translation:
Esma Botulja Burza, MA
Emina Mulabegović, BA
Cover photo: Sabina Daut
Design: Sabina Daut

CIP - Katalogizacija u publikaciji
Nacionalna i univerzitetska biblioteka
Bosne i Hercegovine, Sarajevo

574(497.6)

The STATE of traditional knowledge of biodiversity in Bosnia and Herzegovina
[Elektronski izvor] / Senka Barudanović ... [et al.] ; [translation Esma Botulja Burza, Emina Mulabegović]. - El. knjiga. - Sarajevo : Fondeko : Faculty of Science University, 2024

Način pristupa (URL):
file:///C:/Users/user/Downloads/The%20State%20of%20Traditional%20Knowledge%20of%20Biodiversity%20in%20Bosnia%20and%20Herzegovina.pdf. - Nasl. sa nasl. ekrana. - Prijevod djela: Stanje tradicionalnih znanja o biodiverzitetu u Bosni i Hercegovini. - Opis izvora dana: 31. 5. 2024. - Bibliografija: str. 135-149 ; bibliografske bilješke uz tekst.

ISBN 978-9926-8220-3-3 (Fondeko)
ISBN 978-9926-453-77-0 (Faculty of Science University)

1. Barudanović, Senka
COBISS.BH-ID 60233990

FOREWORD

Today, there is an increasing recognition of the value and contributions of Indigenous and local knowledge towards fostering and enabling sustainable development. Long before science became formalised, human societies developed the capacity for earth observation, knowing and naming their world and understanding our role in conserving precious natural resources. This publication brings an important part of this story to our attention, which is fascinating as it stems from a European example, where Indigenous and local knowledge is often overlooked.

Despite being primarily transmitted orally from one generation to the next, Indigenous and local knowledge has demonstrated its dynamism and adaptability in response to changing conditions and emerging challenges. With urbanisation and shifting of 'knowledge' into formal institutions, there is a growing risk that these complex systems of observation, taxonomies and systems-thinking that define Indigenous and local knowledge are at risk of disappearing. This underscores the relevance of this timely publication on the state of traditional knowledge in Bosnia and Herzegovina, which underlines the interconnectedness between people and their environment, culture, and livelihood.

This publication, supported by UNESCO's Local and Indigenous and Knowledge Systems (LINKS) Programme through the Biodiversity and Ecosystem Services Network (BES-Net), presents the current outlook on traditional knowledge in Bosnia and Herzegovina. It examines its history, meaning, utilisation, significance, and documentation while offering practical recommendations for preserving and revitalising traditional and local knowledge. This publication is a testimony to Bosnia and Herzegovina's rich traditional and local knowledge and diversity of cultural practices that have contributed to human well-being and sustainable use and conservation of biodiversity and ecosystem services.

I hope this publication will catalyse dialogues and partnerships between and among policy-makers, scientists, and knowledge holders. UNESCO is committed to supporting Member States and all knowledge holders in their efforts to ensure effective biodiversity policies and actions are informed by the multi-evidence approach, leveraging scientific, Indigenous, and local knowledge systems as envisioned by the Kunming-Montreal Global Biodiversity Framework and UNESCO's LINKS programme. This foreword invites us to honour and embrace intangible cultural heritage and Indigenous and local knowledge to forge a sustainable pathway through a cultural lens, not just for Bosnia and Herzegovina, but for the world at large. Next time you encounter an elderly person selling wild mushrooms, herbs, pickles or berries, talk about their great body of knowledge about nature and sustainability.

Lidia Arthur Brito
Assistant Director General,
Natural Sciences Sector,
UNESCO

ACKNOWLEDGEMENT

This publication was produced by the civil association FONDEKO as part of Bosnia andHerzegovina's National Ecosystem Assessment (NEA) led by the University of Sarajevo and supported by UNEP-WCMC through the NEA Initiative.

FONDEKO's 'Traditional and local knowledge research project for the Bosnia and Herzegovina NEA' was supported by UNESCO's Local and Indigenous Knowledge Systems (LINKS) Programme, which leads the Indigenous and Local Knowledge Support Unit for the Biodiversity and Ecosystem Services Network (BES-Net) initiative. The financial support for this research and the Bosnia and Herzegovina NEA was provided by the International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection of the Federal Republic of Germany.

The publication was co-published by FONDEKO and the Faculty of Science, University of Sarajevo.

FONDEKO

PSP BiH

UNIVERZITET U SARAJEVU PRIRODNO-MATEMATIČKI FAKULTET

In Partnership with:

unesco

UN environment programme WCMC

NEA NATIONAL ECOSYSTEM ASSESSMENT INITIATIVE

Supported by:

Supported by: Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection based on a decision of

IKI INTERNATIONAL CLIMATE INITIATIVE

LIST OF TABLES

LIST OF FIGURES

LIST OF IMAGES

PREFACE

The risk of losing traditional knowledge and practices was recognized in Bosnia and Herzegovina (BiH) soon after BiH's accession to the Convention on Biological Diversity. Already during the preparation of the first Strategy and Action Plan for the Protection of Biological and Landscape Diversity (BiH NBSAP 2008-2015), strategic goal B5 'Preservation of traditional knowledge and practices in BiH' was defined as one of the priorities.

In the second Strategy and Action Plan for the Protection of Biological Diversity (BiH NBSAP 2015-2020), with a good recognition of the wealth and potential of Bosnian-Herzegovinian traditional knowledge and practices, a specific goal was established: 'By 2017, establish centers for the preservation and implementation of traditional knowledge and practices, especially in rural areas of interest'. Special interest in the state and variety of traditional knowledge and practices in BiH arose through participation in the work of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). The platform strives to strengthen synergy between conventional scientific, and traditional and local knowledge, as well as emphasize their complementarity to support evidence-based decision-making. During the last decade, IPBES has been actively working on assessments that provide credible information on the state of biodiversity and ecosystem services at the global and regional levels, and their benefits to human, as well as recommending policy options for conserving and restoring them.

The global recognition of the need to carry out national ecosystem assessments enabled the launch of the project 'Assessment of the State of Nature and Natural Resources Management in Bosnia and Herzegovina'. With full organizational, technical and professional support and cooperation between the United Nations Environment Programme's World Conservation Monitoring Centre (UNEP-WCMC, Cambridge) and the University of Sarajevo, through financial support from the International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection of the Federal Republic of Germany, the Assessment seeks to determine the state of knowledge about biodiversity, nature's contributions to people (NCP), drivers of change, scenarios and options for management of nature in Bosnia and Herzegovina.

Traditional and local knowledge and practices comprise a large part of the available knowledge regarding nature and nature conservation in Bosnia and Herzegovina, but this essential form of knowledge is insufficiently recognized, utilised or preserved. The richness of traditional and local knowledge and practices in Bosnia and Herzegovina is proportional to the richness of the country's nature and biodiversity. In an effort to include traditional and local knowledge and practices in the 'Assessment of the State of Nature and Natural Resource Management', with the support of the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Programme for Local and Indigenous Knowledge Systems (LINKS) through its Support Unit on Indigenous and Local Knowledge for the Biodiversity and Ecosystem Services Network (BES-Net) initiative, the project 'Research on Local and Traditional Knowledge to Support the National Ecosystem Assessment' was launched in Bosnia and Herzegovina in 2022.

The aim of the research and of this subsequent publication is to assess the current state of traditional and local knowledge relating to nature and biodiversity in BiH. This research was carried out based on and guided by the IPBES approaches and best practices for working with Indigenous and local knowledge in ecological assessments (IPBES, 2017), which resulted in a large amount of information and knowledge.

This publication contains a part of the information and knowledge collected, compiled and synthesized, that relates to the state of traditional and local knowledge in Bosnia and
Herzegovina. The presentation of the richness and diversity of traditional and local knowledge in Bosnia and Herzegovina will be the subject of the next publication.

With sincere gratitude to all our collaborators in local communities, we hope that this
publication will initiate positive changes in the preservation of traditional and local knowledge of biodiversity in Bosnia and Herzegovina.

Authors

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

ABS	Access and Benefit Sharing
AGR	Animal Genetic Resources
APOSO	Agency for Pre-primary, Primary and Secondary Education
BD BiH	Brčko District of Bosnia and Herzegovina
BES-Net	Biodiversity and Ecosystem Services Network
BiH	Bosnia and Herzegovina
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
EC	European Commission
ESAP	Environmental Strategy and Action Plan
EU	European Union
EUNIS	European Nature Information System
FAO	Food and Agriculture Organization of the United Nations
FBiH	Federation of Bosnia and Herzegovina
FPIC	Free, Prior and Informed Consent
GI	Geographical Indication
GIAHS	Globally Important Agricultural Heritage Systems
GTZ	German Agency for Technical Cooperation (ger. Deutsche Gesellschaft fuer Technische Zusammenarbeit)
IKI	International Climate Initiative
ILK	Indigenous and Local Knowledge
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPR	Intellectual Property Rights
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IUCN	International Union for Conservation of Nature
NCP	Nature's Contributions to People
LINKS	Local and Indigenous Knowledge Systems
MAP	Medicinal and Aromatic Plants
NBSAP	National Biodiversity Strategies and Action Plan
PDO	Protected Designation of Origin
PGI	Protected Geographical Indication
PMF	Faculty of Science
RS	Republika Srpska
SDG	Sustainable Development Goals
TEK	Traditional Ecological Knowledge
TSG	Traditional Specialities Guaranteed
TK	Traditional Knowledge
UNBiH	United Nations in Bosnia and Herzegovina
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNDROP	United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas
UNEP-WCMC	United Nations Environment Programme-World Conservation Monitoring Centre
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPOV	International Union for the Protection of New Varieties of Plants
USAID	United States Agency for International Development
WIPO	World Intellectual Property Organization

1. INTRODUCTION

Image 1. *Traditional knowledge is part of the identity of the people in Bosnia and Herzegovina*

People all around the world have developed, nurtured and transferred across generations extensive and detailed knowledge of their environment, which has enabled them to survive and thrive in accordance with the capacities of the natural conditions in which they live. In the conditions of increasingly unpredictable environmental change and in the search for sustainable solutions for environmental management, there is growing recognition of the value of such accumulated folk knowledge.

According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) approach of recognizing and working with Indigenous and local knowledge, these forms of knowledge systems are generally understood as dynamic bodies of integrated, holistic, social and ecological knowledge, practices and beliefs referring to the relationship between living beings, including people, and their environment. Indigenous and local knowledge is established on a territory; it

is very diverse and continuously develops through the interaction of experiences, innovations and different kinds of knowledge - written, oral, visual, silent, gender-specific, practical and scientific. Such knowledge can provide information, methods, theory and practice for the sustainable management of ecosystems. Many Indigenous and local systems of knowledge are empirically tested, applied, contested and validated in different contexts (IPBES, 2017).

Although there is no universal definition of traditional ecological knowledge[1] , this term, often used today, refers, in simplified terms, to accumulated folk knowledge that has been acquired over hundreds or thousands of years through direct contact with the environment. Toledo (2002) and Berkes (2004) define traditional ecological knowledge as a set of knowledges, beliefs, traditions, practices, institutions and worldviews that have been developed and maintained by Indigenous, peasant and local communities in interaction with their biophysical environment. Finn et al. (2017) describe it as part of the total Indigenous knowledge, preserved through oral tradition, including arts, crafts, ceremonies and the cultivation, gathering and preparation of traditional foods.

In recent years, more comprehensive definitions have emerged in relation to traditional ecological knowledge. Molnár et al. (2008) define traditional ecological knowledge as locally embedded, empirical, based upon decades of personal experience with the surrounding landscape, acquired through hands-on management of the landscape, containing centuries-old communally stored experiences which are mostly independent of Western science and connected to rituals of social life. This definition is widely applied in today's research of traditional and ecological knowledge, especially in Europe (Sucholas et al., 2022).

For decades, the relevance and legitimacy of traditional and local knowledge have been questioned, whether because of deviation from the conventional scientific knowledge or because of limited understanding of its conceptualization by the public. With the increasing influence of conventional science, local and traditional knowledge is often neglected and disregarded, as archaic, irrational or superstitious.

However, according to IPBES (2013), the growth in interdisciplinary research in the last few decades has shown progress in overcoming these misconceptions. The contributions of Indigenous and local knowledge systems to the conceptualization of biodiversity and its sustainable use and management tend to be recorded in the scientific and grey literature in many domains: For example, in the preservation of biodiversity and management of wild animals (Freeman and Carbyn, 1988; Inglis, 1993; Berkes, 2012), regular management of marine resources (Johannes, 1978, 2002; Hickey, 2006; Haggan, Neis and Baird, et al., 2007), rural development and agroforestry (Falanruw, 1989), traditional medicine and health (Ford et al.,2010; Pourchez, 2011), impact assessment (Sadler and Boothroyd, 1994; Usher, 2000) and readiness and response to natural disasters (Shaw et al., 2008).

IPBES (2013) states the advantages of strengthening the synergies between Indigenous and local knowledge and conventional scientific knowledge. Advantages for the scientific community include:

- More comprehensive knowledge which interconnects information spanning acrossbiophysical, social and humanistic disciplines
- Historical data on a timeline which, in some cases, can span several generations;
- Localized and detailed observations on spatial and temporal scales that are sometimes inaccessible to Western science;
- Information from regions, sites and ecological systems that are still poorly known to Western science or where available spatial and temporal data is lacking or incomplete;
- Information and worldviews that present new knowledge or that challenge

1. In this report, 'traditional and local knowledge', 'traditional ecological knowledge', and 'Indigenous and local knowledge' are used synonymously.

hegemonic Western scientific thinking and representations; and,

- Observations on the maintenance and use of biodiversity by one of the main user groups.

On the other hand, there are also advantages for holders of Indigenous and local knowledge, which include:

- Possibilities for knowledge exchange which raise awareness of the value and contributions of Indigenous and local knowledge for the sustainable use and management of biodiversity including plants, animals, landscapes, etc.;

- Possibilities to strengthen sustainable use, including regular sustainable use, of biodiversity such as plants, animals, landscapes, etc., guided by Indigenous cultures, traditions and knowledge systems;

- Provision of new knowledge and innovative solutions to solve complex environmental challenges;

- Possibilities to reduce misconceptions about Indigenous and local knowledge and demonstrate the complementarity of diverse forms of knowledge, and in turn reduce existing knowledge gaps;

- Re-affirmation of their Indigenous and cultural identity, acknowledging their in-depth knowledge of biodiversity management, and strengthening bonds with their homelands and territories; and,

- Engagement in the co-creation of knowledge such as through ecological assessments and research, and in policy decision-making processes by recognizing that conservation decisions could have direct and indirect impacts on their lives and existence.

Finally, the strong synergy between scientific, Indigenous, and local knowledge systems could be useful for decision makers and ensure:

- Improved communication and knowledge exchange with the main holders and experts of knowledge on biodiversity and ecosystem services, including scientists, policymakers, and Indigenous and local knowledge holders;

- Improved decision making based on more comprehensive, up-to-date, relevant and consensual knowledge base; and,

- More successful implementation of decisions and projects on biodiversity conservation and management due to the direct and meaningful inclusion of Indigenous Peoples and local communities who are often familiar with and practice sustainable use of biodiversity and ecosystem services.

Today, traditional and local knowledge in Bosnia and Herzegovina offers an important and substantial knowledge base for supporting the planning and implementation of public policies directed at preserving, conserving and sustainably managing biodiversity and natural resources.

However, traditional and local knowledge in BiH is at risk of disappearing. Parts of this knowledge, such as, for example, knowledge on medicinal plants, has survived through the practice of folk medicine. Traditional and local knowledge on the use of wild species is mostly neglected. It should be pointed out that discussions with the local communities who participated in this research demonstrated a common desire to “return to nature”. However, at present traditional knowledge in BiH is underutilized in national planning and actions to protect the environment.

An analysis of the scientific literature on traditional and local knowledge related to the biodiversity in BiH can give insights into the richness of traditional and local knowledge, and also into the range of values and services associated with biodiversity. The existing literature on traditional and local knowledge in BiH mostly relates to certain geographic areas of BiH, and the majority of published materials have focused on ethnobotanics, especially medicinal flora. This is the first publication in BiH to assesses the value and role of traditional and lo-

cal knowledge in relation to biodiversity, as well as the current state of traditional and local knowledge in the country. To develop an up-to-date and robust knowledge base on biodiversity in BiH, it is necessary to conduct contemporary research which can inform us on the role and importance of biocultural diversity for supporting sustainable development.

Throughout history, traditional knowledge has been mostly used in nutrition, where, in addition to crops, numerous wild species have also been used (Palavestra, 1970; Fabijanić, 1976a, 1983, 1986/87a; Redžić, 2006, 2010a; Halilović-Šarić, 2010; Redžić et al., 2010; Redžić and Ferrier, 2014). Traditional heathy lifestyles, foods, and medicinal plants played an important role in people's balanced nutrition. The holders of traditional medicinal knowledge were herbalists, who were highly appreciated and acknowledged (Pelagić, 1879; Prajndleberger, 1900; Bratić, 1903, 1907; Steiner, 1903; Medić, 1904a, 1904b; Filipović-Fabijanić, 1964, 1970, 1971; Fabijanić, 1976a, 1976b, 1982, 1986-87b; Tucakov, 1978). With regard to plant species, it is worth mentioning the *sarači* or leather processors, who played an important role during the whole course of the development of the civilization due to their diverse knowledge of numerous plant species which served as tanning material or leather dye (Kreševljaković, 1927; Draškić, 1958).

Traditional medicine and food culture shaped people's nutrition and dietary practices, and the use of wild plant species. Today, however, wild medicinal and edible plants are mostly used as folk medicine, and this has been widely published in both historical and contemporary literature. It is estimated that about 256 different plant species were used to develop a range of herbal medicines; for example, henbanes were used as opiates (Tanović, 2010; Marčinković, 2011).

Today, bear's garlic and berry wild fruit are the most commonly used wild plants in nutrition. In the past, nutritious plants that were commonly consumed included wild edible plants, such as wild spinach, sorrel, primula and many other species which have been forgotten over time (Tanović, 2010). Trees and bushes with edible fruits are often used today, including hazelnut, sweet chestnut, dogwood, wild apple, wild pear and wild cherry (Jovanović, 2000).

However, wood as a material for making small household items has played a key role in the development and survival of society (Anđelić et al., 1966). For a long time, there were no restrictions on wood harvesting in BiH (Begović, 1960, 1978), which resulted in significant forest loss and degradation.

Historically, the traditional use of wild species in BiH has not been confined to the use of plants, but has also extended to animals and mushrooms. Wild animals and their products were the subject of regular use for their meat, hide or horns. The first hunting regulations and control were introduced with the arrival of the Austro-Hungarian monarchy in 1878. Before that, only the quantity of fur was the determining factor. That caused, for example, the extinction of beavers in BiH, as well as reduction of the mustelid population. On the other hand, traditional and local knowledge on the use and preservation of genetic diversity in farm animals should be mentioned; for example, the use and production of wool, milk and meat has a long tradition in BiH.

Also, different types of invertebrates, fish, birds and other groups of animals have played a role in the development and survival of society. Records on traditional craft practices which are on the verge of extinction today, refer to the use of plant and animal species.

Furriers *(ćurčije)* related to animal hide or skin removers *(sagrdžije)* and leather tailors *(kedžečijama)* processed the hide and fur of domestic animals. However, historical data show that among the exported products from BiH, there were furs of badger, rabbit, wolf, fox, golden marten, bear and deer (Pargan, 2016).

With the closure of the fur trade exchange in Europe – the Budapest Stock Exchange– the export of furs of wild animals stopped. At the time, part of Visoko town was the fur processing centre. In order to process fur, it was necessary to procure tanning mate-

rials, which were obtained from the bark, fruits and leaves of certain species. The most commonly used types of bark came from oaks, chestnuts, alders, willows, sumac and other species that contained tannic substances. The bark was used for different coloured leather dyes including red, brown, yellow, grey and black (Jovanović, 2000).

Until the end of the 19th century, there was no industrial production of detergents or raw materials for glass. Raw materials were obtained in various ways from forests. At the time, ash collectors were well known. They obtained ash from Turkey oak and used it to make hygiene products and silicon oxide as raw materials for glass production. In addition to ashes, they boiled Turkey oak to produce a foam that was used as a raw material for hygiene products. Tanners were resin collectors and processors connected to the pine forests of the Krivaja River valley, Konjuh Mountain and Višegrad area. In addition to collecting the resin, they made lanterns and wicks for burning and lighting in place of candles (Begović, 1960). Special attention was paid to the production of charcoal, and this tradition dates back to the Roman period and medieval Bosnia. Back then, charcoal makers used hardwoods to produce charcoal, and this tradition has been maintained to this day (Begović, 1960).

Mushrooms also had important nutritional qualities in the diets of the population. The number of mushroom species used by the general population was very small, ranging from 20 to 30 species, whilst experienced mushroom pickers tended to harvest more species. In addition to being consumed in diets, mushrooms have also been used for medicinal purposes, including in opiates (Uščuplić, 2004; Tanović, 2010).

From the above review, it can be concluded that the diversity of indigenous flora and fauna has played a very important role in the development of society and culture in BiH and shaped the lives of the population throughout history. Perhaps this role was even more significant than in Central and Western Europe due to historical reasons, considering the position of BiH at the crossroads of cultures and other influences. In BiH, there has been a noticeable reduction in the use of local plant and animal species in the last hundred years, largely due to industrialization and more recently as a result of the intensive depopulation of rural areas. Also, many old crafts that used plant products, especially those that relied on wood forest products, are disappearing. However, traditions and knowledge have been partially preserved through folk medicine and are still present today.

Historical records imply that harvesters only collected moderate quantities of natural resources from the local environment in order to ensure a sustained source of income. Pargan (2016) writes about this in his work, where he noted that the collectors of the green-winged orchid tubers returned one tuber to the ground and took the other. In this way, they ensured its restoration and use in the following seasons. The sweepers had similar practices, shaking off the seeds when collecting sorghum, thus ensuring harvest in the following season.

Unfortunately, findings show that some plant species, such as mushroom species, diminished due to systematic harvesting to meet societal demand. Endangered mushroom species in the country include girolle, morels and Caesar's mushroom. Some of the species facing the threat of extinction include yellow gentian, cowleek and Icelandic lichen.

Although there have been cultural traditions that regulate the use of biodiversity and ecosystems, this form of traditional knowledge is barely documented. Today, information and evidence about traditional practices have already been lost and it is very difficult to recover, reconstruct, restore and document the lost knowledge and practices. The few sources of information that do exist are fragmented and incomplete. This publication will, at least partially, show the available and practiced traditional and local knowledge and assess available potential and opportunities for transferring this knowledge to the younger and new generations.

1.1. Administrative-territorial organization of Bosnia and Herzegovina[2]

Bosnia and Herzegovina is a complex state, which, according to the General Framework Agreement for Peace in Bosnia and Herzegovina, consists of two entities: the Federation of Bosnia and Herzegovina, covering 51% of the territory, and Republika Srpska covering 49% of the territory. The area of Brčko, which was the subject of a dispute and international arbitration, was declared a district, thus the state of Bosnia and Herzegovina consists of the two entities and the Brčko District. Entities have their own constitutions, which are required to be in harmony with the Constitution of Bosnia and Herzegovina.

Entities

The Federation of Bosnia and Herzegovina consists of ten cantons which are further administratively divided into municipalities. They are Una-Sana, Posavina, Tuzla, Zenica-Doboj, Bosnia-Podrinje, Central Bosnia, Herzegovina-Neretva, West-Herzegovina, Sarajevo and Livno Canton (Canton 10). The legislative power consists of the Parliament of the Federation of Bosnia and Herzegovina, which consists of the House of Representatives and the House of Peoples. Executive power is exercised by the president and two vice-presidents of the Federation of BiH, as well as the Government of the Federation of BiH. The capital of the Federation of BiH is Sarajevo.

Republika Srpska is administratively divided into regions, namely Banja Luka, Doboj, Bijeljina, Pale and Trebinje, and the regions are further divided into municipalities. Legislative power is exercised by the National Assembly of Republika Srpska and the Council of Peoples. Executive power is exercised by the president and two vice-presidents of Republika Srpska, as well as the Government of Republika Srpska.

The territory of Brčko, which was under arbitration, did not belong to the Federation of BiH or Republika Srpska, but was placed under the administration of the state of Bosnia and Herzegovina as a separate district at the end of the year 2000 by the decision of the International Arbitration Commission for Brčko. The Brčko District has its own multi-ethnic government with an elected assembly, executive committee, judiciary and police force.

1.2. Climate characteristics of BiH[3]

Bosnia and Herzegovina has a largely moderate continental climate in the northern and central areas, a sub-mountainous and mountain-type climate at altitudes above 1,000 m, and an Adriatic, Mediterranean and modified Adriatic type of climate on the Neum coast, which also applies to lower Herzegovina. For the reasons mentioned above, the climate of Bosnia and Herzegovina varies from moderately continental in the northern part of the Pannonian Plain along the Sava River and in the foothills, to an alpine climate in the mountainous regions, and a Mediterranean climate in the coastal area and the area of lowland Herzegovina in the south and southeast. In the northern part of the country, the average air temperature varies between -1 and -2°C in January and between 18 and 20°C in July. At altitudes above 1,000 m, the average temperature varies from -4 to -7°C in January, and from 9 to 14°C in July. On the Adriatic coast and in lowland Herzegovina, the air temperature varies from 3 to 9°C in January, and from 22 to 25°C in July (period 1961-1990). Extreme temperatures of -41.8°C (low) and 42.2°C (high) have also been recorded.

The lowland areas of northern Bosnia and Herzegovina have a mean annual temperaturebetween 10°C and 12°C, and in areas above 500 m, the temperature is usually below 10°C. The mean annual air temperature in the coastal area is between 12°C and 17°C. In the period 1981-2010, an increase in temperature was recorded in the entire territory of Bosnia and Herzegovina. The biggest increase was during the summer

2. This section has been reproduced from the relevant government documents available at: https://www.mvp.gov.ba/dobro_dosli_u_bih/drzavno_uredjenje/administrativno_teritorijalno_uredjenje/?id=265

3. This section has been reproduced from the relevant government documents available at: http://www.unfccc.ba/site/pages/karakteristike_klime.php

and winter period with an approximate temperature rise of 1°C.

Annual rainfall varies from 800mm in the north along the Sava River to 2,000mm in the central and southeastern mountain regions (period 1961-1990). In the continental part of BiH, which belongs to the area of the Danube River basin, the majority of the annual precipitation occurs in the warmer half of the year, reaching its maximum in June. The central and southern part of the country, with numerous mountains and narrow coastal areas, is characterized by a modified Mediterranean pluviometric regime under the influence of the Adriatic Sea, so that monthly maximum amounts of precipitation occur in late autumn and early winter, mostly in November and December. In the period 1981-2010, in the greater part of lower Herzegovina, a decrease in precipitation was recorded on an annual basis, while an increase in precipitation was recorded at most mountain weather stations. Compared to the period 1961-1990, in this period there was a more uneven distribution of precipitation during the year, which is one of the main factors that cause more frequent droughts and floods.

The duration of sunny periods decreases from the coast towards the interior and towards higher altitudes. The annual sum of sunshine hours in the central mountain area is 1,700-1,900 hours, which is a consequence of above-average cloudiness of 60-70%. Due to frequent fogs during the cold period of the year, solar radiation in the interior is lower than at the same altitude on the coast. In the southern parts, we have 1,900-2,300 hours of sunshine (Mostar = 2,285 hours). In northern Bosnia and Herzegovina, the number of sunny hours is 1,800-2,000, more in the eastern part than in the western part. Cloudiness decreases from west to east.

The average annual precipitation in BiH is about 1,250 mm, which, considering that the area of BiH is 51,209 km 2 , amounts to 64 x 109 m 3 of water or 2,030 m 3 /s. Runoff from the territory of BiH is 1,155 m 3 /s or 57% of the total amount of precipitation. However, these amounts of water are not equally distributed, spatially or temporally. For example, the average annual runoff from the Sava River valley, whose catchment area is 38,719 km 2 (75.7%) in BiH, is 722 m 3 /s or 62.5%, while the runoff from the Adriatic Sea valley, which has an area of 12,410 km 2 (24.3%) in BiH is 433 m 3 /s or 37.5%.

2. HISTORICAL INFORMATION ON THE TRADITIONAL USE OF BIODIVERSITY IN BOSNIA AND HERZEGOVINA

Image 2. *Ilustration*

The world population is in a period of great social and economic turbulence, characterized by the rapid development of technologies. As well noted, economic development in the last few centuries has, for the most part, occurred at the expense of nature.

It is widely recognized that new lifestyles, including an accelerated pace of life, has led to the loss of essential traditional and local knowledge that humankind acquired by living for a long time in accordance with the carrying capacities of the local environment. According to Filipović (1958, 1962) this loss is much smaller in the countries of Western Europe because, unlike in BiH, the transition to new lifestyles was gradual.

Globally, changes in social and economic development began with the industrial revolution in the 18 th century. During this time, changes in the development and use of traditional and local knowledge and practices began to occur. With time, the place of traditional products was tak-

en over by industries as products became cheaper and more accessible to everyone.

Today, in the post-industrial age and the age of artificial intelligence, traditional and local knowledge is at risk of disappearing. Nevertheless, despite everything offered by the modern standard of living, existing traditional knowledge is irreplaceable, which is why the return to nature is increasingly noticeable. That process in BiH requires reminding stakeholders of essential forgotten skills and knowledge about biodiversity and its use, including knowledge of ethnology (Filipović, 1958). Therefore, mobilizing traditional and local knowledge first requires a detailed insight into the available historical literature.

Traditional and local knowledge is closely connected to biocultural diversity. As growth in the production of cheap industrial products occurred, traditional knowledge, crafts and practices were lost at an increasingly rapid rate (Muderizović, 1929; Draškić, 1958; Stanić, 1967; Kulenović, 1985; Mileusnić, 1986/1987). As a result, the demand for various raw materials that were used in craft making ended, which led to the loss of knowledge regarding the origin of the materials used for making these crafts. This was the case for many useful herbaceous plants such as wild edible plants, cowleek, sumac; wild fruit trees such as pedlar and sorb tree; products made from various types of wood such as holly wood for inlays, Bosnian maple for instruments; and animal products and parts including hide, horns, parts of bones and shells, etc.

In contrast to other parts of Europe, today it can be claimed that the rural population in BiH has been nurturing traditional and local knowledge of biodiversity for a long time. Usually, traditional and local knowledge is closely connected to nature, and as a result, the transition to urban living was difficult. BiH was isolated from the rest of Europe for several years, so traditional and local knowledge was preserved in its original form. Until the beginning of the 1950s, all basic life needs were met from nature through small-scale craft and guild production (Kreševljaković, 1927; Beljaškić-Hadžidedić, 1972/73; Kulenović, 1985), but also through the direct use of natural resources for medicinal treatment and nutrition. BiH was a country with a large rural population until the end of the 1960s. As a result of an introduced policy of moving the population to cities and engaging them in industrial activities, the use of traditional and local knowledge dwindled and, in some cases, it disappeared or remained on a smaller scale. For the most part, the knowledge related to herbal treatment has been preserved, and has been widely documented in literature (Pelagić, 1879; Prajndleberger, 1900; Bratić, 1903, 1907; Steiner, 1903; Medić, 1904a, 1904b; Fabijanić, 1976b, 1982, 1986-87b; Filipović-Fabijanić, 1964, 1970, 1971), as well as preserving traditional fruit products (Ilić, 1972/73).

In addition to the direct use of biodiversity to meet people's basic needs through numerous plant species, there was a strong connection between nature and the spiritual needs of the local population (Protić, 1898a, 1898b; Pichler, 1902; Mazalić, 1932, 1934; Ballian and Kraigher, 2021). Certain types of plants and animal parts have been used as spiritual mediums in the past. Others, for example, were used as a sign for girls ready for marriage or those who are about to get married, as is the case with the i*mmortelle* in Herzegovina (Džubur, 2017).

However, as already mentioned, in the last few decades, there are increasing efforts to revive, restore and preserve traditional and local knowledge, especially that related to nutrition (Redžić, 2006, 2010b; Redžić et al., 2010; Redžić and Ferrier, 2014) and treatment (Tucakov, 1978). In recent times, a special branch of science called ethnobotany has been developing that investigates plants from the aspect of socio-cultural and economic benefits to people (Behxhet et al., 2012; Dajić Stevanović et al., 2014; Ferrier et al., 2015; Rexhepi et al., 2018; Łuczaj et al., 2019; Krželj and Vitasović-Kosić, 2020). Redžić made special contributions to this science in BiH, both through academic publications (2006, 2007, 2010a, 2010b, Redžić and Ferrier 2014), and through the popularization of scientific knowledge in the TV series *Prirodna baština Bosne i Hercegovine* (Natural Heritage of Bosnia and Herzegovina).

In the past, there were numerous crafts that were related to products or semi-products obtained directly from nature and were used for further processing in small craft factories (Krešević, 1927; Muderizović, 1929; Draškić, 1958; Stanić, 1967; Kulenović, 1985; Mileusnić, 1986/87). The use of plants and wild animals as raw materials in small quantities did not cause excessive exploitation of natural resources. For the society at that time, the priority was industrialization and not the continuity of diversity of crafts

2.1. Short overview of tradition al knowledge, occupations and practices in Bosnia and Herzegovina

Use of plants

The history of the use of edible and medicinal plants, animals and mushrooms in Bosnia and Herzegovina dates back to ancient times, through the Roman and Byzantine eras, the Middle Ages, the Turkish and Austro-Hungarian periods and continues to this day (Anđelić et al., 1966). Along with the use of edible and medicinal plants from the fields and forests throughout BiH, numerous folk customs have developed. Many of them have their origins in polytheistic and monotheistic religions that were practiced in this area. The development of the traditional use of plants for healing in this region was also influenced by other cultures. For example, the Turkish conquerors transferred here the knowledge of the use of herbs from the Arabs and Iranians. Later, in the 19 th century, Austro-Hungarian, Jewish and other Central European influences arrived. The value of today's traditional and local knowledge about the use of plants in BiH is greater precisely because of the diversity of knowledge that contributed to its formation.

In BiH, numerous archaeological findings of plant motifs (Anđelić et al., 1966), from the Neolithic, through Antiquity to the Middle Ages, speak of the importance of plants. The first literary data can be found in medicinal books, some of which are written in manuscript. The oldest medicinal books, also containing a list of plants and methods of treatment, date back to the 17th century (Karamatić, 1984; Nikić, 2004; Brkić Midžić, 2017). The most famous is the medicine book from Plehan, which was probably written in the second half of the 19th century under the title *Zbirka lijekova sa zbirkom ljekovitih trava i uputom za pravit meleme i murćefe* ('Collection of medicines with a collection of medicinal herbs and instructions for making salves and tincture'). The original manuscript was kept in the archives of the Franciscan monastery in Plehan (Kujundžić et al., 2006).

Among the important professions related to the traditional use of plants in BiH, herbalists or traditional healers (*hećimi*) are of particular significance. They were collectors and processors of medicinal plants, which is well documented (Pelagić, 1879; Prajndleberger, 1900; Bratić, 1903, 1907; Steiner, 1903; Medić, 1904a, 1904b; Filipović-Fabijanić, 1964, 1970, 1971; Fabijanić, 1976a, 1976b, 1982, 1986/87a, 1986/87b). This tradition, unlike many other traditions related to the use of biodiversity, is still relevant in modern medicine (Fabijanić, 1976a, 1982, 1986-87a; Tucakov, 1978). In the past, this knowledge was passed down 'from generation to generation', and there were entire families that were engaged in medicinal practices throughout the centuries. It should be noted that many inhabitants of BiH still use traditional medicinal practices in addition to readily available industrial pharmaceutical products. This is evidenced by numerous herbal pharmacies, as well as manufacturers of herbal products. At that time, herbalists collected and processed about 260 different plants. They used them to make herbal mixtures, tinctures and creams for about 60 different ailments. Plant species such as *immortelle* (Džubur, 2017), lavender, rosemary and others are also used for making essential oils and have great spiritual and social values.

In addition to medicinal plants, some plants have been used for nutrition (Redžić, 2006, 2010b; Redžić et al., 2010; Redžić and Ferrier, 2014). *Salebji*, craftsmen and sellers of the drink known as salep, still practice the production of the drink to this day. This drink originates from the Middle East and was brought to BiH with the arrival of

the Ottoman Empire in BiH (Kreševljaković, 1927). *Salep* is a non-alcoholic drink prepared from the powder obtained by drying and grinding the tubers of some types of orchids which grow in BiH. The production of *salep* in BiH has adapted to the climate, so the tuber of the ordinary green-winged orchid (*Orchis morio* – "kaćun" in local language) is used to obtain the powder. Given that this plant is protected today and is on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the original *salep* can rarely be found on sale as an original domestic product. As the green-winged orchid has two tubers, the experienced collectors of this plant usually take both out of the ground, tear one off, and return the other to the ground with the plant. In this way, they ensure the continued supply of tubers (Pargan, 2016). Also, throughout history, forest fruits have been used as an important source of food. Thus, many remains of forest fruits and other seeds were found in archaeological excavations. Those fruits were preferred in the New Stone Age by the inhabitants who lived in the stilt house settlements of western and northern Bosnia. Several wild fruit seeds were found in the stilt house settlements of Ripča and Donja Dolina (Maly, 1904; Benac, 1951).

The craft of broom making was extremely developed in the north of Bosnia in the plains, where brooms are made from sorghum, which grows like corn. Brooms were also made in central Bosnia, and towards the south from ruscus or wintergreen, which were tied in the same way and could last a long time. For rougher work, for stables and outdoor use, birch brooms were made from birch branches (Pargan, 2016).

In addition to tarpaulins and carpets, rugs were used to cover the floors in more modest households. They were made from plant material from wet marsh habitats. These artisans were known as *hasuraši* or *rogožari* - carpet weavers. The original name is from the word *rogoz* - bulrush, the plant used to weave rugs. They made mats that were mostly used for covering floors (Pargan, 2016), but also for outdoor seating, covering, partitions, roofing, etc.

Some plants were used to produce fabrics, primarily linen, hemp, but also nettle. Unfortunately, today there is practically no artisanal production of these types of fabrics using traditional practices, because, with the exception of linen, they have been replaced by industrial cotton fabrics (Anđelić et al., 1966; Beljaškić-Hadžidedić, 1966; Bajić, 1983, 1985).

The tradition of nomadic herding is related to the use of the pasture ecosystems of Bosnia and Herzegovina. There are archaeological findings from the Neolithic period about extensive nomadic herding. Popović (1929a, 1929b, 1931, 1932, 1933a, 1933b, 1935, 1936, 1938, 1939), who describes the summer dwellings of herdsmen in the mountains of Bosnia and Herzegovina, talks about the importance of extensive herding and knowledge of mountain meadows suitable for grazing.

Some types of herbaceous plants have also been used in the construction of old buildings. For example, some types of grass and cereal residues were used in the production of mudbrick (Čaušević and Rustempašić, 2014). They were useful for binding clay and developing solid and elastic building material (Bugarski, 1974; Čaušević and Rustempašić, 2014). Historically, sawdust of soft or hard wood was also mixed for the same purposes. Rye or barley straw was used to cover buildings in high mountain areas of Bosnia and Herzegovina (Bugarski, 1967, 1988/89), while reeds were used in lowland areas along large rivers (Bugarski, 1974, 1976). Reed was also used in interior decoration, and mortar was applied over it after masonry. For the same purpose, ferns were used, especially *boujad*, while mosses on the walls were used to insulate buildings (Bugarski, 1974).

Plants were often the inspiration for decorating clothing and other items, and very often one can find modified motifs of various flowers, for example, on woollen items, such as carpets, folk costumes, woollen socks, etc. (Čulić, 1962, 1963, 1964; Vladić-Krstić, 1970, 1976, 1977, 1978; Beljkašić-Hadžidedić, 2002).

Use of wood

Substantial traditional and local knowledge about the use of wood, not only as a building material but also for the production of household and art objects, has been preserved until today (Bugarski, 1964, 1967, 1970, 1971, 1972/73, 1976, 1979, 1980/81, 1983, 1986/87, 1988/89, 1990, 1991, 2008). Wood as a building material in BiH from the Neolithic to the Middle Ages can best be seen in the work *Kulturna povijest BiH* ('Cultural History of BiH') (Anđelić et al., 1966). Research on this was carried out by Popović in the mountains throughout BiH (1929a, 1929b, 1931, 1932, 1933a, 1933b, 1935, 1936, 1938, 1939), and by Bugarski (1964, 1967, 1970, 1971, 1972/73, 1976, 1979, 1980/81, 1983, 1986/87, 1988/89, 1990, 1991, 2008). Wood has been an indispensable material for builders in BiH throughout history. In a more recent monographic work, Bugarski (2008, 2009) deals precisely with the rural architecture of BiH, where wood plays a major role, both in the construction and in the addition of indigenous residential buildings. Numerous sacral objects are, in the traditional way, also built of wood, and are characterized by elements specific to certain regions (Momirović, 1953, 1956; Fočo, 2014). Today, these natural materials are being replaced by materials used for large-scale industrial purposes. The traditional old architecture is disappearing, together with the loss of traditional and local knowledge about their construction. Old traditional buildings were often built without the use of nails and screws, which required the old masters to know the technical properties of different types of wood.

In the past, wood was the basic building material for centuries, and entire settlements were built from wood. Stilt house settlements on the big rivers in BiH - Una and Sava - were built from wood (Anđelić et al., 1966). The reason for this is that humans realized very early on that they could work wood with stone tools, and later with the making of bronze tools, it became even easier and simpler. A little later, residential areas became more complex in their construction, and stone was increasingly used in building on account of being strong and durable. Thus, wood did not lose its importance, but began to be combined with stone. This is how the carpentry craft developed and has survived to this day. Over time, a lot of traditional and local knowledge related to carpentry was lost. In his books on traditional Bosnian architecture, Bugarski (2008, 2009) points out some particular carpentry skills that have been lost today. In mountainous areas, the soft wood of conifers and some soft broad-leaved trees were used, while in hilly and plain areas, hard-leaved wood, mostly oak, was used for building. In this way, traditional and local knowledge about wood and building with wood, as well as knowledge about the best use of different woody species, were developed (Jovanović, 2000).

Dishes were also made from wood. Wooden bowls called *čanak* were made of soft wood, and containers for long-term storage of food and drinks were made of hard wood. Also, containers for the transport of agricultural products were made in the form of tubs, barrels and other such containers. Some items were made for everyday use, from wooden plates to wooden spoons, as well as glasses and jugs called *bukara*, which were made from spruce. The masters of that time knew how to choose quality material, and each type had a specific use value.

Wood was also used to make musical instruments. Thus, makers of *gusle*, a single-string instrument, used maple, white pine, pear, walnut and aspen as the basis of the instrument. Horsehair was used for strings. Also, for a good *gusle*, it was necessary to choose a good, tanned sheep or goat skin, and sometimes the skin of wild animals. To produce other instruments such as *shargies* or *saz* which are both types of lute, tambourines and little tambourines, narrow-grained spruce wood was used, which gave the instrument specific acoustics (resonance wood). Today, unfortunately, there are fewer and fewer crafts people making traditional instruments.

Wood was also used for hygiene purposes, such as ash that was used to make laundry detergent. On the other hand, in the southern regions, ash, which was rich in silicon, was collected and served as a raw material for the production of glass and gunpowder. To produce that ash, rather

than burning a certain type of tree, entire forests were burned, and then a specific type of ash was collected from the fire site. In addition to ashes, the ash collectors also boiled turkey oak. The foam obtained during cooking was used for making soap. Few local people practiced this craft, so masters came from abroad (Zubić, 1930; Begović, 1960).

Katranari or tar workers collected resin in pine forests, most often in the Krivaja valley, and in the area of Teslić and Višegrad. The resin was broken down into smaller pieces by boiling. The processed raw material was used in construction as insulation and for the protection of wood, but also in the pharmaceutical industry. In addition to resin collectors, there were also *lučari* or kindling wood makers working in the pine forests who made torches for lighting fires and cheaper wicks for lighting to be used instead of expensive candles (Begović, 1960).

The production of charcoal, a natural resource derived from wood, has also been a prominent traditional occupation in BiH's history. The tradition of charcoal production is related to iron processing, which dates back to Roman times. Iron processing became more prevalent in the Middle Ages with the arrival of the Saxons, who raised production and mining to a Europe-wide scale at the time. In addition to this, the production of wood charcoal has been developed using particular methods which are still used in central Bosnia to this day. Producers of wood charcoal use hard-leaved wood, such as beech, oak and hornbeam, of a certain maturity and at specific times of the year to obtain the largest amount of wood charcoal from the production process (Begović, 1960). The wood is cut in the winter and stacked as firewood. Wood is also used for the construction of fire pits and for burning certain kinds of moss, and lichens are used as a plant cover under the protective mantle of the fire pit.

Basket makers traditionally used wood to make wooden accessories from willow and young hazel branches. Basket making is a centuries-old tradition in BiH, in which younger shoots from wicker willows are dipped in water and dried to a certain extent in order to obtain flexibility (Pintarić et al., 1985). The very tradition of basket weaving in the traditional way has survived even today in Bosanska Posavina, around Orašje and Pelagićevo. However, in contrast to the old techniques of collecting shoots from wicker, since the 1970s, hybrid willow shoots are used (Ballian and Baotić, 2012). This is more suitable for making larger woven pieces including as part of furniture. In addition to household haberdashery, fishing nets were also knitted from willow branches.

Traditional wood carving for producing furniture, objects and art has a special craft and artistic value in BiH (Kazazić, 1937; Čelić, 1976; Mulić, 1985; Miličević Sečić, 2021). Whilst other craft practices have become less common over time, this traditional practice has been preserved in the area of Konjic until today. Carpentry is one of the oldest living trades in BiH, and records show that traditionally crafted wooden items can be found widely in BiH (Karanović, 1937).

Today, some of BiH's forgotten crafts are being revived, especially through small and medium-sized enterprises.

There are a number of challenges and opportunities related to traditional woodcraft practices in BiH. In commercial industries, there is low willingness to diversify the business portfolio (Avdibegović, 2006) to include traditional and contemporary knowledge about forest products. Within the forestry sector, there are more possibilities for the inclusion of traditional and local knowledge in the development of secondary forest products, which could partially help to preserve traditional and local knowledge. In particular, this could involve knowledge and practices related to resin collection, ash removal, collection of medicinal plants, mushrooms, and the production of traditional wooden accessories.

Use of wild animals

Records show that one of the earliest human activities was hunting. Stone and wood were initially used for mak-

ing hunting weapons and tools. Over time, parts of wild animals were also used as weapons, mostly horns or parts of bones (Anđelić et al., 1966; Bešlagić, 1979). Hunting originated as a means to find food and later animal products provided hides for clothing. In later periods, aside from being a practice for collecting meat and fur, hunting became a pastime, as shown in the illustrations in Bosnian *stećci* or tombstones.

The processing of the hides of hunted animals requires the use of certain plants, the chemical composition of which makes the hides soft and therefore easier to create clothing items from. These are plants rich in tannins, and the bark of oaks and sweet chestnuts were most commonly used. With the development of tannery throughout history, craftsmen also invented substances of plant origin that enabled dyeing of hides and furs. Thus, the bark of alder and sumac was used for a reddish colour, and hazel bark for a yellowish colour (Riter-Studnička, 1958; Jovanović, 2000).

In addition to hides, game bones and horns were processed to make numerous small practical household items or ornaments. Mouthpieces, buttons and combs were usually made from the horns. Horns of antlers were used to make containers for *belegija*, part of mowing equipment, as well as cups and combs. These items were prominent in trading because of their high utility value. However, these practices are no longer in use today.

Fishing as a craft was linked to the larger rivers in BiH. Today, unlike in neighbouring countries, this trade has completely disappeared in BiH, and only one professional fisherman works on the Sava River. This used to be a highly valued occupation, as there was a constant demand for fish, especially during holidays and fasts. Dragičević (1909) and Čurčić (1912, 1915a, 1915b, 1916) wrote about this traditional occupation and the harvesting of diverse fish species from rivers and lakes, as well as the techniques used for catching and processing different types of fish. They also describe the materials and tools used in these traditional fishing practices, including some types of trees and plants which had important uses for making tops, nets, and poles for fishing.

In addition to fishing, shells found along the rivers were also used as a material in traditional craft practices. Shellfish harvesting as a trade no longer exists in BiH or neighbouring countries (Tadić, 1956). It is known that Sava shells were harvested, particularly those with a lot of mother-of-pearl. Very attractive buttons were made from these shells, or they were used for making inlays in wood for carved furniture, butts of hunting weapons, handles of old pistols, and more. The production of mother-of-pearl buttons lasted until 70 years ago (Tadić, 1956), but today it is extremely rare in BiH and elsewhere.

Use of mushrooms

Throughout history, mushrooms have had an important place in the diet of the population, as well as in medicine (Uščuplić, 2004; Redžić et al., 2010; Tanović, 2010). However, due to poor knowledge of the different species of mushrooms, people were often poisoned by them. In spite of this, mushrooms and lichens played a special role in the diets and treatment of people during the war events of 1992-1995, as Redžić (2012) writes. Very little is known about mushrooms with medicinal values in BiH. In addition to edible mushrooms, earlier collectors could identify those mushrooms with medicinal properties and those that could be used as opiates like Satan's mushroom which were mostly avoided (Uščuplić, 2004; Tanović, 2010).

Use of stone

Stone is one of the first resources that humans used from the environment. Weapons and tools for tilling the soil and other products were made from stone. Later, dwellings, temples and even fortified palaces were built of stone (Anđelić et al., 1966). Even today,

stone is an object of human interest, but in many cases, it has been replaced by industrial products. Many traditional occupations involve the processing of stone to make items that were used for processing other natural resources. For example, stone tools for sharpening scythes and axes, i.e., *belegija* was used for mowing (Pavković, 1958), or for grinding grain. Water wheels were made of two types of stone, solid stone such as shale limestone and porous stone, mostly metamorphic rock which wears out over time. Also, traditional and local knowledge and practices for constructing stone buildings were used, as described by Bugarski (1990).

3. EARLIER RESEARCH ON TRADITIONAL KNOWLEDGE OF BIODIVERSITY IN BOSNIA AND HERZEGOVINA

Image 3. *Hawthorn, Crataegus monogyna Jacq. (Photo: Ballian, D. 2022)*

By reviewing the research on traditional and local knowledge in Bosnia and Herzegovina, it can be concluded that many areas and localities have preserved a lot of knowledge about the way natural resources are traditionally used, especially when it comes to medicinal plant species, mushrooms and other resources which provide benefits to people. Due to the diversity and wide dispersal of existing knowledge and the large number of toponyms, the data in this publication are presented according to the regions of BiH: northern, eastern, western, southern and central areas of Bosnia and Herzegovina.

The broadest systematic presentation of the use of medicinal plants in traditional practices and treatment in BiH was presented by Redžić (2006), who in the period 1990 -2010 published a large number of works in which he investigated the traditional use of plants. A significant diversity of medicinal and edible flora was noted in the Mediterranean and sub-Mediterranean belt of BiH, which consists of over 60% of

endemic plant species out of a total of 450 registered (Redžić, 2006). In the last 25 years, several studies on the use of medicinal plants through traditional practices have been carried out in BiH. In the period 2000-2004, the research conducted in the wider area of BiH showed the use of 308 plant species that are used daily in nutrition and treatment. According to their different uses, the edible wild species are classified into four basic groups: vegetables, fruits, bread plants and spices. Wild vegetables dominate this spectrum. Garden plants include tuberous vegetables with leaves and flowers. The most common species in this group are: *Urtica dioica, Tussilago farfara, Taraxacum officinale, Allium ursinum, Chenopodium bonus-henricus, Amaranthus retroflexus, Portulaca oleracea, Malva sylvestris, Oxalis acetosella, Rumex acetosa, R. patientia, Cichorium intybus, Epilobium angustifolium, Primula sp., Campanula pyramidalis, Crithmum maritimum, Nasturtium officinale, Alchemilla sp., Brassica sp., Pastinaca sativa, Picea abies, Polygonum bistorta, Pteridium aquilinum, Salicornia herbacea, Sanguisorba minor, Silene sp., Stellaria media* and *Valerianella locusta*.

Wild fruit plants comprising 17% of the range of edible wild species can be found in almost all climatic belts and produce fruit throughout the year. Some of the more significant species of this group are: *Arbutus unedo, Celtis australis, Cornus mas, Rosa sp., Crataegus sp., Cotoneaster sp., Sorbus sp., Fragaria sp., Rubus sp., Juniperus communis, Malus sylvestris, Pyrus pyraster, Morus alba, Prunus avium, P. spinosa* and *Vaccinium myrtillus*. There are only few plants from which flowers are used, around 16%, and some of them are: *Fagus sylvatica, Castanea sativa, Quercus sp., Corylus sp., Asphodelus albus, Lilium martagon, Orchis sp., Ornithogalum umbellatum, Phragmites australis, Polypodium vulgare, Trapa natans* and *Paliurus spina-christi*. Spice plants which have certain nutritional values comprise 13% of the edible wild species in BiH. The most important ones are: *Laurus nobilis, Capparis spinosa, Carum carvi, Daucus carota, Geum sp., Hyssopus officinalis, Melissa officinalis, Origanum vulgare, Salvia officinalis, Satureja sp., Thymus sp. and Viola sp.* In addition to their use as spices, most of these plants are used in ethnotherapy.

The most commonly used parts of these plants are their young juicy shoots, fruits, young leaves, and roots. Wild edible plants are used to prepare various nutritional dishes, the most common of which are cooked dishes, fresh salad, stews and bread, as well as fresh fruit and drinks. These wild edible species can be attributed to 74 plant families, predominantly: Rosaceae, Compositae, Labiatae, Cruciferae, Liliaceae, Leguminosae, Polygonaceae and Apiaceae.

Useful plant species belong to different vegetation units, 46 in all, and can be found in different types of ecosystems. Among them, the majority of plant species belongs to the vegetation of the orders *Arabidetalia flavescentis, Arrhenatheretalia, Artemisietalia, Atropetalia, Bidentetalia, Bometalia erecti, Chenopodietalia, Corynephoretalia, Epilobietalia angustifoliae, Fagetalia, Glechometalia hederaceae, Juniperetalia, Molinietalia, Montio-Cardaminetalia, Nardetalia, Onopordetalia, Origanetalia, Ostryo-Carpinetalia orientalis, Phragmitetalia, Pinetalia heldreichii-nigrae, Pinetalia mugi, Plantaginetalia majoris, Populetalia albae, Potametalia, Prunetalia spinosae, Pteridietalia, Quercetalia pubescentis, Quercetalia robori-petraeae, Quercetalia ilicis, Robinietalia, Salicetalia albae, Salicetalia purpureae, Scorzonero-Chrysopogonetalia, Secalinetalia, Seslerietalia tenuifoliae, Stipetalia, Vaccinetalia, Vaccinio-Piceetalia*, etc.

Studies by authors Šarić-Kundalić et al. (2010a, 2010b, 2011) showed that there are significant similarities between different regions and ethnic groups in BiH regarding the use of medicinal plants for a range of remedies and concoctions. It is interesting that there were few differences in the types of medicinal plants used, including remedies and preparation methods, between the central, western and southern parts of BiH and the eastern, northern and northeastern parts of BiH. The results also showed the great importance of medicinal plants for the physical health of the people of Bosnia and Herzegovina (Šarić-Kundalić et al., 2011).

3.1. Existing information on traditionally used plant species in different areas of Bosnia and Herzegovina

Until now, a lot of scientific research has been carried out in the territory of BiH with the aim of understanding the specific and unique characteristics and diversity of flora. However, the diverse values contained in that biodiversity have not yet been fully explored, discovered and documented. This particularly refers to traditional and local knowledge and practices of using natural resources, which have been developed over many generations and have found application in everyday life. Throughout history, people in BiH have used the blessings of nature for the purposes of nutrition, treatment, preparation of beverages, toolmaking and more, and in this way traditions in the rural areas of BiH have developed. Local environments have been shaped by the plant and animal species that people use as part of traditional practices.

In the territory of BiH, research on the use of medicinal, edible and aromatic plants has been carried out in the past few years as part of independent research, diploma and masters' theses. It has been discovered that there is a large diversity of plant species that are used daily for domestic purposes. So far, several papers have been published on the subject of the use of biodiversity, and the papers that describe the use of plant species with medicinal properties in nutrition and treatment stand out. Some of them are: Grujić-Vasić et al., 2006; Redžić, 2006, 2007, 2010a, 2010b, Šarić-Kundalić et al., 2010a, 2010b, 2011, 2016; Ferrier et al., 2012, 2014; Tahirović et al., 2012; Murtić et al., 2014; Rogić, 2014; Kazazić et al., 2015; Huseinović et al., 2017, etc.

Several scientific and professional works deal with research on the ecosystem structure, some of which are comprised of medicinal plants, such as: Đuričić and Elizar, 1964; Gajić and Kilibarda, 1968; Lakušić et al., 1979, 1980, Lakušić, 2004; Redžić et al., 1991, 2009; Vojniković et al., 2013; etc. The number of works dealing with research on traditional knowledge is significantly smaller, some of them are: Gluck, 1892; Vuletić-Vuksanović, 1896; Zovko, 1896a, 1896b; Ritter-Studnička, 1958; Trako, 1984; Paić-Vukić, 2003; Kujundžić et al., 2006; Krehić-Fočak, 2017; etc. The Institute for the Study of Medicinal Plants from Belgrade took the first steps in researching the potential of wild medicinal plants in BiH in the period 1961-1968. The earliest research on estimations of biomass of plant species was carried out by Ljubojević, 1992; Ljubojević et al., 1987, 1992 (Vojniković et al., 2013).

For a long time, the population of BiH has had publications on treatments involving medicinal plants. The first known book, entitled *'Narodni učitelj'* ('National Teacher'), was written in 1879 by Vaso Pelagić, and the second by Sadik Sadiković in 1928, was entitled *'Narodno zdravlje'* ('National Health'). After that, several more significant works on medicinal plants appeared, such as: *'Ljekovito bilje i jetra'* ('Medicinal plants and the liver') by Hasanagić Enes, 1980; *'Lecenje biljem'* ('Healing with herbs') by Tucakov Jovan, 1984; *'Ljekovitim biljem do zdravlja'* ('Medicinal herbs to health') by Rada Marušić, 1984; *'Sakupljanje i upotreba ljekovitog bilja'* ('Collection and use of medicinal plants') by Bešlija Smajo, 2000; *'Ljekovito bilje Bosne i Hercegovine branje i upotreba'* ('Picking and using the medicinal herbs of Bosnia and Herzegovina') by Bešlija Smajo, 2004.

Despite the existing data on the use of plant species, the total number of plant species that are utilized by people has not yet been determined. Data on this differs between publications, so Đuričić and Elizar (1964) describe approximately 240 cultivated medicinal species, Grlić (1990) approximately 409 species, Redžić (2006) approximately 308 species, a USAID study documents 700 species (USAID/Sweden FARMA BiH, 2010), Šarić-Kundalić et al. (2010a) approximately 228 species, and Tanović (2010) approximately 66 species. One of the most current pieces of research on the use of natural resources in traditional practices was carried out as part of a PhD dissertation with the aim of assessing the loss of traditional knowledge. According to the research, a total of 748 plant species were found to be used in traditional practices as medicinal plants and as dietary

supplements. This figure was determined through an analysis of 55 literary sources published in BiH (Macanović, 2019; Macanović and Barudanović, 2021).

In the last 20 years, research that has been conducted in different regions of BiH shows that medicinal plants are very often used in households, but that their specific uses differ from area to area and depending on their availability in the local ecosystems.

However, some research has been more comprehensive and not been limited to particular areas of BiH. For instance, Redžić (2007) compares results from the areas of Neum, Trebinje, Bihać and Bjelašnica, and those that show a significant diversity of the use of wild medicinal and aromatic plants. This ethnobotanical research was carried out using qualitative interviews with local communities in the following areas: Neum (village Hutovo), Stolac (Žegulja), Trebinje (villages Trebinjska šuma, Lastva), Sarajevo (village Obhodža, Buća potok, Miljevići and Vučija luka), Tuzla (the settlements of Stupari, Husino), Brčko (the settlements of Maoča and Bosanska Bijela), Bihać (the settlements of Ripač, Lohovo, Martin Brod and Klokot), Banja Luka (the settlements of Vinac, Torlakovac, Barevo, Surjan and Manjača), Zvornik (the settlements of Drinjača and Kriva Drina), Bjelašnica mountain, Vranica mountain and Vlašić. During the research, 227 plants from 71 different plant families were recorded, which are used for ethnotherapeutic purposes.

The most commonly used plants in the field of ethnopharmacology, compared to ethnotherapeutic practices in other regions, are: *Ballota nigra, Aesculus hippocastanum, Calluna vulgaris, Centaurea cyanus, Euphrasia rostkoviana, Geranium robertianum, Gentiana asclepiadea, Helichrysum italicum, Lycopodium clavatum, Marrubium vulgare, Nepeta cataria, Populus tremula, Ruta graveolens, Tamus communis, Teucrium montanum, T. chamaedrys*, as well as endemic species such as: *Gentiana lutea* subsp. *symphyandra, Teucrium arduini, Micromeria thymifolia, Satureja montana, S. subspicata, Rhamnus fallax* and *Viola elegantula*. The most widely used plant species are: *Achillea millefolium, Agrimonia eupatoria, Artemisia absinthium, Althaea officinalis, Arctostaphyllos uva-ursi, Betula pendula, Capsella bursa-pastoris, Centaurium umbellatum, Crataegus monogyna, Equisetum arvense, Gentiana symphyandra, Glychyrrhiza glabra, Hypericum perforatum, Malva sylvestris, Matricaria chamomilla, Melissa officinalis, Mentha longifolia, Ononis spinosa, Helichrysum italicum, Orchis morio, Origanum vulgare, Polygonum aviculare, Potentilla erecta*, etc. The results of the analysis of the ecological and phytoecological distribution of certain plant species indicate that they inhabit 53 different habitats and ecosystem types, indicating the ecosystem diversity and species richness of this area. Most plant species grow in ecosystems of broad-leaved deciduous forests of the *Fagetalia* order, thermophilic pastures of the *Brometalia erecti* order, thermophilic forests of the *Quercetalia pubescentis* order, order *Prunetalia spinosae, Prunetalia spinosae*, *Scorzonero-Chrysopogenetalia Adenostyletalia* and *Onopordetalia* (Redžić, 2007).

Medicinal and aromatic plants have the potential to significantly contribute to the development of the national and local economy in the entities of the Republika Srpska, the Federation of BiH and the Brčko District. Even today, despite the existence of advanced agricultural technology, harvesting plants is still one of the main activities in BiH and is an important part of local economies in rural areas. Currently, roughly 50 small and medium-sized enterprises in BiH operate in this sector. Most are engaged in harvesting and selling wild medicinal and aromatic plants. Many of these companies also harvest, process and sell wild berries, mushrooms and other forest products. According to GTZ estimates from the year 2000, approximately 100,000 collectors are connected to these companies in BiH and collect forest products mainly on lands owned by the state, where they have unrestricted access. Only a small amount of forest products is collected on private property and from cultivation (USAID/Sweden FARMA BiH, 2010).

Out of over 700 different types of medicinal and aromatic plants recorded in BiH, about 200 are harvested (Gatarić et al.,

1988). However, this list also contains several endangered species, including those that are most commonly sold and bought: *Gentiana lutea* L. - yellow gentian, *Arnica montana* L. – mountain arnica, *Arctostaphyllos uva-ursi* L. - bearberry and *Orchis* sp. – green-winged orchid (Bjelić, 2012).

In the period before the war of 1992-1995, the largest areas of plantation for producing medicinal and aromatic plants were in the Dubrovnik region, where sage covered approximately 5,700ha, rosemary covered 50ha and *immortelle* covered 730ha (Kosović and Dunjić, 2000). The rural population were engaged in harvesting as a primary or additional source of income. The increase in the use and demand for these plant species attracted increasing numbers of harvesters who unfortunately lacked adequate training and tended to have poor practices for harvesting which put these plant species under increasing pressure.
Over-harvesting is often a significant contributing factor to the decline and loss of plant and animal species. For some harvesters, medicinal and aromatic plants are first and foremost an important source of income and less consideration is given to sustaining these species; for example, harvesters often neglect to leave enough of the plant or its coverage intact to ensure it grows back (Kosović and Dunjić, 2000). The most endangered plant species in BiH are *immortelle* and yellow gentian. The situation is similar in industries which use the secondary products from forest fruits, and consequently juniper, wild rose and numerous types of mushrooms are becoming endangered. In the agro-industrial sub-sector of medicinal and aromatic plants in BiH, harvesting of these plants has dominated for centuries. At least 160-170 species of medicinal and aromatic plants are native to BiH, and most are still harvested. About 100,000 people are engaged in the collection of medicinal and aromatic plants. Between July 2006 - November 2006, a study was conducted in the main collection areas in the northern part of BiH, and harvesters and herbalists who purchase the medicinal and aromatic plants were interviewed. From the northern part, ten herbalists and buyers, and twenty harvesters from the vicinity of Bihać, Bosanski Petrovac, Drvar, Ključ, Prijedor, Banja Luka and Kotor Varoš were surveyed. Ten herbalists and twenty harvesters from the Herzegovina regions of Mostar, Ljubuški, Stolac, Ljubinje and Trebinje were interviewed. Over-harvesting, lack of awareness of sustainable practices and lack of alternative livelihoods for the local population were the main factors driving unsustainable use of medicinal and aromatic plants, as well as habitat loss, fragmentation and degradation, and loss of genetic diversity. The study also showed that harvesters with a longer harvesting tradition and longer personal experience were more likely to use more sustainable harvesting methods. However, financial hardship may drive the harvesters to over-harvest. One of the possible solutions for the future is the cultivation of important medicinal and aromatic plants, in situ and ex situ conservation efforts to support the recovery of threatened species, and greater institutional engagement in this matter (Pećanac, 2010).

The wealth of biodiversity in Bosnia and Herzegovina is extremely large. It represents not only national value and pride, but also has exceptional potential for driving sustainable development if used in a responsible manner. Since ancient times, the focus has been on the collection of wild medicinal plants from nature, and historically only a small number of producers bought and exported them. With the growing demand for food, cosmetics, medicines, and pharmaceutical products for use in daily life, the demand for plant resources is increasing, which in turn has driven an increase in the number of industries and businesses processing medicinal and aromatic herbs. Increased interest in plant resources has led to excessive and unregulated exploitation of natural resources. This is why appropriate regulations to ensure sustainable practices for harvesting wild plants is essential. Bosnia and Herzegovina has extremely favourable climatic conditions for organic and conventional production of medicinal and aromatic plants. If regulations on sustainable harvesting methods are introduced and enforced, producers will still be able to ensure a continuous and a„mple supply of medicinal and aromatic herbs. It would also help to prevent the disappearance of certain plant species that have been

brought to the brink of existence. This was one of the reasons why non-governmental organizations helped interested local communities to focus their activities on planting medicinal and aromatic plants. Now in Bosnia and Herzegovina there are large areas used for cultivating various medicinal and aromatic herbs, as well as some plant species that until recently could only be found in the wild. Some of them are: lemon balm, mint, chamomile, calendula, yellow gentian, yarrow, thyme, St. John's wort, sage, immortelle and lavender (Zeljković/ Зељковић, 2020).

3.2. Traditional use of medicinal plants in different areas of Bosnia and Herzegovina

Research that includes the traditional use of medicinal plants contains knowledge from different regions and areas of BiH. In order to cover the entire area of BiH where relevant research has been conducted, the knowledge was presented according to the area where it was documented and presented in a table alongside data about the authors, the title of the work, the location and the number of plant species in use.

3.2.1. Northern area of Bosnia and Herzegovina

In the northeastern and eastern areas of BiH, research was carried out by Šarić-Kundalić et al. (2011) to provide a systematic overview of the traditional use of wild and cultivated plants. Interviews were conducted in 45 locations to gather ethnobotanical data and knowledge (Figure 1), including cities and mountainous areas. The research sites were: Ahmovići (Goražde), Behrami (Srebrenik), Blatnica (Teslić), Miričina (Gračanica), Novo selo (Tešanj), Odžak, Orašje, Bukinje, Crnjevo, Čelić, Dobrnja, Dokanj, Gornja Tuzla, Grabovica Donja, Grabovica Gornja,

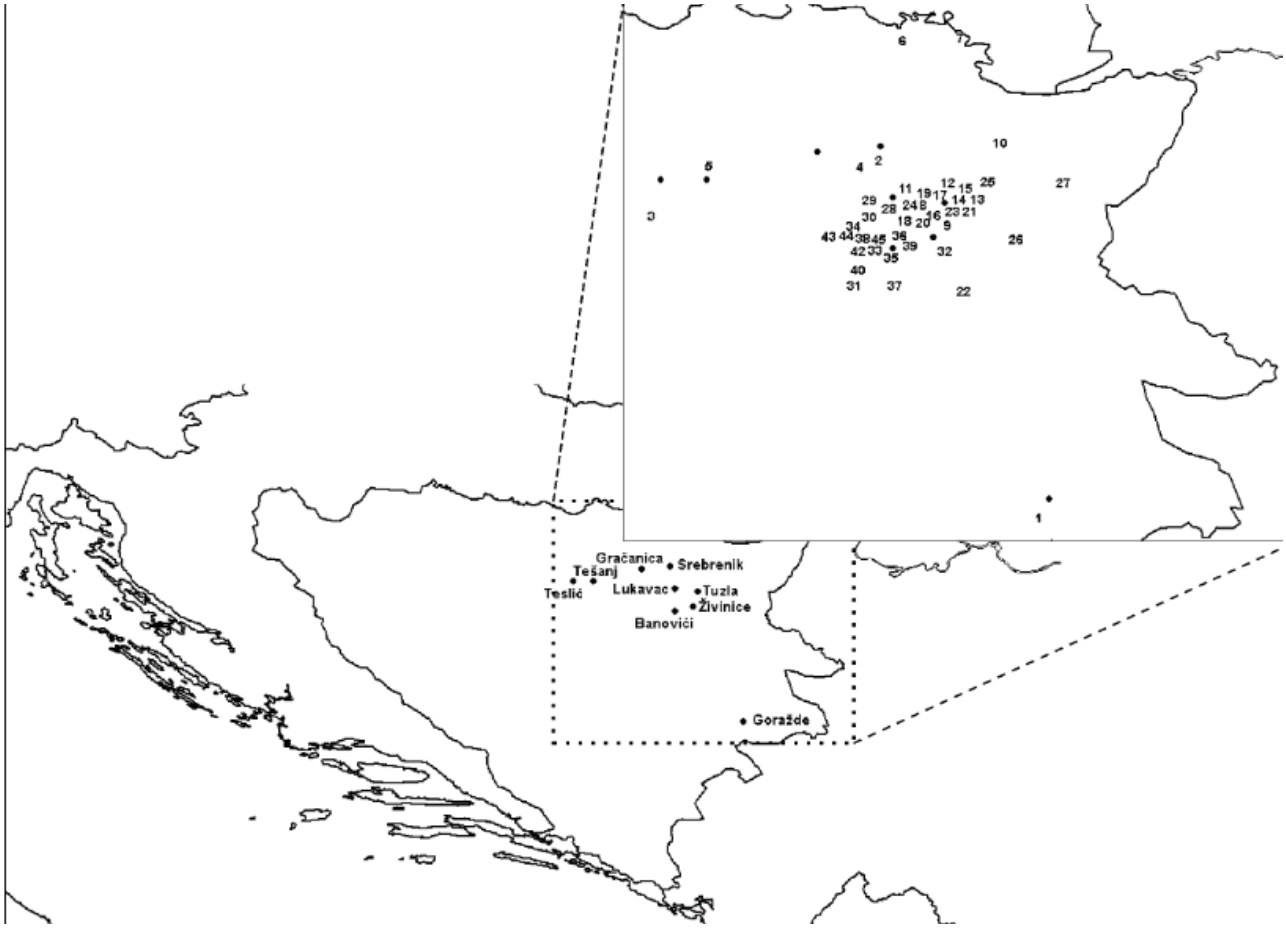


Figure 1. *Research sites in northeastern area of BiH (Reproduced from Šarić-Kundalić et al., 2011)*

Husino, Ilinčica, Kiseljak, Lipnica, Ljubače, Simin Han, Suha, Ši Selo, Šićki brod, Majevica planina (Tuzla), Kalesija, Teočak, Bistarac Donji, Puračić, Vijenac (Lukavac), Maoča, Đurđevik (Živinice), Čubrić, Golići, Gradina, Jezero, Konjuh, Mušići, Oskova, Ribnica, Selamići, Selo Banovići, Seona, Treštenica and Tulovići (Banovići). During the research, 254 plant species that are used in traditional human therapy were recorded. Medicinal plants were most often used to treat ailments of the digestive tract, respiratory system, urogenital tract, skin, blood system, cardiovascular system, nervous system and rheumatism. Infusions were the most prepared formulation. Other remedies and uses that were less frequently mentioned were drinks, syrups, tinctures, direct application of plants without prior preparation, ointments, freshly squeezed juices, oils and powders.

Special preparations, which are typically only found in the territory of BiH, have also been recorded in this region, namely salve and a type of syrup called '*ulbe* sugar'. While salves are already recognized and accordingly discussed in the central, southern and western parts of Bosnia and Herzegovina, '*ulbe* sugar' seems to be known only in the northeastern region. The main ingredients of this preparation are sugar or honey, lemon and the flowers of a specific species of the genus Rosa, which in Bosnia is called *'ulbe'* rose or 'sugar' rose. Traditionally, preparation recipes are transmitted orally, from mother to daughter (Šarić-Kundalić et al., 2011).

The 254 plant species recorded are classified into 60 different families and 149 genera. The most commonly used plants in the northeastern part of BiH are the species of the genera *Sambucus, Citrus, Olea, Allium, Matricaria, Juniperus, Malus, Mentha, Pimpinella, Angelica, Vaccinium, Quercus, Tilia, Achillea, Hedera, Hypericum, Melissa, Salvia, Urtica, Arctium, Foeniculum, Equisetum, Plantago* and *Rubus*. The most commonly registered medicines were used for the treatment of gastrointestinal, respiratory and skin diseases among others. The listed plants were also used for the treatment of influenza infections, metabolic disorders, and musculoskeletal disorders. Research has shown that medicinal plants are rarely used for the treatment of diseases of the senses, endocrinological diseases, liver and bile problems, inflammations or diseases caused by parasites (Šarić-Kundalić et al., 2011).

The traditional use of medicinal plants in the Konjuh mountain area is still prevalent. A significant diversity of medicinal plants used by the population of Kladanj and Tuholje was recorded (Šarić-Kundalić et al., 2010a). *Lincura* (*Gentiana lutea*) is a rare medicinal plant species that grows in the areas of Zelemboj, Hambarište, Zidine and Mali Konjuh, and is on the list of endangered and protected species (Red list of FBiH). Konjuh is home to several medicinal and wild edible plants, of which the most abundant is *Thymus serpyllum*. The most widely used plants are: *Urticaria dioica, Achillea nobilis, Centaurium erythraea, Artemisia absinthium, Plantago major, Calendula officinalis, Salvia officinalis, Melissa officinalis, Matricaria discoidea, Polygonum aviculare agg., Sambucus nigra, Allium sativa, Tilia sp., Tussilago farfara, Valeriana officinalis, Citrus sp., Mentha sp., Taraxacum officinale* agg., *Ocimum basilicum, Gentiana lutea, Cichorium intybus, Equisetum arvense, Quercus pubescens, Fragaria vesca, Juglans regia, Primula veris, Betula pendula, Sorbus aucuparia, Chelidonium majus* and *Allium ursinum*. The mentioned plant species are used for the treatment of various human diseases such as gastrointestinal, respiratory, urogenital, immune, cardiovascular, nervous system and skin diseases (Šaric-Kundalić et al., 2016).

Through research, useful plants were divided into several groups, namely: A) wild plant species that grow in the wild without human intervention and that represent an authentic genetic pool in the area's biodiversity (Redžić et al., 2008). B) Semi-cultivated species that grow naturally in the wild but are often found near human settlements because of their importance to humans. In the research area, such species are: *Juglans regia, Malus sylvestris, Prunus avium, Pyrus pyraster, Rumex paticia, Sambucus nigra, Corylus colurna* and *Tilia sp*. C) Plants that grow wild in nature or are cultivated through horticulture and are sufficiently adapted to a certain climate to

grow wild in nature, mainly in anthropogenic habitats. In the research area, *Robinia pseudoacacia* belongs to this group because it has formed wild communities in some places.

Edible wild plant species grow in 24 different habitats, which, according to ecology and syntaxonomy, belong to different vegetation units. In the low altitude areas, oak and hornbeam of the *Querco-Carpinetum* community dominate. The slopes to the north are dominated by beech forest, *Fagetum moesiaceae*. In the warmer parts of BiH, on shallow carbonate soils, the vegetation consists of forests and bushes of honey oak (*Quercus pubescens*), hornbeam (*Ostrya carpinifolia*) and flowering ash (*Fraxinus ornus*). There are many endemic communities in the canyon. The most important are linden and Bosnian maple forests, *Aceri obtusti-Tilietum mixtum*, black hornbeam, and *Seslerio-Ostryetum* autumn sedge forests. The places with suppressed forests are dominated by rocky vegetation from the order *Scorzonero-Chrysopogonetalia*, thermophilic pastures from the order *Brometalia erecti* and mesophilic pastures from the order *Arrhenatheretalia* (Redžić, 2006). The most abundant species are part of deciduous forests of the order *Quercetalia pubescentis*, dry meadows of the order *Brometalia erecti* and mesophilic meadows of the order *Arrhenatheretalia*. Syntaxonomic affiliations include: *Quercetalia pubescentis, Fagetalia, Brometalia erecti, Arrhenatheretalia, Adenostyletalia, Prunetalia spinosae, Onopordetalia, Vaccinio-Piceetalia, Scorzonero-Chrysopogonetalia, Epilobietalia angustifoliae, Chenopodietalia, Bidentetalia, Origanetalia, Molinietalia, Amphoricarpetalia, Populetalia albae, Montio-Cardaminetalia, Artemisietalia, Agrostetalia albae, Salicetalia purpureae, Robinietalia, Pteridietalia, Pinetalia heldreichii-nigrae, Phragmitetalia, Juniperetalia*, etc. (Redzic and Ferrier., 2014).

3.2.2. Eastern area of Bosnia and Herzegovina

In the Eastern Bosnia area, during the war events of 1992-1995, natural resources were used in several households. According to research by Redžić and Ferrier (2014), the vegetation around Žepa is lush and diverse. The research identified 147 types of vascular plants that were used as food in households in this area. The most commonly used species were: *Allium ursinum, Betula pendula, Campanula trachelium, Carpinus betulus, Carlina acaulis, Cichorium intybus, Tussilago farfara* and *Urtica dioica*. Wild fruit trees include: *Cornus mas, Crataegus laevigata, Fragaria sp., Rubus sp., Rosa sp., Corylus sp., Prunus avium, Prunus spinosa, Pyrus pyraster, Malus sylvestris and Ribes sp*. Based on their nutritional value, 259 different uses of these plants were identified. Some of them are used as vegetables, salads, spices, fruits; to prepare bread, drinks, teas, sweets, coffee and as water sources. A total of 63 species used as vegetables were registered, some of them are: *Urtica dioica, Tussilago farfara, Chenopodium album, Epilobium angustifolium* and *Pastinaca sativa*.

Species important for the preparation of salads are diverse, and a total of 47 species have been identified. Some of the garden-fresh salad greens include: *Rumex acetosa, Oxalis acetosella, Allium ursinum, Primula vulgaris, Primula columnae, Nasturtium officinale, Taraxacum officinale, Alchemilla hybrida, Sanguisorba minor* and *Trifolium sp*. In addition to this, almost 37 types of plants are used as spices. The most abundant species are: *Allium ursinum, Origanum vulgare, Daucus carota, Galium odoratum, Hypericum perforatum, Mentha sp., Micromeria thymifolia, Polygonum hydropiper* and *Thymus sp*. Most of these plants are also used to prepare teas. As a raw ingredient for bread and cakes, different types of oaks *Quercus sp*. are used, especially sweet oak *Quercus frainetto*, and other species such as: *Betula pendula, Carpinus betulus, Coryllus avellana, Platanthera bifolia* and *Gymnadenia conopsea* among others.

The Eastern area of BiH is extremely rich in wild fruits. Fruits were eaten fresh and raw, or processed to prepare beverages. Beverages are simple preparations, prepared by soaking plant raw materials in water through maceration, and heating them over low heat to make a decoction. About 67 wild fruit species were used to prepare different beverages, the most common of which are *Cotoneaster sp., Amelanchier*

sp., Crataegus laevigata, Fragaria sp., Juniperus communis, Picea sp., Pinus nigra, Pyrus sp., Prunus sp., Malus sp., Rosa sp. and *Rubus sp.*, from which jam, marmalade and dried fruit could be made.

Plant species used by humans were classified into 47 families. The most widespread families were Rosaceae, Lamiaceae, Asteraceae, Apiaceae and Campanulaceae. The correlative relationship between the taxo-

12. Nerići; 13. Kraljevo polje; 14. Rijeke; 15. Podžeplje; 16. Gerovi; 17. Milići; 18. Vitići (Figure 2).

The residents of the settlements mentioned above mainly practice agriculture. About 73 plant species with medicinal properties were identified, and different methods for their preparation and use were recorded. The most commonly used species were: *Thymus sp., Angelica sylvestris, Tilia platy-*

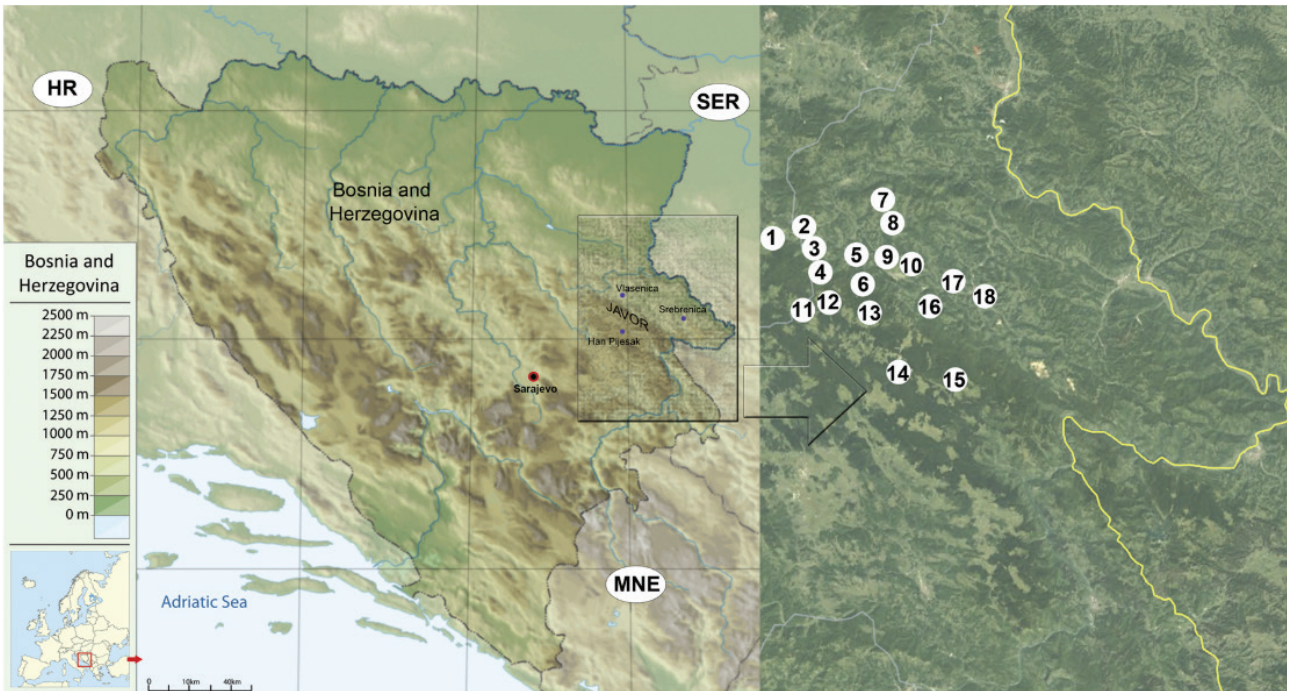


Figure 2. *Research sites in the northeastern area (Šarić-Kundlić et al., 2011)*

nomic classification of the identified plants and their useful parts was established. The plants whose parts were used as wild fruits and salads mainly belonged to the Asteraceae family; wild fruits to the Rosaceae family; bread substitute plants belonged to the Liliaceae and Betulaceae families; and spices to the Lamiaceae, Apiaceae, Polygonaceae andothers (Redžić and Ferrier, 2014).

During 2015 and 2016, research was conducted on the use of medicinal plants in the Javor mountain area. On that occasion, 18 settlements were assessed, namely: 1. Turalići; 2. Grabovica; 3. Mišari; 4. Rača; 5. Drum; 6. Kulina; 7. Šadići Gornji; 8. Šadići Donji; 9. Gradina; 10; Bakići; 11. Malo polje;

phyllos, Ocimum basilicum, Urtica dioica, Hypericum perforatum, Mentha piperita, M. longifolia, Sambucus nigra and *Achillea millefolium*, while the least recorded are *Viola tricolor* and *Veronica officinalis*. The identified species mostly belonged to the families Asteraceae, Lamiaceae and Rosaceae. The parts of the plants that were most commonly used were the aerial part and the leaf, and infusion was the most common way of preparing herbal medicines. The plant most valued by the respondents was *Hypericum perforatum*, which was used to treat skin problems, haemorrhoids, moderate depression, gastrointestinal diseases and respiratory infections. The phytotherapeutic preparations of the rhizome of the species *Veronica officinalis* was used

in the treatment of jaundice, and the bark of the species *Prunus domestica* was used for the prevention of tooth decay (Savić et al., 2019 [4]).

3.2.3. Western area of Bosnia and Herzegovina

In the wider area of the Una River valley, from the source to Bosanska Krupa, the research was carried out with the aim of identifying medicinal plant species. In the ecosystems studied, 177 medicinal plant species, and 105 potentially medicinal, edible, aromatic and vitamin species were identified. A large number of identified species occupy specific habitats in river canyons. In total, 51 medicinal plant species and 46 potential medicinal plant species were identified in rock crevice communities on the carbonates of the *Edraianthion* and *Edraianthion yugoslavica*. The most important medicinal plant species were *Ceterach officinarum, Asplenium trichomanes, Asplemium ruta-muraria, Sedum maximum, Teucrium montanum, Fraxinus ornus, Hedera helix, Cotinus coggygria, Rhamnus catharticus* and others. The most common potential medicinal plant species that are also important in these communities are *Micromeria thymifolia, Satureja montana, Satureja subspicata, Frangula rupestris, Iris bosniaca, Artemisia alba, Jovibarba heuffelii, Berberis croatica, Daphne alpina* and many others. The sedge communities in the research area are represented by vegetation type *Corydalion ochroleucae* and *Peltarion Alliaceae* which are the optimal environment for medicinal plant species like *Geranium robertianum, Asplenium trichomanes, Ceterach officinarum, Sedum acre, Sisyrinchium montanum*, and potential medicinal plant species such as *Corydalis leiosperma, Micromeria thymifolia, Vincetoxicum hirundinaria, Campanula pyramidalis* (Redžić et al., 1991).

3.2.4. Southern area of Bosnia and Herzegovina

The area of Herzegovina, which represents the southern part of BiH, is characterized by a high diversity of medicinal and aromatic plants. Intensive ethnobotanical research by Redžić (2010) between 2000-2005 showed the use of 96 types of vascular plants. These species are part of the wild flora of the southern area and play a key role in the phytotherapy of the Mediterranean and sub-Mediterranean parts of BiH. The research includes the population of Herzegovina, spanning from the coast of the Adriatic Sea to Hutovo Blato, the area of Stolac, the area of Ljubuški, the villages of Vitina and Klobuk, the area of Čapljina as well as the surroundings of Mostar and Podveležje. Medicinal plants in the research area are mostly used by the local people for disease prevention and treatment, in total 140 different diseases or conditions could be treated with these medicinal plants. Also, 527 different applications for their use were identified. It is common for one plant species to be used for the treatment and prevention of several different diseases, as its medicinal properties affect different functional systems. Analysing the records of herbal medical treatments, it was observed that some plants were used more often than others, such as *Achillea millefolium, Hypericum perforatum, Salvia officinalis, Taraxacum officinale, Thymus serpyllum, Tilia cordata* and *Urtica dioica*. These plants were also the most easily identified by the local people. Certain medicinal plants, which are otherwise very popular in the Mediterranean area, are increasingly less used by the local population. Some of these species are: *Ruscus aculeatus, Punica granatum, Verbascum thapsus, Fraxinus ornus, Glycyrrhiza glabra,Herniaria hirsuta, Paliurus spina-christi, Cnicus benedictus* and *Vitex agnus-castus* (Redžić, 2010a).

In this area, 22 habitats of interest (through EUNIS habitat classification) were recognized and consist of several groups, namely: forests and thickets, pastures and rock fields, rock crevices and karst swamps, and abandoned habitats.

In this region, the inhabitants found about 40% of medicinal plant species in open places, such as Mediterranean and sub-Mediterranean rock communities of the order *Thero-Brachypodietalia* and *Scorzonero-Chrysopogonetalia*, thermophilic pastures of the order *Brometalia erecti* and wet pastures of the order *Ar-*

4. Among the authors of this publication there in no consensus on the term 'aggression' used in the work Redžić and Ferrier (2014), nor on the demographic information in the work Savić et al. (2019).

rhenatheretalia and *Trifolio-Hordeetalia secalini*. About 30% of the species grow in evergreen forests belonging to the *Quercetalia ilicis* order, thermophilic broad-leaved forests and shrubs from the *Quercetalia pubescentis* and *Ostryo-Carpinetalia orientalis* orders, and black pine forests from the *Pinetalia heldreichii-nigrae* order. A significant number of species - about 20% - were found in abandoned ecosystems (Redžić, 2010b).

3.2.5. Central area of Bosnia and Herzegovina

In the central area of BiH, there are several rural areas where traditional and local knowledge isstill used. One such area is Lukomir, which is a settlement at the highest altitude in BiH, about 1,495 m. Lukomir's residents have been using numerous natural resources for hundreds of years as established by Ferrier et al. (2014). A total of 58 plant species from 35 families are regularly and sustainably used by the local population. It is interesting to note that among these species, they also use eight endemic plants, namely: *Helleborus odorus, Gentiana lutea, Lilium bosniacum, Silene uniflora subsp. glareosa, Silene uniflora subsp. prostrata, Salvia officinalis, Jovibarba hirta*, and *Satureja montana*. 13% of the medicinal plants used are endemic flora. This area is particularly significant because it is inhabited by the aforementioned endemic species that were not previously reported by earlier research on traditional medicine in BiH. Residents frequently used roots of *Gentiana lutea* species and so far, its use has not been recorded in other studies in the country. They also use blueberry for the treatment of diabetes. *Lilium bosniacum*, the Bosnian lily, is endemic to the central Dinaric Alps. The list of flora used for treatment and nutrition in the immediate vicinity of the village of Lukomir belong to the following syntaxonomic units: *Adiantetalia, Arabidetalia flavescentis, Amphoricarpetalia, Arrhenatheretalia, Artemisietalia, Atropetalia, Brometalia erecti, Bidentetalia, Chenopodietalia, Corynephoretalia, Epilobietalia angustifoliae, Fagetalia, Juniperetalia, Montio- Cardaminetalia, Onopordetalia, Ostryo-Carpinetalia orientalis, Origanetalia, Plantaginetalia majoris, Prunetalia spinosae, Quercetalia pubescentis, Scorzonero-Chrysopogonetalia, Stipetalia, Vaccinietalia, Vaccinio-Piceetalia* (Ferrier et al., 2015).

Apart from Lukomir, in the village of Prokoško lake near the Vranica mountain, research conducted on the use of medicinal plants by Šarić-Kundalić et al. (2010b) showed that 43 plant species were used in 83 recipes. These plants were used to treat a wide range of diseases, among which the most common were diseases of the digestive tract, disorders of the blood system, skin diseases, respiratory tract infections, and diseases related to the urinary and genital tract. The most common method of preparing medicinal herbs was i*nfusum*, followed by ointments, salves and beverages. Special Bosnian salves are prepared from freshly chopped or freshly squeezed herbs. *Abies* or *Picea* resin, raw cow or pork fat, olive oil and honey are used for the substrate (Šarić-Kundalić et al., 2010b).

The use of medicinal plants was a significant practice among the inhabitants of Sarajevo, who, during the war (1992-1995), used and depended on available natural resources from the environment on a daily basis. Detailed research was carried out by Redžić (2010a), who in his original paper presents a systematic review of data on the use of wild and semi-wild edible plants in the diet of the population in the period 1992-1995. The author of the study spent significant time in Sarajevo, and through population surveys, 91 types of wild plants and three types of mushrooms that the residents used regularly were identified. 49 species of wild vegetables, 24 species of spices, 16 species of wild fruits and 2 species of bread raw material were frequently used. All useful plants are classified into 26 families that grow in different habitats: urban areas, riverbanks, forests, low thickets, meadows and rocky areas. A broad range of methods for preparing plants for consumption were identified. Vegetables prepared in different ways such as soups, broth, sauces dominate with 80 preparation methods, followed by salads 41, spices 39, various beverages 38, desserts 21, nutritious teas 15, among others. In order to improve conventional foods such as macaroni, rice, lentils and old beans, people used spices prepared from different wild plants.

Salads were prepared from fresh or cooked vegetables with the addition of natural vinegar. Some plants were used raw, such as the leaves of *Primula vulgaris, Rumex acetosa* and *Reynoutria japonica*. According to research, the mentioned plant species belong to different vegetation units, namely: *Fagetalia, Quercetalia pubescentis, Ostryo-Carpinetalia orientalis, Populetalia albae, Salicetalia purpureae, Prunetalia spinosae, Robinietalia, Juniperetalia, Adenostyletalia, Origanetalia, Scorzonero-Chrysopogonetalia, Brometalia erecti, Arrhenatheretalia, Montio-Cardaminetalia, Agrostetalia, Glechometalia, Bidentetalia, Artemisietalia, Onopordetalia, Chenopodietalia* and *Plantaginetalia majoris* (Redžić, 2010a).

In the wider area of the central area around Prozor, including the mountain massifs of Vranica, Zec, Tikva, Štit, Vitreuša, Makljen, Raduša, Ljubuša, Vran, Vlašić, etc., scientific research was carried out by the Biological Institute of the Faculty of Science, University of Sarajevo in 1978. In that period, the research was focused on possible methods of cultivating medicinal plants, and not on their traditional use. Through the study led by the University of Sarajevo researchers, the value of plant species to local communities and the specific uses of medicinal, vitamin and edible plant species of mentioned mountains were specially analysed. The species listed as important natural resources are: blueberry (*Vaccinium myrtillus*), raspberry (*Rubus idaeus*), meadow saffron (*Colchicum sp.*), gooseberry (*Ribes grossularia*), strawberry (*Fragaria sp.*), buckthorns (*Rhamnus fallax*), rose (*Rosa sp.*), juniper (*Juniperus sp.*) and violet (*Viola sp.*). These species were grouped into three categories according to their natural potential:

- A_1 category comprised species with unlimited natural potential which could be used in unlimited quantities as medicinal, vitamin and edible plants. This group included: blueberries (*Vaccinium myrtillus*), roses (*Rosa sp.*) and junipers (*Juniperus sp.*).

- A_2 category comprised species with limited natural potential, or which, with the application of professional methods, could be used for a longer period of time. This group included: raspberry (*Rubus idaeus*), strawberry (*Fragaria sp.*), *ljigovina* (*Rhamnus fallax*), meadow saffron (*Colchicum sp.*) and violet (*Viola sp.*).

- A_3 category comprised species with very limited natural potential that, from an economic point of view, were not of much interest for humans. Species such as currants (*Ribes sp.*) belonged to this group.

In addition to the mentioned categories, natural potentials were also investigated from the aspect of cultivation possibilities, and based on the assessment, these species were classified into two categories:

- B_1 category, comprised species that were relatively easy to grow, because they usually had wide amplitudes in relation to the basic ecological factors, and especially to the hydrothermal regime of the habitat. This group included: blueberry (*Vaccinium myrtillus*), raspberry (*Rubus idaeus*), strawberry (*Fragaria sp.*), buckthorns (*Rhamnus fallax*), rose (*Rosa sp.*), juniper (*Juniperus sp.*), violet (*Viola sp.*) and currant (*Ribes sp.*).

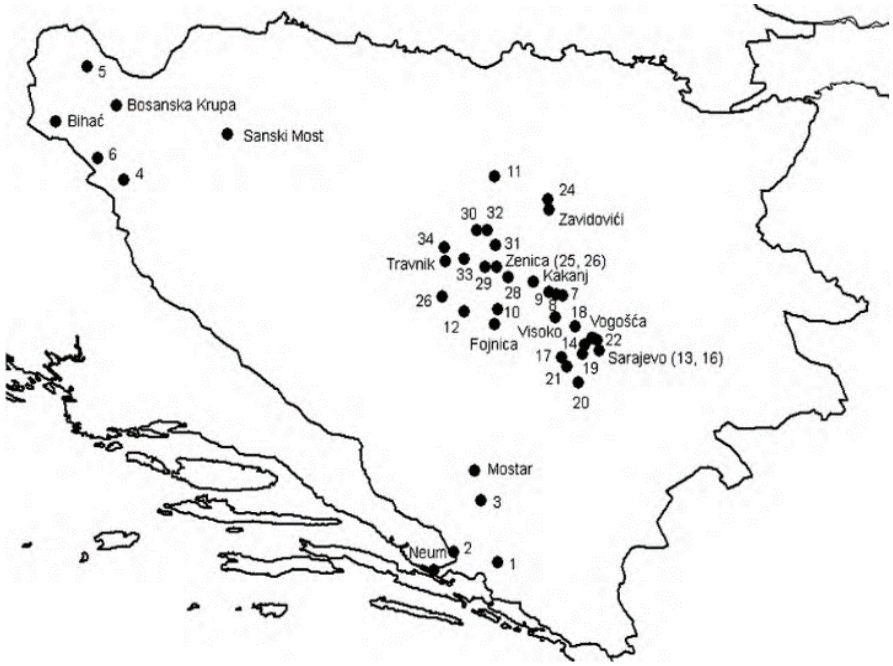
- B_2 category, comprised species that were difficult to cultivate, for example, *Colchicum sp.*

From the point of view of the need for cultivation, the researched species were divided into three categories, namely:

- C_1 category comprised species that are naturally very widespread in the researched area and whose natural potential allowed unlimited exploitation, and from an economic aspect could and should be cultivated. The following species belonged to this group: *Vaccinium myrtillus, Rosa sp.* and *Juniperus sp.*

- C_2 category comprised species whose availability in nature was limited, and which should be cultivated both from the point of view of ecological protection and economic gains. The follow-

Figure 3.
Locations studied in the central area of BiH (reproduced from Šarić-Kundalić et al., 2010a)



ing species belonged to this group: raspberry (*Rubus idaeus*), strawberry (*Fragaria sp.*),*ljigovina* (*Rhamnus fallax*), meadow saffron (*Colchicum sp.*) and violet (*Viola sp.*).

- C_3 category comprised species whose natural potential was very limited, and could and should not be exploited, both from the aspects of ecological protection and economic consideration. Therefore, only their medicinal, vitamin and edible properties were to be utilized through their cultivation. This group includes species from the genus Ribes (*Ribes sp.*) (Lakušić et al., 1979).

Another study on traditional and local knowledge about the use of medicinal plants was carried out by Šarić-Kundalić et al. (2010a) from 2006 to 2009. 34 locations were investigated (Figure 3), including cities and mountainous areas that encompass the wider area of BiH. The locations covered were: Gornje Hrasno, Borut, Neum, Gubavica and Mostar, Brdari (Sanski most), Bag (Bosanska Krupa), Ćukovi (Bihać), Bare (Visoko), Bijelo polje, Brežani (Kakanj), Botun, Prokoško jezero, Vranica planina, Fojnica, Buća potok, Obhodža, Rajlovac, Vučja luka, Hadžići, Ilijaš, Ilidža, Bjelašnica, Igman (Sarajevo), Hotonj, Uglješići (Vogošća), Dolac (Zavidovići), Vučijak, Lisac, Smetovi, Janjići, Lokvine, Šerići, Vranduk, Bistričak (Zenica), Han Bila and Vlašić mountain (Travnik).

The research recorded 228 wild and cultivated species and 730 different methods of their preparations. Most of the interlocutors emphasized species from the genera *Achillea, Hypericum, Mentha, Teucrium, Thymus* and *Urtica*. The most common medical usage was for the treatment of diseases related to the urogenital tract, respiratory system, digestive tract, and skin conditions, among others. *Infusum* was the most commonly used method to prepare medicines. Other applied preparation methods that are now rarely mentioned include decoctions, salves, direct application of plants without prior preparation, syrups and tinctures or collards, freshly squeezed juices, powders, and macerations. A specialty of the area is salves prepared from freshly chopped or squeezed herbs. Heated fir or spruce resins, beeswax, raw cow or pork fat, olive oil and honey were used as additives in the preparation of salves. Species from the genera *Arctium, Carlina*, *Euphrasia, Hypericum, Plantago, Teucrium* and *Urtica* were most often used to prepare salves. The wide range of identified preparation methods and their frequent application show that the traditional use of plants is of great importance for the people of BiH (Šarić-Kundalić et al., 2010a).

3.3. Diversity in the use of mushrooms and lichen through traditional practices

In addition to the high degree of diversity of plant species, it is assumed that about 15,000 to 20,000 species of fungi exist in the territory of BiH. So far, only 549 of them are known (Redžić et al., 2008). Although they are regularly encountered in different types of habitats and ecosystems, publications or research on fungi are still limited today. Over the course of more than 100 years, several scientific papers were published on the diversity of mushrooms and

Image 4. *The practice of preserving mushrooms (Photo: Ballian, D. 2022)*

their use, especially from 1945 to 1992, given the fact that Bosnia and Herzegovina was one of the largest exporters of mushrooms in the former Yugoslavia (Đug et al., 2013). Some of the notable publications are: Protić, 1898a; Baudyš, 1918; Đuričić and Elazar, 1964; Klinger, 1963; Grđić, 1971a, 1971b; Rončević, 1974; Focht, 1979; Giunio, 1981; Uščuplić, 1984; Redžić, 1990a, 1990b; 1990c, 1991a, 1991b, 1991c, 1991d, 1991e; Okić, 1991; Jukić and Omerović, 2017; among others.

A detailed overview of the use of mushrooms in BiH was given by Hasanbegović (2008) in the publication entitled '*Gljive šumsko bogastvo Bosne i Hercegovine*' ('Mushrooms - Forest wealth of Bosnia and Herzegovina'), where he describes 103 types of mushrooms specific to the area of BiH, many of which are used for nutrition. The ways of using mushrooms vary, and certain types can be dried (48 types), pickled (66 types), and some can be used to prepare special nutritional supplements such as aperitifs, starters, soups, desserts, salads, chutney, powder, spices and extracts.

Today, the kingdom of mushrooms still has high economic potential, as there is a developed market and demand for many species. Species of the genera *Morchella, Boletus* and *Cantarelus* have long been the main forest product on the European market. The quality of the habitat and the cleanliness and quality of the biomass mean that even today, many local communities make a profit through the harvesting and growing of different types of mushrooms within suitable habitats (Redžić et al., 2008).

In addition to the nutritional value, the inhabitants of BiH also used different types of mushrooms in traditional practices, which were particularly significant during the war events of 1992-1995. The group of higher fungi - *agaricus* - also includes species that are known to have high nutritional properties and were used to prepare food and medicine. Among the most famous are champignon (*Agaricus bisporus*), natural anticancer shiitake (*Lentinula edodes*), truffle (*Tuber magnum*), morel (*Morchella sp.*), boletus (*Boletus sp.*), milkweed (*Lactarius sp.*), foxglove (*Cantharellus sp.*), and others that represent significant sources of profit for local communities. Among the mushrooms, there are also some exceptionally deadly species such as death cap (*Amanita verna*), mushroom fool (*Amanita virosa*), some species of the genera *Inocybe* and *Clytocybe*, and a number of other species with different toxic effects. Some other types of mushrooms, most often from the genera *Amanita* and *Claviceps*, were used as hallucinogens (Redžić et al., 2008).

Research conducted in certain areas of BiH

confirms the use of both mushrooms and lichens in traditional practices. According to the research by Redžić et al. (2010), in the area of Podrinje and Žepa, local people used 25 different types of mushrooms (Table 1). This was especially important during the war events of 1992-1995 in the period of food shortage. Among the species that have found widespread use are: *Agaricus campestris, Lactarius piperatus, Morchella conica, Boletus edulis, Cantharellus cibarius* and *Lactarius deliciosus*. The recorded species of fungi occur in different types of ecosystems such as *Arrhenatheretalia, Brometalia erecti, Vaccinio-Piceetalia, Fagetalia, Quercetalia pubescentis, Prunetalia spinosae, Onopordetalia, Chenopodietalia, Pteridietalia, Juniperetalia* and *Pinetalia heldreichii-nigrae*.

Table 1. *Overview of useful mushrooms in BiH (Redžić et al., 2010)*

Type (vernacular name)	Family	Habitat
Agaricus campestris L. (Field mushroom)	Agaricaceae	*Arrhenatheretalia, Brometalia erecti*
Agaricus macrosporus (F. H. Moller & Jul. Schäff.) Pilát 1951 (big mushroom)	Agaricaceae	*Arrhenatheretalia, Brometalia erecti*
Agaricus silvaticus Schaeff. 1774. (Wood mushroom)	Agaricaceae	*Vaccinio-Piceetalia, Fagetalia*
Armillariella mellea (Vahl) P. Karst. 1881. (Honey fungus)	Physalacriaceae	*Fagetalia, Vaccinio-Piceetalia, Quercetalia pubescentis*
Boletus aereus Bull. 1789 (Butter bolete)	Boletaceae	*Fagetalia, Vaccinio-Piceetalia*
Boletus edulis Bull. 1782 (Penny bun)	Boletaceae	*Fagetalia, Vaccinio-Piceetalia*
*Calocybe gambosa (*Fr.) Donk 1962 (St. George's mushroom)	Lyophyllaceae	*Arrhenatheretalia, Brometalia erecti, Prunetalia spinosae, Vaccinio-Piceetalia*
Calvatia gigantea (Batsch) Lloyd 1904 (Giant puffball)	Agaricaceae	*Brometalia erecti, Arrhenatheretalia*
Cantharellus cibarius Fr. 1821 (Girolle)	Cantharellaceae	*Fagetalia, Vaccinio-Piceetalia, Quercetalia pubescentis*
Coprinus atramentarius (Bull.) Fr. 1838 (Inky cap)	Coprinaceae	*Onopordetalia, Fagetalia, Prunetalia spinosae, Chenopodietalia*
Coprinus comatus (O.F. M¸ll.) Pers. 1797 (Shaggy ink cap)	Coprinaceae	*Onopordetalia, Fagetalia, Vaccinio-Piceetalia*
Hydnum repandum L. 1753 (Hedgehog mushroom)	Hydnaceae	*Fagetalia, Vaccinio-Piceetalia*
Kuehneromyces mutabilis (Schaeff.) Singer & A.H. Sm. 1946 (F20801) (Sheathed woodtuft)	Strophariaceae	*Fagetalia, Quercetalia pubescentis*
Lactarius deliciosus (L.) Gray 1821 (Saffron milk cap)	Russulaceae	*Fagetalia, Vaccinio-Piceetalia, Pteridetalia*

Type (vernacular name)	Family	Habitat
Lactarius piperatus (L.) Pers. 1797 (Blancaccio)	Russulaceae	*Fagetalia, Vaccinio-Piceetalia, Quercetalia pubescentis*
Lactarius volemus (Fr.) 1838 (Weeping milk cap)	Russulaceae	*Fagetalia, Vaccinio-Piceetalia*
Lycoperdon perlatum Pers. (Puffball)	Agaricaceae	*Arrhenatheretalia, Brometalia erecti*
Macrolepiota procera (Scop.) Singer 1948 (Parasol mushroom)	Agaricaceaee	*Quercetalia pubescentis, Fagetalia*
Macrolepiota rhacodes (Vittad.) Singer 1951 (Shaggy parasol)	Agaricaceae	*Fagetalia, Arrhenatheretalia, Juniperetalia*
Marasmius oreades (Bolton) Fr. 1836 (Fairy ring mushroom)	Marasmiaceae	*Arrhenatheretalia., Brometalia erecti*
Morchella conica Pers. 1818 (Morel)	Morchellaceae	*Vaccinio-Piceetalia*
Pleurotus ostreatus (Jacq.) P. Kumm. 1871 (Hiratake)	Pleurotaceae	*Fagetalia, Vaccinio-Piceetalia*
Polyporus squamosus (Huds.) Fr. 182 (F21401) (Dryad's saddle)	Polyporaceae	*Fagetalia*
Ramaria flava (Schaeff.) Quél. 1888 (Coral mushroom)	Gomphaceae	*Fagetalia*
Tricholoma terreum (Schaeff.) P. Kumm. 1871 (Grey knight)	Tricholomataceae	*Vaccinio-Piceetalia, Fagetalia*

Lichens are very sensitive to changes in the environment. As such they serve as key bioindicators in the assessment of the state and carrying capacity of the environment, and particularly in the monitoring and assessment of air quality due to their sensitivity to air pollution. Therefore, they play an important role in the sustainable management and systemic biomonitoring of the environment. In addition to the above, they contain nutrients and vitamins, and today they are used as healthy food or for the treatment of a wide range of diseases. Particularly well-known lichens of this group are: *Cetraria islandica*, species of the genus *Lobaria, Parmelia, Usnea, Evernia*, etc. So far, about 300 species of lichens have been recorded in BiH. However, it is estimated that their diversity is much greater as they have not been sufficiently researched in these areas. The first set of data was recorded by Fran Kušan in 1931, who worked on the basis of Karl Maly's findings. In the later period, apart from sporadic results on the partial horology of certain mushroom species and data obtained through floristic and phytocenological research of the plant cover in BiH, a more organized database on this group is yet to be established (Redžić et al., 2008).

Redžić et al. (2010) stated that the residents of Podrinje and Žepa use 7 types of lichen (Table 2). These species include: *Bryoria fuscescens, Cetraria islandica, Pseudevernia furfuracea, Evernia prunastri, Lobaria*

pulmonaria, Ramalina farinácea and *Usnea barbata*. Vegetation units where the mentioned lichens live are orders such as *Brometalia erecti, Juniperetalia, Fagetalia,Quercetalia pubescentis* and *Vaccinio-Piceetalia* (Redžić et al. 2010).

Table 2. *Overview of useful lichen (Redžić et al., 2010)*

Type (vernacular name)	Family	Habitat
Bryoria fuscescens (Gyeln.) Brodo & D. Hawksw. 1977 (Lichen)	Parmeliaceae	On the bark of a tree species of the genus *Fagus, Quercus*
Cetraria islandica (L.) Ach. 1803 (Iceland lichen, Iceland moss)	Parmeliaceae	*Brometalia erecti, Juniperetalia*
Pseudevernia furfuracea (L.) Zopf 1903 (Tree moss)	Parmeliaceae	*Fagetalia, Quercetalia pubescentis*
Evernia prunastri (L.) Ach. 1810 (Oakmoss)	Parmeliaceae	*Fagetalia, Prunus*
Lobaria pulmonaria (L.) Hoffm. 1796 (Lung lichen)	Lobariaceae	*Fagetalia, Vaccinio-Piceetalia,*
Ramalina farinacea (L.) Ach. 1810	Ramalinaceae	*Fagetalia*
Usnea barbata (L.) Weber ex F.H. Wigg. 1780	Parmeliaceae	*Fagetalia*

4. MODERN RESEARCH ON TRADITIONAL AND LOCAL KNOWLEDGE IN BOSNIA AND HERZEGOVINA

Image 5. *Equestrian wood carving – "sehara" with Bosnian pattern (Photo: Hatibović, E. 2022)*

The need for research to assess the state and usage of traditional and local knowledge of biodiversity in Bosnia and Herzegovina arose two decades ago, along with the recognition of the risk of its disappearance. However, during the implementation of the project, 'Supporting decision making and building capacity to support IPBES through national ecosystem assessments', it became clear that very little is known about the status and contributions of traditional and local knowledge to nature conservation in Bosnia and Herzegovina. During the project, numerous scientific papers and studies were identified, which mainly deal with ethnobotanical research in certain parts of Bosnia and Herzegovina as elucidated in the previous chapter. To date, however, the state of this knowledge and its association with nature's contributions to people (NCP), and traditional conservation practices that were and/or are still used by the people of Bosnia and Herzegovina have not been determined.

With the support of UNESCO's Local and

Indigenous Knowledge Systems (LINKS) Programme, which leads the Indigenous and Local Knowledge Support Unit (ILK) for the BES-Net Initiative, the project, 'Local and Traditional Knowledge Research to Support National Ecosystem Assessment in BiH' was initiated. The research was conducted by the Civil Association FONDEKO in close cooperation with the University of Sarajevo, which led the implementation of BiH's National Ecosystem Assessment supported by UNEP-WCMC.

As stated above, the research project arose out of the needs and gaps identified by the 'Assessment of the State of Nature and Management of Natural Resources in Bosnia and Herzegovina' project. The assessment project aimed to prepare a technical assessment document on the status and threats to biodiversity in BiH and at the same time to serve as a capacity building platform for both scientific and policy communities by achieving a significant reference for the members of the authors' team and scientific community. It also aims to increase awareness of the importance of the sustainable use of nature for the policy community. The development of the assessment process and report represents a collaborative and interactive new process in Bosnia and Herzegovina, especially by creating a space for dialogue between scientists and decision-makers through participatory engagement in multi-stakeholder processes. During the implementation of the assessment project, gaps in knowledge about traditional and local knowledge were identified. It is expected that the documentation of available data on local and traditional knowledge in BiH will complement and enrich the assessment document, given that most local communities still possess detailed traditional and local knowledge.

The research project on traditional and local knowledge officially started in February 2022 and was completed in March 2023. The results of this project include data collected during field research of local and traditional knowledge conducted in 2021. The implementation of this research was financed as part of the project 'Assessment of the state of nature and management of natural resources in Bosnia and Herzegovina'.

The goal of the research project was to research local and traditional knowledge in certain localities using a range of data collection methods such as dialogues, interviews and surveys, to determine the degree of its preservation and loss, and identify drivers leading to its loss. The overall goal was to support the mobilization, documentation and synthesis of local and traditional knowledge on the use and conservation of biodiversity to feed into the assessment document. The final output of the research project was to develop a publication on the 'State of traditional and local knowledge of biodiversity in Bosnia and Herzegovina', which was published in a national language and translated into English. Both versions are open-access and available in electronic form. This research project was carried out across the entire territory of Bosnia and Herzegovina (Figure 4).

For the purposes of this research, the localities are divided into the following areas: north, east, west, south and central. The northern area includes the area of Posavina, including the city of Banja Luka in the west, Odžak in the northeast, the Sava River in the north, and in the south the border extends to Mountain Ozren. The eastern area includes eastern Bosnia; in the west, it extends to the town of Odžak and includes the slopes of Majevica and Konjuh, the Krivaja River, and south to the Zelengora mountain; the eastern limit coincides with the state border with the Republic of Serbia and along the Drina River. The western area includes western and northwestern Bosnia; the mountains of Čvrsnica and Čabulja from the southern limit; the western limit extends to the mountain Kamešnica and the Una River, which is the state border with the Republic of Croatia; also, the northern border is the state border that coincides with the Sava River; the western border includes the area up to the city of Banja Luka. The southern area includes Herzegovina; the northern limit is the town of Jablanica and the mountains of Čvrsnica and Čabulja, the southern limit is the border of BiH with the Republics of Montenegro and Croatia, the eastern limit

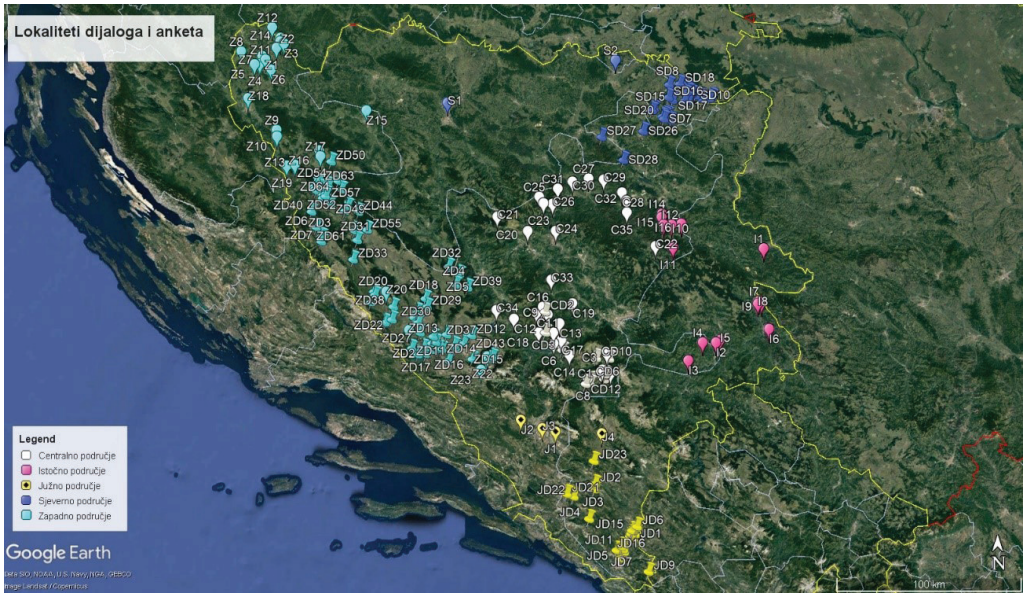


Figure 4. *Sites where dialogues and surveys were conducted (Prepared by Hatibović, 2023, using Google Earth)*

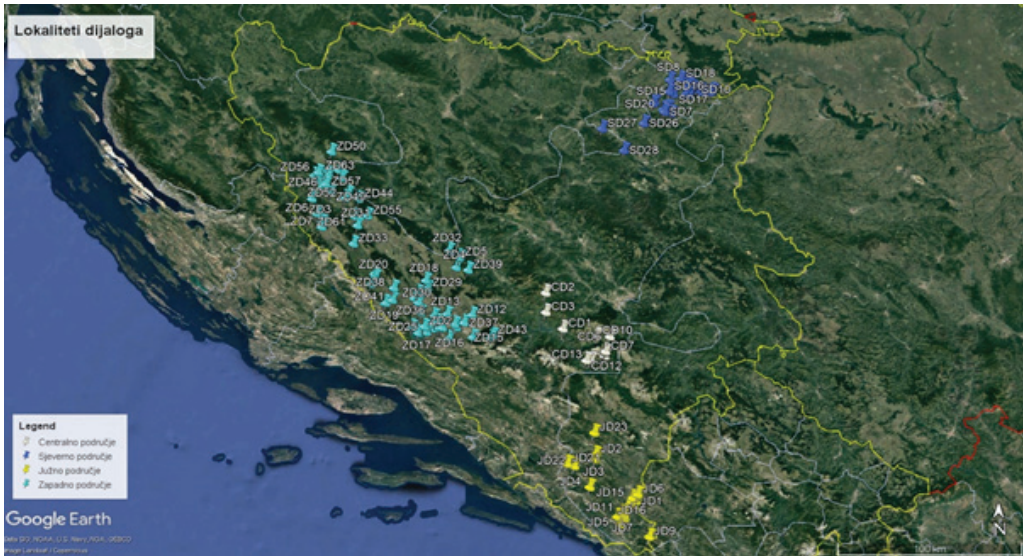
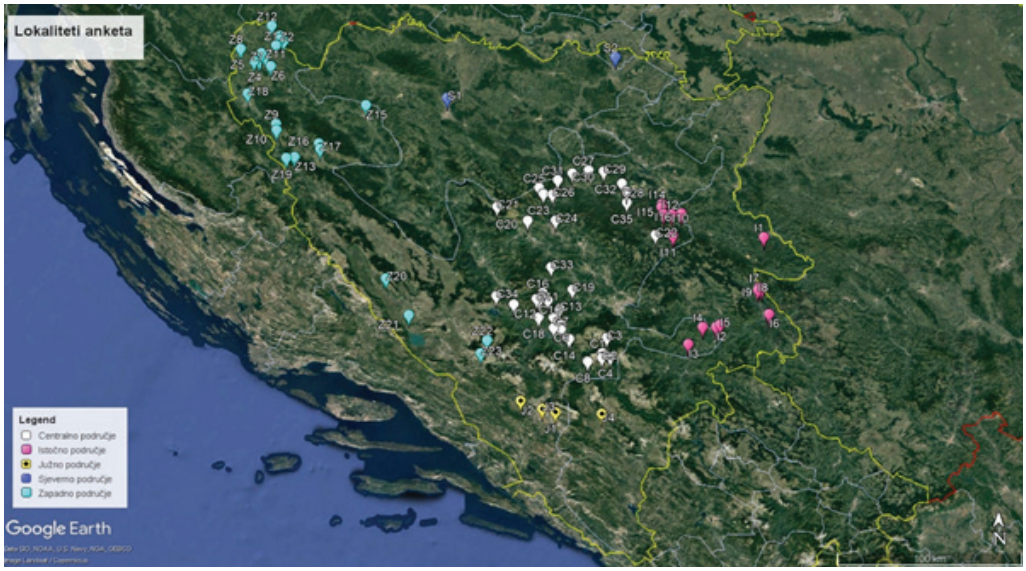


Figure 5. *A- Locations of dialogues (group and individual; Prepared by Hatibović, 2023 using Google Earth)*



B - Locations of surveys (Prepared by Hatibović, 2023 using Google Earth)

is the mountain of Zelengora, and the western limit is the border with the Republic of Croatia. The central area includes localities in central Bosnia; the southern limit extends to the area of the town of Jablanica and the Zelengora mountain; the northern border is located on the southern slopes of Mountain Ozren, the eastern on the slopes of theMountain Konjuh, and the western on Mountain Vranica.

Based on the results of dialogues, individual interviews and surveys, a total of 208 localities were mapped: 30 in the North, 16 in the East, 87 in the West, 27 in the South and 48 in the Central area. The list of all locations is provided in the Annex. In order to present the data more clearly, the mapped localities of dialogues including individual interviews and surveys are presented separately on the maps (Figure 5 a and b).

4.1. Methodology for collecting data on traditional and local knowledge of biodiversity

The methodological approach for collecting data on local and traditional knowledge in Bosnia and Herzegovina was aligned with the methods, principles and goals of the IPBES approach of working with Indigenous Peoples and local communities[5] and their knowledge. At the same time, the adopted approach and methods in this research also took into account the unique and recognizable features of Bosnian nature and society, such as the diversity of ecological, climatic,

Image 6. *Individual interview (Konjic, Jasenik; photo: Hatibović, E., 2022)*

pedological, orographic conditions; a high level of species, ecosystem and genetic diversity; ethnic and cultural diversity; complex state organization; and uneven regional development, among others.

4.1.1. Individual research

4.1.1.1 Questionnaire method

For the purposes of this research to assess the state of traditional and local knowledge, several different methods were used. One of them is the written questionnaire, which was answered by 271 respondents from different parts of Bosnia and Herzegovina. A sample of the questionnaire can be found in the Appendix of this publication. Respondents were offered a questionnaire consisting of a total of 30 questions (Table 3). Of these, five questions referred to the respondents' general data, eleven questions referred to traditional practices, seven to traditional knowledge, and seven to the respondents' opinions about the state and management of natural resources, and the future of traditional and local knowledge in Bosnia and Herzegovina.

Table 3. *Structure of the questionnaire*

Categories	Number of questions	
General data	5	P1, P2, P3, P4, P5
Practices	11	P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, P16
Knowledge	7	P17, P18, P19, P20, P21, P22, P23
Opinions and worldviews	7	P24, P25, P26, P27, P28, P29, P30
Total	30	

In order to gain better insights into the structure of the answers obtained through the questionnaire, the answers to individual questions were analysed according to the age of the respondents. Following Dyussenbayev (2017), respondents were grouped into four age categories (Table 4). The differentiation of the total group of respondents was also made based on gen-

5. Draft methodological guidance for recognizing and working with indigenous and local knowledge in IPBES (https://ipbes.net/sites/default/files/inline-files/IPBES_ILK_MethGuide.pdf)

der, work status (student, employed, unemployed and retired), and according to the highest level of education attained by the respondents (not educated, primary, secondary, university education).

Table 4. *Age categories of respondents (reproduced from: Dyussenbayev, 2017)*

Category	Age group range in years
I	Below 25
II	25-44
III	45-60
IV	61-75

Image 7. *"Walking interview" with holders of traditional knowledge (Ozren; photo: Hatibović, E. 2021)*

Table 5. *Overview of locations where the questionnaire was carried out*

Central area	Western area
• Zavidovići • Zenica - Nemila - Šerići • Zenica • Olovo • Travnik • Prozor-Rama • Fojnica • Jelaške • Starić • Brateljevići • Kladanj • Goletići • Tuholj • Gurdići, Olovo • Željezno polje • Zavidovići • Žepče • Vozuća • Kreševo • Konjic • Konjic, Grabovci • Konjic, Orahovica • Bjelimići • Bjelašnica - Sinanovići • Bjelimići - Trnovo • Bjelimići - Odžaci	• Rakitno • Blidinje • Vržerale • Lusnić • Livno • Cazin • Radoč • Martin Brod • Bihać • Bosanski Petrovac • Sanki Most • Bučevci • Orašac • Bužim
Southern area	**Eastern area**
• Ljuti Dolac • Buna • Ortiješ • Bratač - Nevesinje	• Višegrad • Goražde • Ustikolina • Srebrenica • Luka - Srebrenica
Northern area	
• Odžak • Banja Luka	

4.1.1.2 Interview method

Individual interviews with holders of traditional and local knowledge were carried out using a specific form of 'walking' interview, guided by a method elaborated by Chang (2016). The method of 'walking' conversation has several advantages compared to interviews that are conducted in a closed space, because it stimulates the willingness and ability of participants to shape and convey their own experiences and thoughts. On the other hand, this method enables the researcher to understand the subject of the research more directly and does not disrupt the everyday life of the participants in the research. This method can lead to spontaneous discovery of new knowledge. The guide method is specific in that it is implemented in three phases - a preparatory interview, an interview during a joint walk around the location of interest, which includes taking photos, and a concluding interview around a discussion of the collected data (Chang, 2016). The locations where the questionnaire method was implemented were divided according to different areas of Bosnia and Herzegovina (Table 5).

4.1.2. Group research - Dialogue and workshop method

Local communities are key connoisseurs and bearers of valuable knowledge about practices and customs related to the use of nature in BiH, and also witnesses to ongoing environmental changes. Therefore, data that local communities possess are invaluable, not only for the purpose of documentation, but also for the practical preservation of traditional and local knowledge in BiH.

In order to collect data on the state of traditional and local knowledge and practices in different local areas of Bosnia and Herzegovina, dialogue workshops were organized during the last two years, which are presented below by area (Table 6).

By organizing workshops and dialogues in the mentioned local areas, the team tried as far as possible to get data on traditional and local knowledge about different ecological, climatic and orographic conditions in Bosnia and Herzegovina. First of all, the typical biogeographical division of BiH (Pannonian, mountainous and Mediterranean) was taken into account. Later processing of the data also tried to determine the connection with previous research conducted in the northern, eastern, western, southern or central regions of Bosnia and Herzegovina.

Table 6. *Overview of locations in which workshops were organized*

Locations	Date	Number of participants	Area
Trebinje	28.06.2021	13	Southern
Livno	30.06.2021	17	Western
Drvar	01.07.2021	10	
Brčko	06.07.2021	11	Northern
Srebrenik	06.07.2021	6	
Ozren	07.07.2021	5	
Bjelimići	06.07.2022	8	Central
Konjic	01.11.2022	6	

While sending invitations to workshop attendees, special consideration was given to ensuring equitable representation and participation of different stakeholders in each location of focus. Prominent organizations and local administrative structures were sent a written invitation with a request for further distribution. In this way, local producers, beekeepers, collectors of medicinal herbs, mushrooms and forest fruits, cattle breeders, fisherfolks, hunters, reapers, scouts, mountaineers, foresters and connoisseurs of ancient craft were invited. The invitation particularly emphasized the importance of women's participation in the workshop and dialogue. With the consent of the participants guided by the principle of free, prior and informed consent (FPIC), individual and group contributions to the dialogues were recorded and documented through written texts and on maps, guided by the method of Steven DeRoy (2016) of direct-to-digital mapping.

Dialogues were based on a combination

of creative and qualitative research approaches. In this sense, data on traditional and local knowledge in the aforementioned workshops were collected in the following ways:

- In the first part of the workshop, which was a discussion, the holders of traditional and local knowledge presented themselves and described the main activity they are engaged in;
- The second part of the workshop took place in the form of group discussions that focused on the sustainability of the traditional and local knowledge and practices, as well as challenges noted and experienced by knowledge holders; and,
- In the third part of the workshop, the holders of traditional and local knowledge actively participated in mapping specific micro localities connected with the traditional and local knowledge and practices in their surrounding area. The mapping was done using direct-to-digital mapping technique through Google Earth Pro software.

By applying the above-mentioned method, a large amount of spatial data was collected, on the basis of which a wide database was established. In addition to the collected information on traditional and local knowledge and practices, information about the area, locality, GPS coordinates, description of practices, statements of holders of traditional and local knowledge were also gathered and entered into the database. Each recorded piece of knowledge was coded with map marks (ZD13, SD23, etc.), survey marks (B400, B403, B387, etc.), descriptions of nature's contributions to people (NCP1-NCP18) as well as various forms of direct and indirect drivers affecting the state of the local ecosystems (D1 -D5; I1-I5). Summary databases that contain basic information about locations, mapped traditional and local knowledge, as well as a list of respondents, are presented in the appendix of the publication as separate tables for dialogues and questionnaires. In the database of surveys, gender, work status and education for each participant are also listed in the Appendix.

Given that oral data were collected using the individual interview method and the dialogue method at the workshops as opposed to the questionnaire method, the research results obtained through these two methods are presented together.

4.1.3. Typology of Nature's Contributions to People

In chapter 4.2 of this publication, the results related to NCP will be presented. According to Díaz et al. (2018), 18 categories of NCPs were defined (Table 7), which are organized into three partially overlapping groups, namely: regulatory, material and non-material groups of contributions. The type of contribution depends on nature's contributions to people's quality of life. The group of material NCPs consists of raw materials, materials and other material elements provided by nature, which people directly use for their daily activities and for the creation of other material goods through economic and other activities. The non-material group of NCPs consists of nature's effects and natural processes on the experiential and psychological dimension of people's quality of life at the individual and collective levels. The regulatory group of NCPs is the result of the functionality and ability of ecosystems and organisms to influence environmental conditions and regulate the emergence of material and non-material NCPs. These contributions indirectly, but constantly, affect people's quality of life.

Table 7. *Typology of Nature's Contributions to People, reproduced from Díaz et al. (2018)*

Nature's Contributions to People	Category
Habitat creation and maintenance	NCP1
Pollination and dispersal of seeds and other propagules	NCP2
Regulation of air quality	NCP3
Regulation of climate	NCP4
Regulation of ocean acidification	NCP5
Regulation of freshwater quantity, location and timing	NCP6
Regulation of freshwater and coastal water quality	NCP7
Formation, protection and decontamination of soils and sediments	NCP8
Regulation of hazards and extreme events	NCP9
Regulation of detrimental organisms and biological processes	NCP10
Food and feed	NCP11
Energy	NCP12
Materials, companionship and labour	NCP13
Medicinal, biochemical and genetic resources	NCP14
Learning and inspiration	NCP15
Physical and psychological experiences	NCP16
Supporting identities	NCP17
Maintenance of options	NCP18

4.1.4. Typology of drivers on biodiversity and nature

In chapter 4.2.1. the results related to the drivers on nature, which the interviewees emphasized during the research, will also be presented. According to IPBES (2018), two large groups of drivers on biodiversity are defined, namely: direct drivers or on-site drivers and indirect drivers relating to adverse social phenomena and movements. Both groups of drivers are further differentiated into their respective categories (Table 8).

Table 8. *Typology of drivers on nature (according to IPBES, 2018)*

Direct drivers:	Indirect drivers:
1. Conversion (loss, change of habitat) 2. Overexploitation of biodiversity 3. Pollution 4. Invasive species 5. Climate change	1. Institutional drivers 2. Economic drivers 3. Demographic drivers 4. Cultural and religious drivers 5. Scientific and technological drivers

4.2. Results of current research on traditional and local knowledge of biodiversity

4.2.1. Analysis of the questionnaire results

As stated in the methodology section (4.1), for the purposes of contemporary insight into the state of traditional and local knowledge, a large part of the data was collected using questionnaires. In this way, written responses were obtained, which through subsequent processing, were included in a wide database (Appendices 2 and 3). Out of the 30 questions from the questionnaire, for the purposes of this publication, the questions that directly respond to the key questions of the 'Assessment of the State of Nature and Management of Natural Resources in Bosnia and Herzegovina' have been singled out.

Questions from the questionnaire will be presented in the following order:

1. Analysis of general information of respondents;
2. Analysis of the knowledge and application of traditional practices;
3. Analysis of the traditional and local knowledge in local communities;
4. Analysis of the opinion on the state and use of natural resources.

4.2.1.1 Analysis of general information of respondents

The assessment of the state of traditional and local knowledge using the questionnaires was carried out in a total of 51 locations. In total, 271 respondents answered the questionnaire, of which 55.06% were men and 40.45% were women (Figure 6). Age groups were not equally represented. There were two respondents in age group I (up to 25 years), 91 respondents in age group II (26 to 44 years), 101 respondents in group III (45 to 60 years) and 59 respondents in group IV (61 to 75 years) (Figure 7).

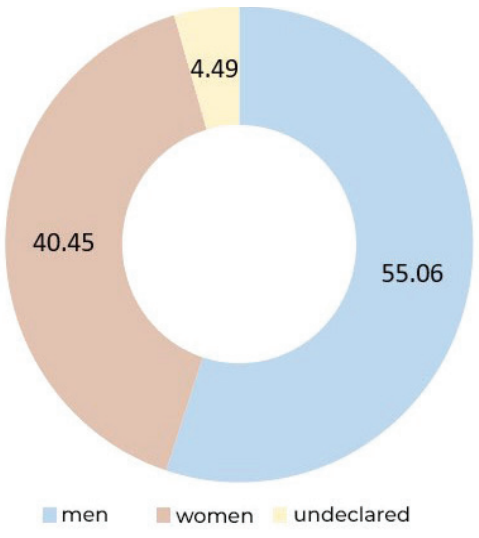


Figure 6. *Respondents according to gender (%)*

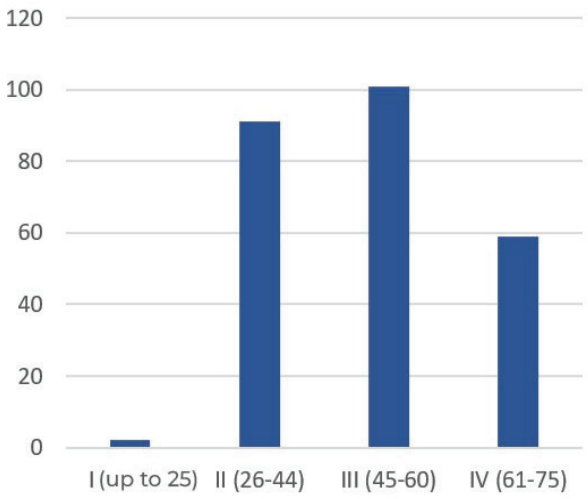


Figure 7. *Respondents according to age groups (%)*

Image 8. Dialogue in Bjelimići
(Photo: Macanović, A. 2022)

The workshop in Bjelimići (Visočica mountain) was held on July 6, 2022. A total of 8 traditional and local knowledge holders were present The participants highlighted numerous NCPs in their environment and shared details about the traditional use of different plant species. In the conversation, local expressions were recognized for certain species (such as skunk or pear tree, Frangula alnus Mill.), specific expressions for objects and specific ways of using resources from nature (wood for making shimla, work tools, wool, provide, etc.). The discussion was also conducted around the drivers in nature, among which the construction of small hydropower plants, the lack of tourist infrastructure and insufficient involvement of institutions in the direction of sustainable rural development are particularly prominent. The local community has clearly emphasized its interest in local development on the one hand, and the preservation of tradition on the other. On the basis of the dialogue, digital mapping of localities with recognized NCPs was carried out. Participants and other residents of the area were surveyed and interviewed.

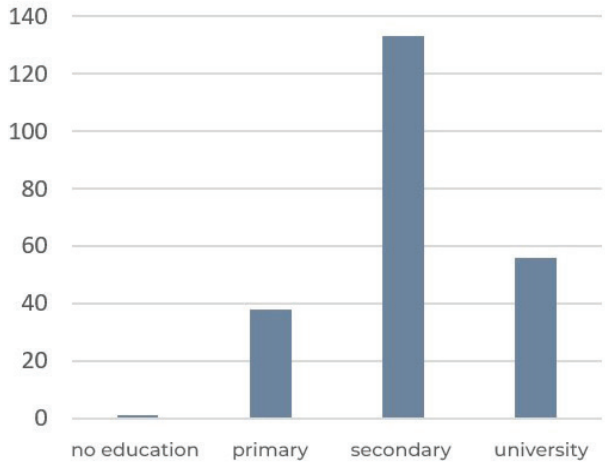


Figure8. *Respondents, according to level of education (%)*

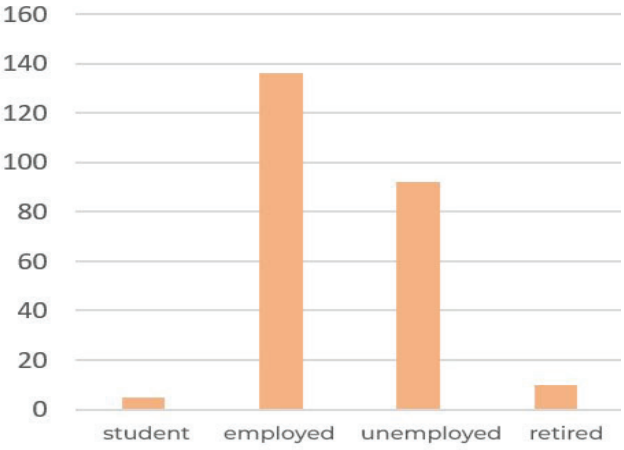


Figure 9. *Respondents, according to employment*

The analysis of the group of respondents in relation to the level of education (Figure 8) shows that the largest number of respondents have obtained secondary (58.3%) and university education (24.6%). Fewer respondents have obtained primary education and only one had no education. Upon analysing the results, it was determined that the largest number of respondents (56%) were employed, and a smaller number (37.9%) were unemployed (Figure 9). Pensioners (4.1%) and students (2.1%) also participated in the survey.

4.2.1.2. Analysis of the knowledge and application of traditional practices

Q1 Do you use natural resources?

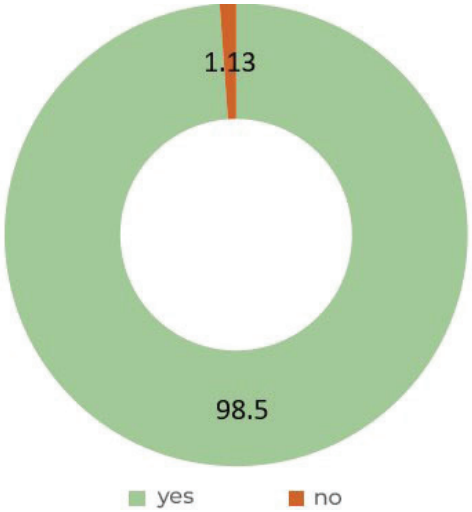


Figure 10. *Practice of using resources from nature (%)*

Based on the analysis of the answers to the question about the use of natural resources, it can be concluded that almost the entire surveyed group uses natural resources in their everyday life, which was confirmed by 98.5% of respondents (Figure 10). Therefore, natural resources in BiH are widely used. Analysis of the same answer by age groups (Figure 11) shows that natural resources are commonly (74.70%) used today by respondents aged between 25 to 60 years. However, the youngest age group had the lowest use of natural resources, although this could be attributed to the lowest number of respondents in this group category that responded to the survey (Figure 7). Analysing the work status of the respondents (Figure 12), it can be seen that people who have a job use natural resources the most, which is contrary to the expected result. The use of natural resources can support the economic condition of the respondents, and it was expected that the unemployed would be the main user group.

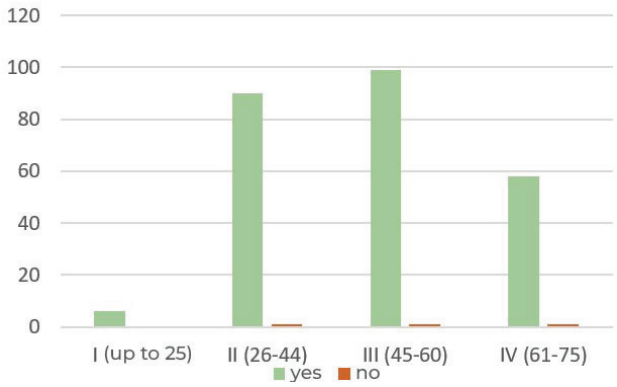


Figure 11. *Practice of using resources from nature, according to age groups (%)*

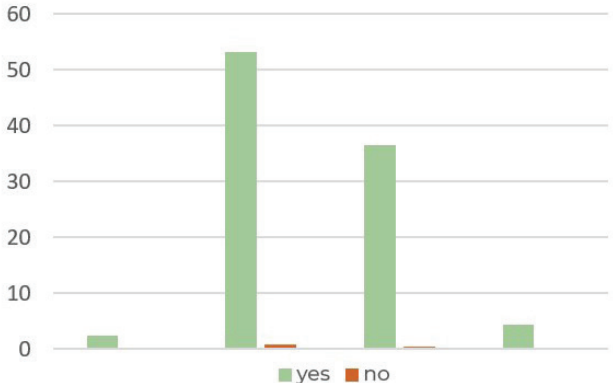


Figure 12. *Practice of using natural resources, according to employment status (%)*

Q2 Do you use medicinal plants for treatment?

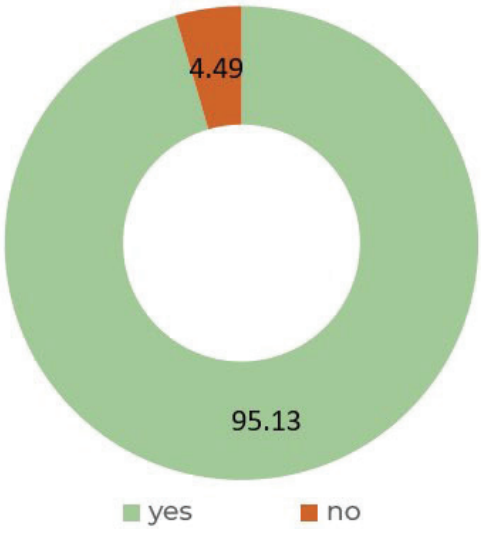


Figure 13. *Practice of using medicinal plants (%)*

According to the answers received, almost all respondents use medicinal plants in the treatment of diseases (Figure 13). The analysis of age groups in the answers to the same question shows a normal distribution to the use of medicinal plants across all age groups (Figure 14).

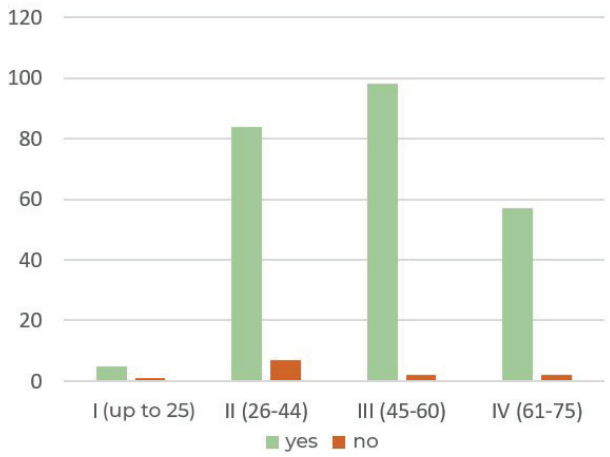


Figure 14. *Practice of using medicinal plants according to age groups (%)*

Q3 Do you prepare homemade juices, *pekmez* (type of syrup), jams or marmalades from resources collected from nature?

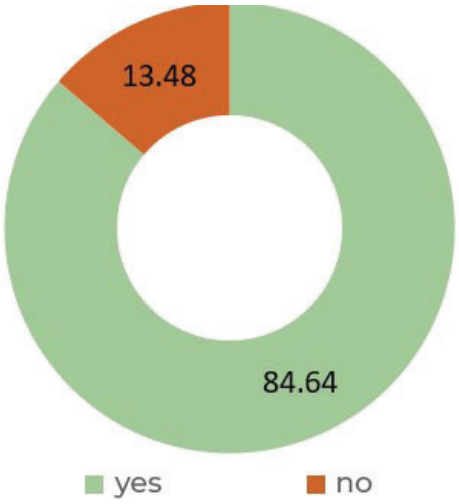


Figure 15. *Practice of preparing homemade juices, pekmez, jams, marmalades from plant resources (%)*

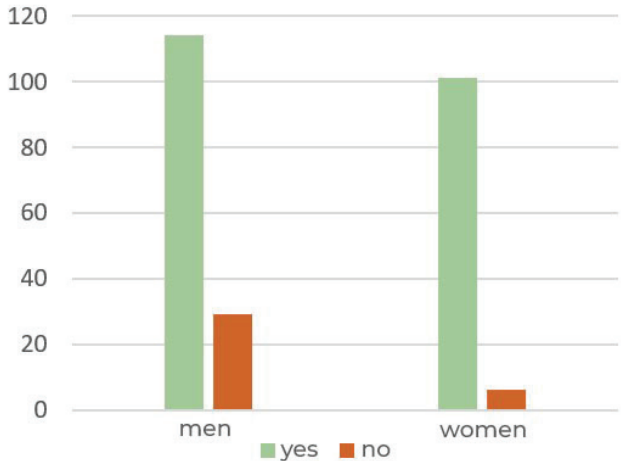


Figure 16. *Practice of preparing homemade juices, pekmez, jams, marmalades from plant resources, by gender (%)*

Respondents used natural resources in the preparation of traditional products (Figure 1 5). By analysing the gender (Figure 1 6), it cannot be concluded that women participate more in the preparation of traditional recipes. The main reason for this distribution of answers by gender probably lies in the fact that male respondents referred to what happens in their households, and not only what they themselves participate in. However, it is worth noting that fewer proportion of women, compared to men, indicated that they don't prepare homemade juices.

Q4 Do you harvest, grow, buy or otherwise source medicinal plants for use?

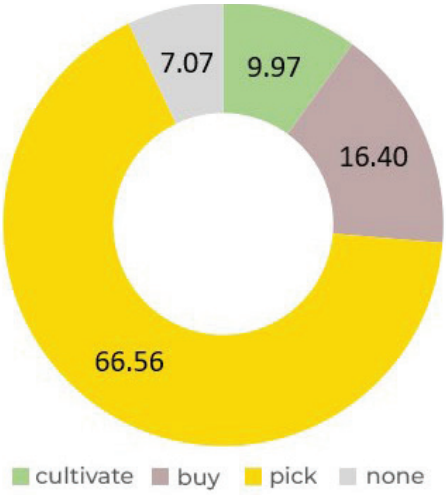


Figure 17. *Use of medicinal plants (%)*

The analysis of the questionnaire responses shows that the respondents most often independently collect medicinal plants from nature by themselves (Figure 17), and only a small proportion of respondents purchase them. A small proportion of the respondents also grow medicinal plants. Analysing the responses in relation to respondents' occupation status (Figure 18), it can be seen that medicinal plants are collected by both employed and unemployed people. The analysis shows that employed people buy medicinal plants more often than the unemployed. Respondents in the status of pensioners are engaged in collecting and growing medicinal plants to a lesser extent, and rarely buy them.

Analysis of motives for collecting plant resources (Figure 19) shows that the majority of the respondents collect plant resources for the purpose of providing the household with healthy food. The next motive is the use of plants for the purpose of disease treatment and prevention. According to the survey responses, sale ranks third as a motivating factor for collecting plant resources.

Q5 What is your motive for collecting plant species?

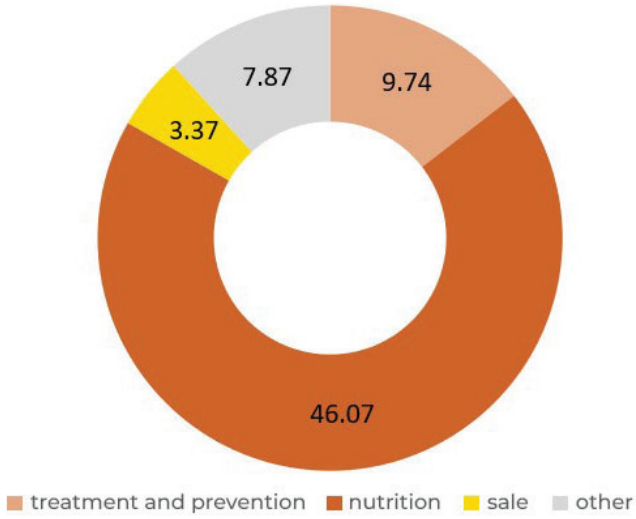


Figure 19. *Motive for gathering plant species (%)*

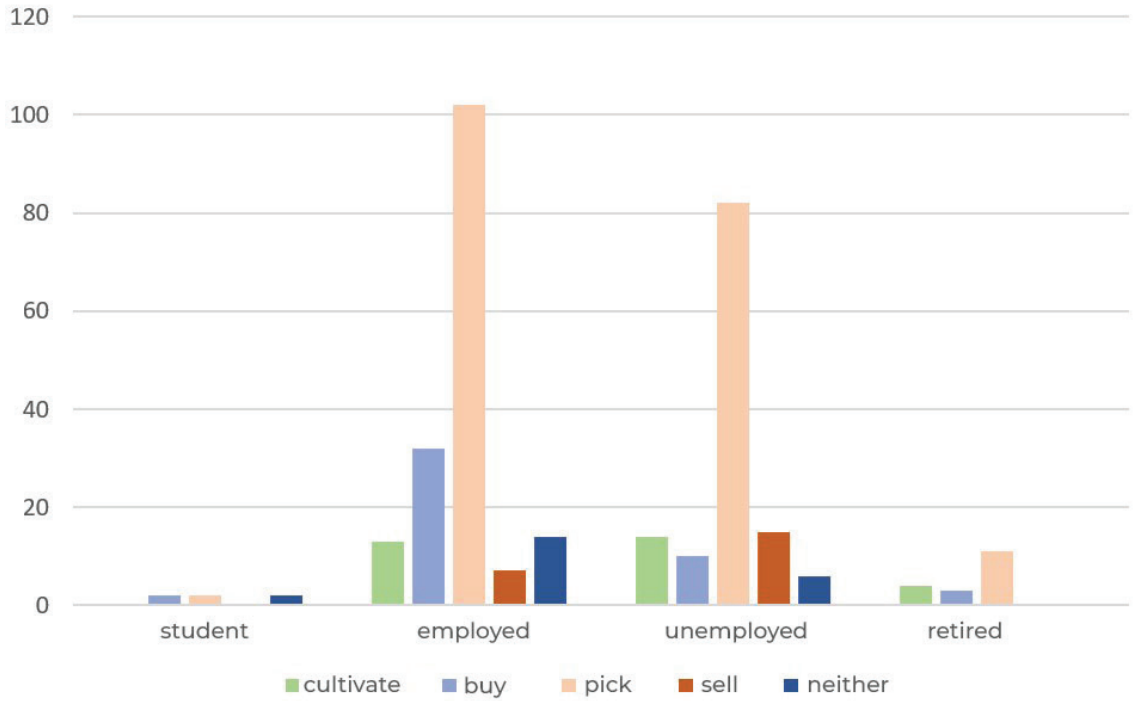


Figure 18. *Use of medicinal plants, according to the employment status (%)*

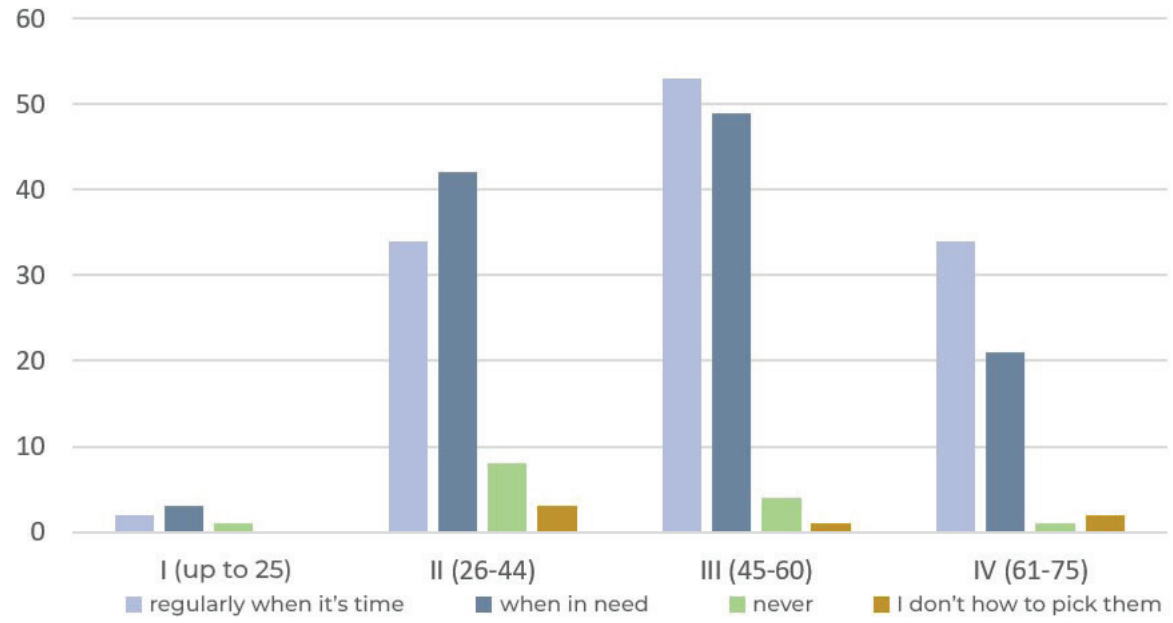


Figure 20. *Frequency of collecting medicinal plants, according to age group (%)*

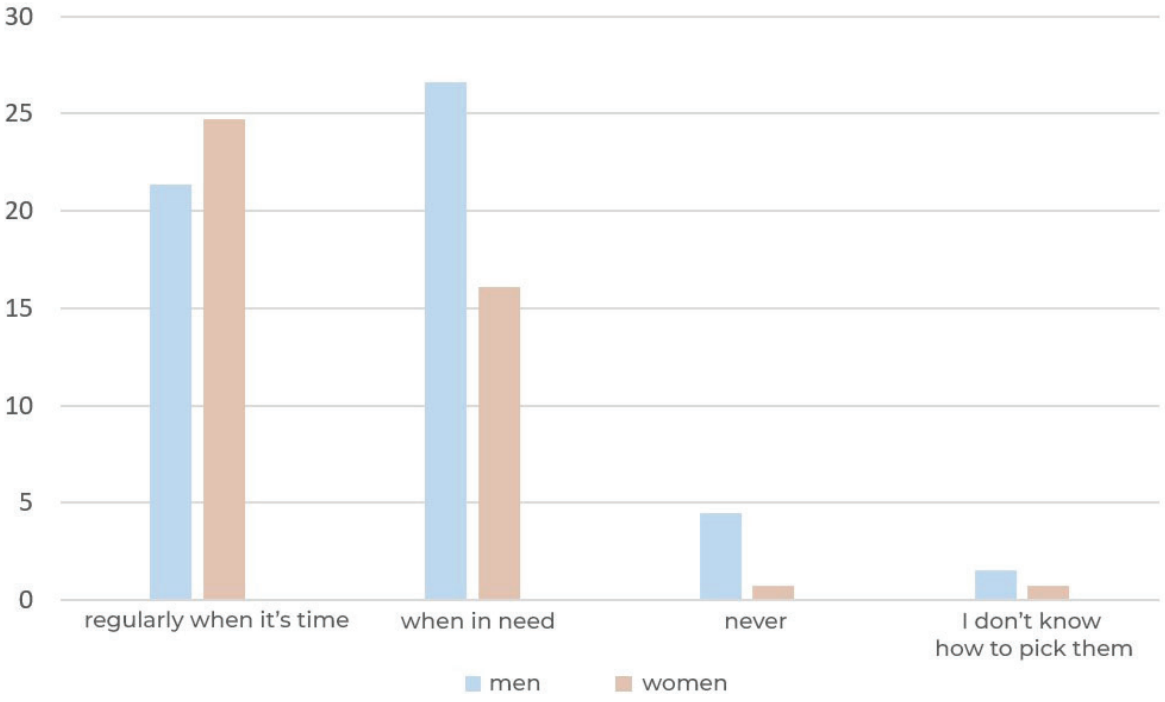


Figure 21. *Frequency of collecting medicinal plants, according to gender (%)*

Q6 How often do you pick or collect medicinal plants?

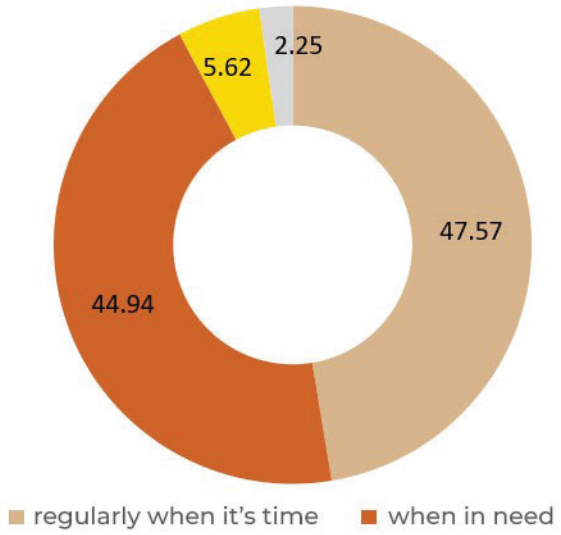


Figure 22. *Frequency of collecting medicinal plants (%)*

Analysis of frequency of the practice of harvesting medicinal plants shows (Figure 22) that the largest proportion of respondents (47.57%) regularly collect medicinal plants. A slightly smaller proportion of respondents (about 45%) collect medicinal plants only on a need basis. Analysis of the frequency of harvesting medicinal plants by age group (Figure 20) shows that all respondents over 60 have a more regular practice of collecting medicinal plants, and that respondents between the ages of 26 and 44 usually collect medicinal plants when in need. The analysis of the same answer according to gender (Figure 21) shows that women are more involved in regular harvesting, while men are more likely to collect medicinal plants when needed.

Image 9. Dialogue in Trebinje (Photo: Velić, S. 2021)

The dialogue with the local community in Trebinje was held on July 6, 2021. Local producers and representatives of local institutions were present. Numerous NCPs were recognized in the Trebinje region, and among them food supply, beekeeping, grazing of autochthonous varieties of cow (gatačka buša), and collection of medicinal and aromatic species and their cultivation are particularly prominent. The present promotion of food products is linked to the development of tourism through the Herzegovina House (sale of local traditional Herzegovina products). The discussion was also conducted on numerous direct and indirect drivers, among which the loss of large areas of natural habitats due to the construction of power plants and the construction of large infrastructures stands out. One of the recognized problems is the appearance of insects that were not widespread in this area before.

Image 10. Dialogue in Livno (Photo: Velić, S.2021)

The dialogue with the local community in Livno was held on June 30, 2021. It was attended by representatives of the local communities of Kupres, Tomislavgrad, Livno and Glamoč. The partecipants highlighted numerous NCPs, such as the production of healthy food (Livanjski cheese), the collection of medicinal plants, beekeeping, the use of sheep's wool for knitting, etc. The entire Livno region and its surroundings are oriented towards tourism, and traditional customs, such as mowing in Kupreško polje, attract attention today. This custom has been on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity since 2020. There was s discussion about the drivers that affect nature and people in this area of BiH. The effects of climate change are recognized through frequent fires and large burnt areas. Soil pollution occurs through the use of pesticides in agriculture. The younger population is moving abroad en masse, as a result of which there is a weakening of agriculture and a decrease in livestock.

Q7 When was the last time you prepared a traditional dish?

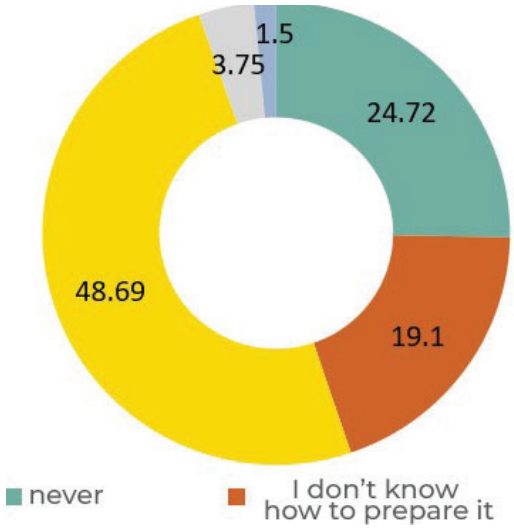


Figure 23. *Frequency of preparing traditional dishes (%)*

Analysis of the common practice of preparing traditional dishes (Figure 23) shows that approximately half of the respondents regularly prepare traditional dishes, while a fifth of the respondents never do. Analysis based on age groups (Figure 24) shows a decline in the application of this practice in all age groups. Analysis of the practice of using traditional recipes (Figure 25) according to gender, as expected, shows that this is practiced less often by men. The answers show that women are the guardians of traditional recipes through their regular application.

Image 11. Traditional production of Livno cheese (Milak family, Livno; photo: Hatibović, E. 2022)

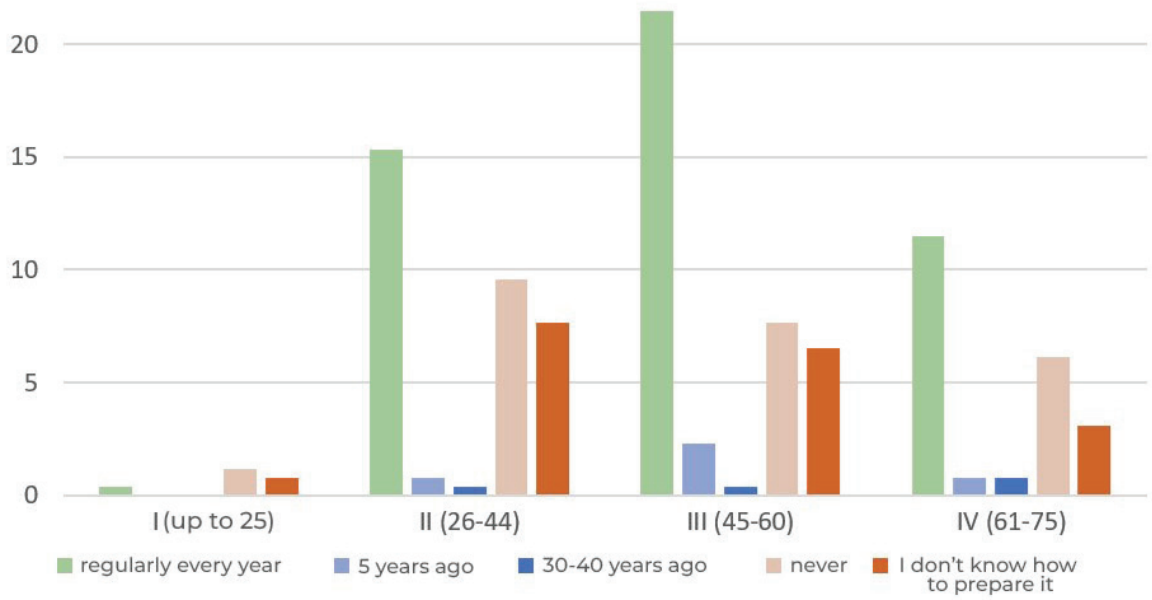


Figure 24. *Frequency of preparing traditional dishes, according to age group (%)*

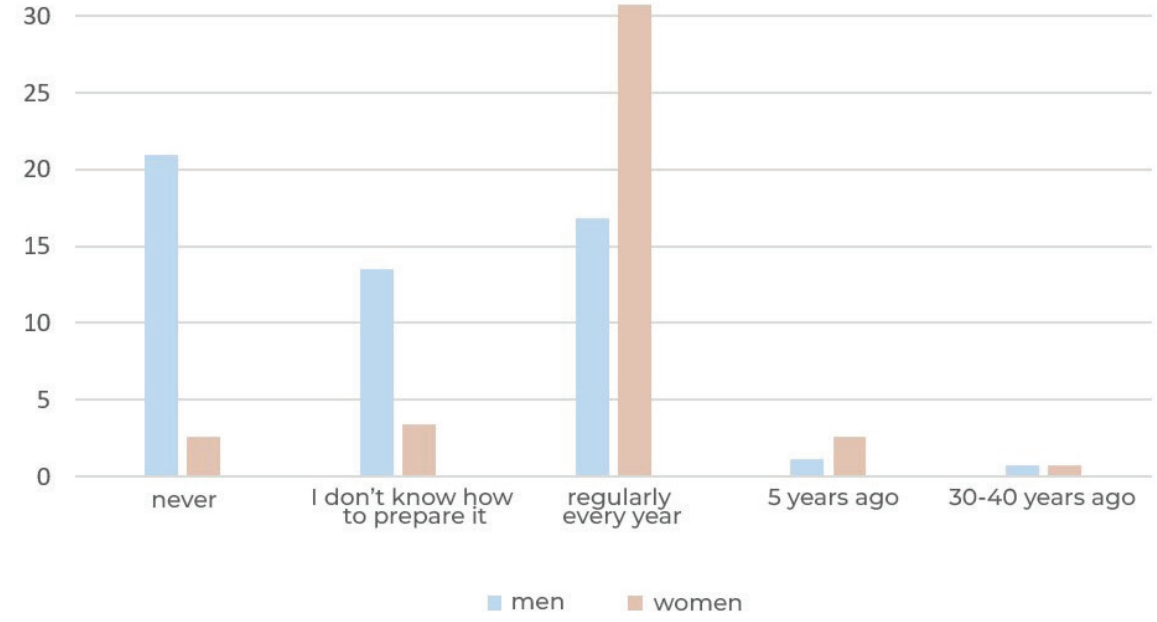


Figure 25. *Frequency of preparing traditional dishes by gender (%)*

Image 12. Interview in the Ozren Mountain, Ekocentar (Photo: Hatibović, E. 2021)

In the area of Ozren near Doboj, the meeting was organized on 07.07.2021. in the Ekocentar, which is successfully managed and developed by Jasenka and Rade Živković. It was discussed about the numerous NCPs of wild, as well as species grown within the Ekocentar. In an effort to develop in the youngest children a love for nature and an awareness of its benefits, Rade and Jasenka host large groups of children from BiH. Several farms were visited in the Ozren area, where discussions were held about the existing drivers in nature. Residents pointed out significant changes that are visible in nature, among which the disappearance of Ozren streams is particularly prominent, due to climate change, as they assume, but also due to intensive water capture. In order to develop and increase the standard of living, the local population actively collects medicinal resources and prepares various products. Among the medicinal species of this area is the mountain germander (*Teucrium montanum*), the usual collection of which is protected by UNESCO as an intangible heritage of Bosnia and Herzegovina.

Q8 When was the last time you consumed some traditional medicinal beverage?

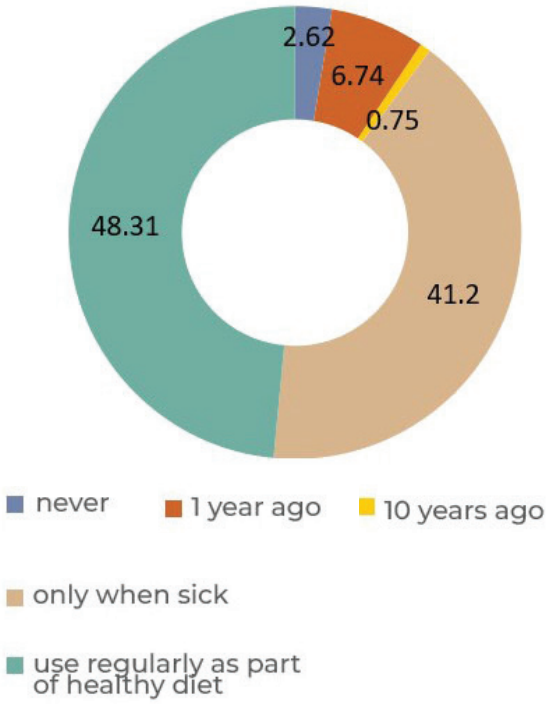


Figure 26. *Frequency of using traditional medicinal beverages (%)*

Frequency analysis on the use of traditional medicinal beverages (Figure 26) indicates that nearly half of the respondents use traditional beverages regularly for nutrition purposes and about 41% of the total respondents only use traditional medicines when sick. Frequency analysis based on occupation status (Figure 27) shows that all groups except students regularly use traditional beverages as a healthy way of eating. Analysis by age (Figure 28) shows that older groups use traditional beverages more regularly as a healthy way of eating compared to younger respondents. Analysis by gender shows that women regularly use traditional medicine, while men primarily use this method of treatment only when sick. In terms of education level, the analysis shows that people with a higher level of education use traditional beverages more regularly (Figure 29).

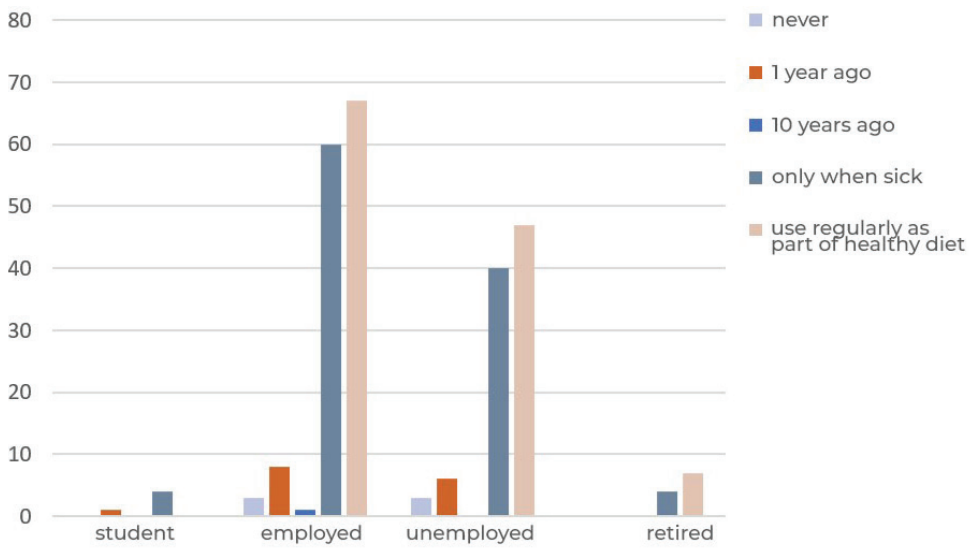


Figure 27. *Frequency of using traditional medicinal beverages, according to the employment status (%)*

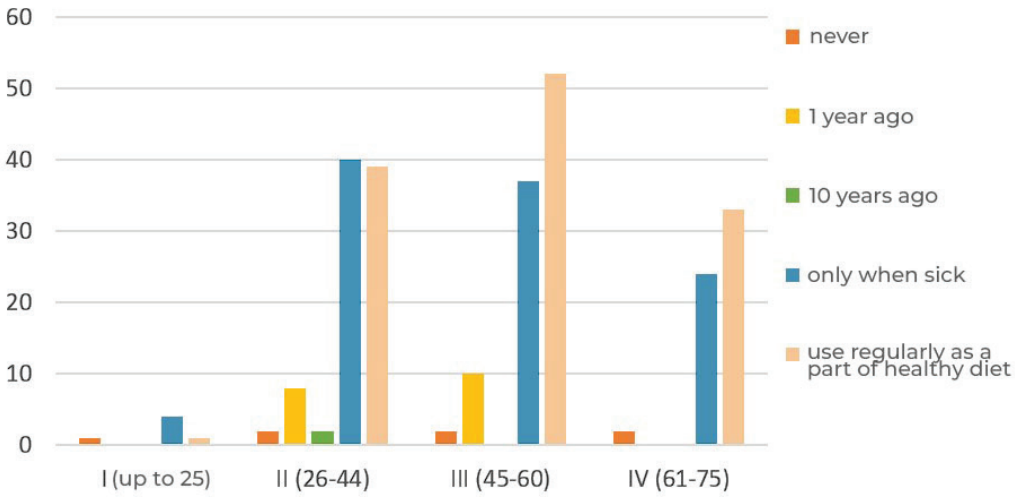


Figure 28. *Frequency of using traditional medicinal beverages, according to age group (%)*

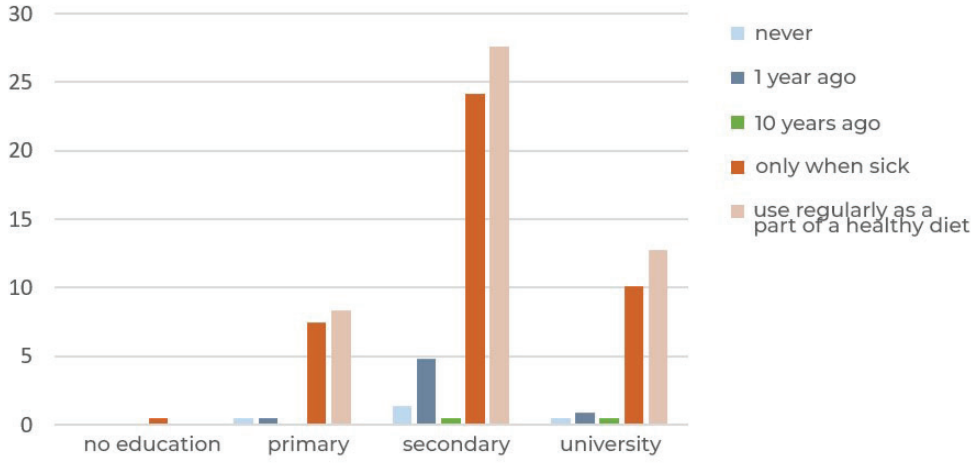


Figure 29. *Frequency of using traditional medicinal beverages, by education (%)*

Q9 Which resources do you often use from nature?

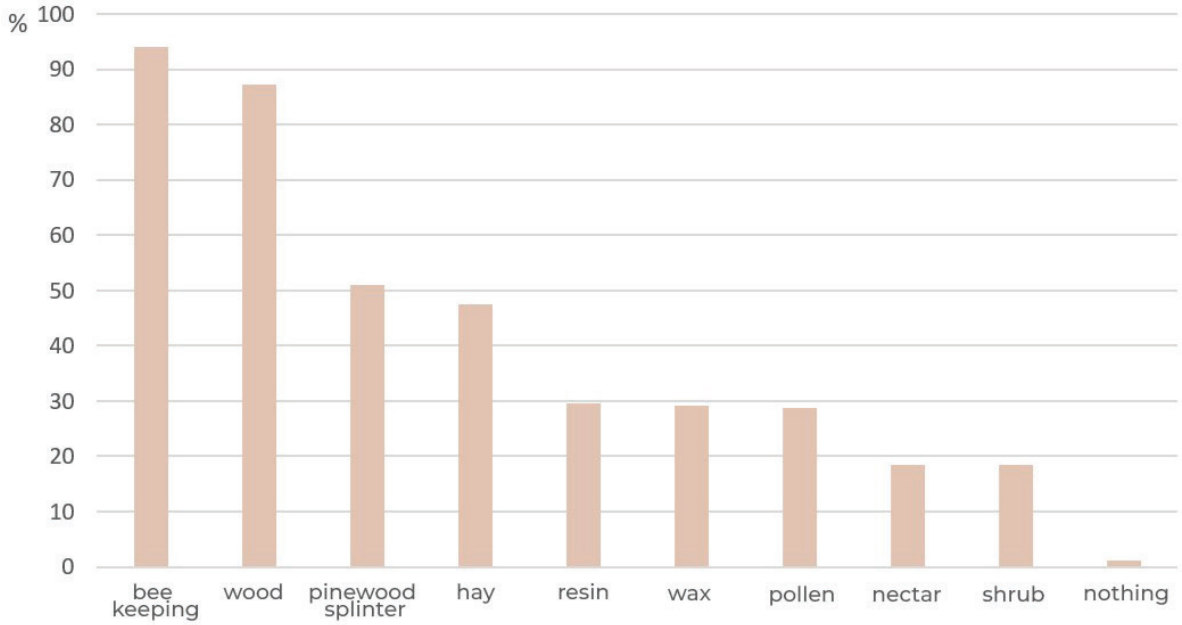


Figure 30. *Most frequently used resources from nature (%)*

Analysis of frequently used natural resources shows that over 90% of respondents rely on natural ecosystems for the production of honey (Figure 30). Also, over 85% of the respondents directly collect wood from nature, primarily for heating purposes. Nearly half of the respondents use hay as animal feed or fertilizer. The findings revealed that the commonly obtained provisioning ecosystem services are bee keeping, wood and hay. Accordingly, the study shows that employed respondents benefit from nature more than the unemployed. At the same time, it should be taken into account that the group of employed respondents mainly consists of those who live in cities, where they are exposed to higher living costs. This group of respondents only occasionally (on weekends) live in rural areas where they directly use natural resources. In contrast, the group of unemployed respondents is largely made up of residents of rural areas. The results indicate that residents of rural areas make less use of available natural resources. Another factor is that rural areas today are mainly populated by older citizens. This is demonstrated in Figure 32 which shows that the oldest respondents were least likely to use the analysed resources and NCPs.

Image 13. Traditional way of grinding flour in mills (Photo: Barudanović, S. 2022)

Image 14. Traditional practice of mowing meadows (Vlašić; photo: Barudanović, S. 2022)

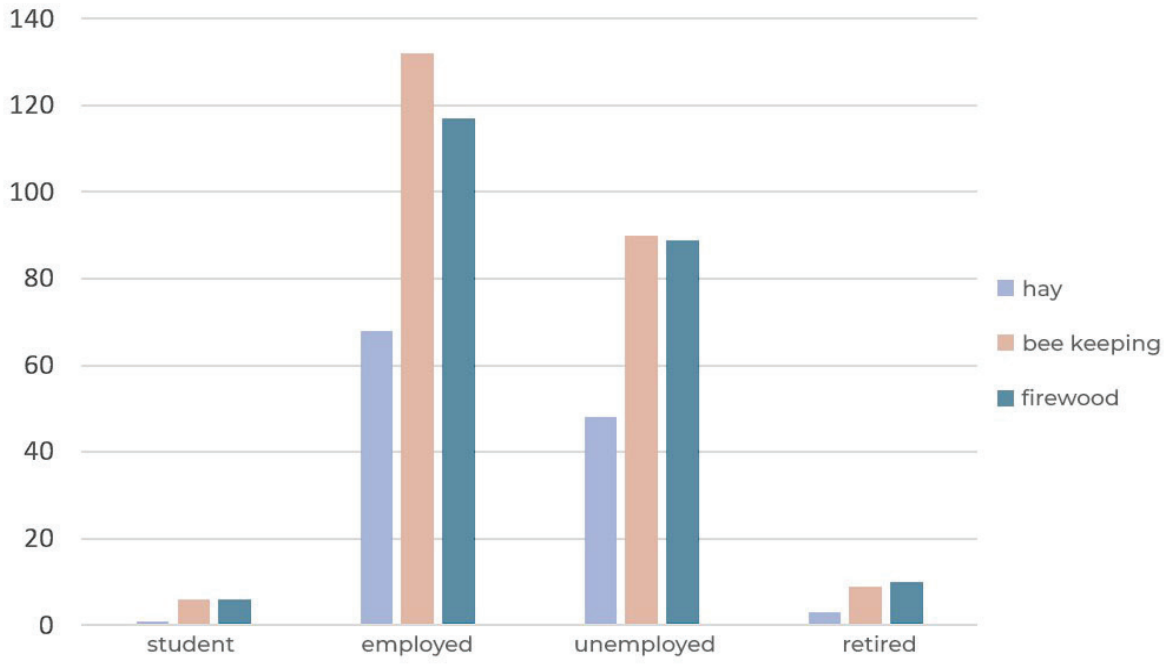


Figure 31. *Use of bee keeping, hay and wood, by employment status (%)*

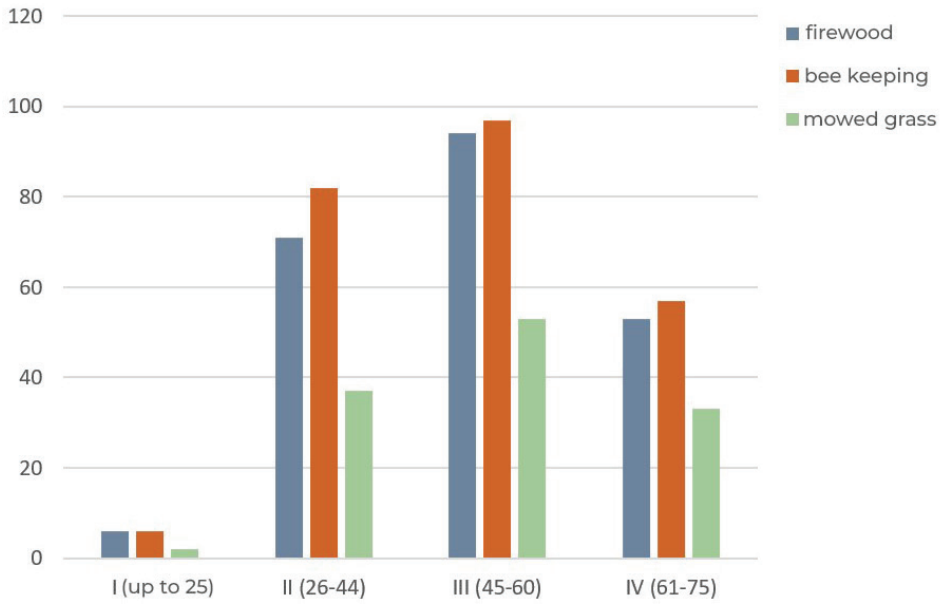


Figure 32. *Use of bee keeping, hay and wood, according to the age group (%)*

Q10 Do you practice any of the mentioned activities?

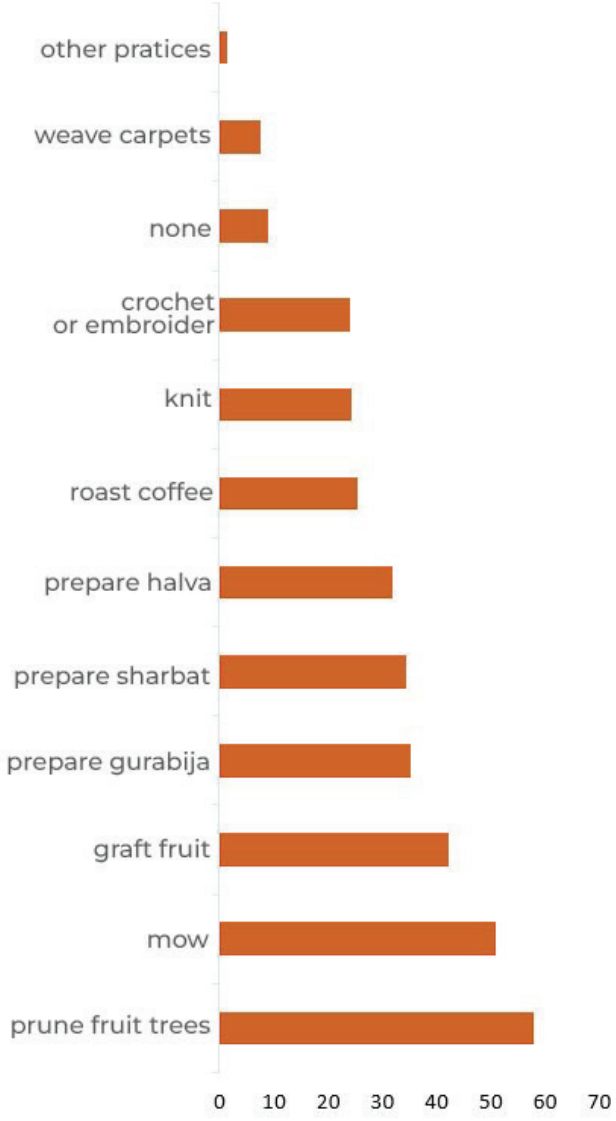


Figure 33. *Adoption of traditional practices (%)*

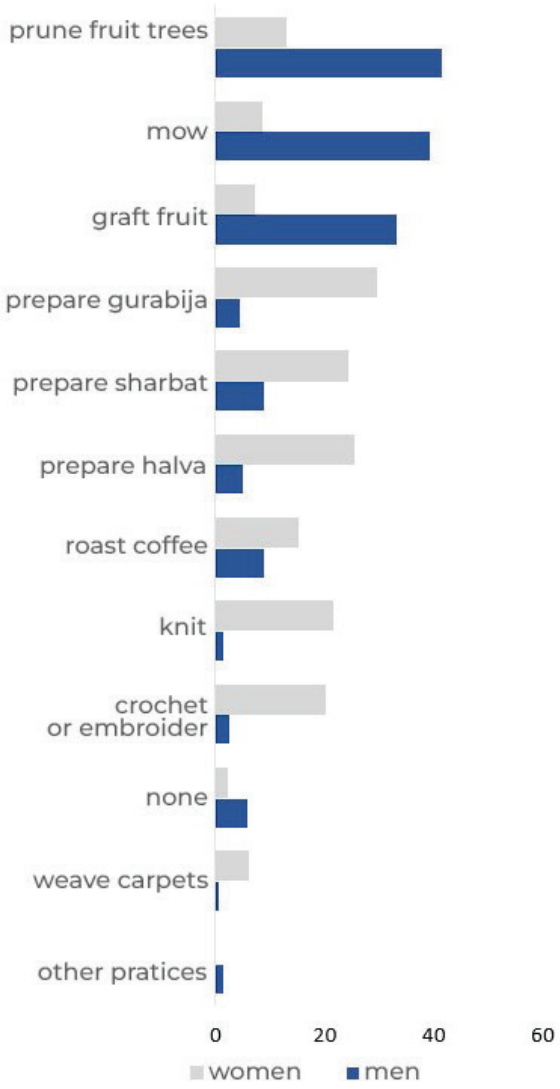


Figure 34. *Adoption of traditional practices, according to gender (%)*

The analysis of the adoption of traditional practices in rural areas of Bosnia and Herzegovina shows that in relation to the total number of respondents (271), at best, about a quarter of the respondents still observe some of the practices as depicted in Figure 33. It was observed that practices that ensure food supply for humans and animals are most widely practiced. On the other hand, although there is still a traditional division of jobs across gender in BiH, the number of women engaged in traditionally male dominated jobs such as, mowing, pruning and grafting of fruit trees is not negligible (Figure 34). This distribution of traditional jobs may be the result of current and historical demographic changes in BiH.

Image 15. Selling domestic products in the tourist offer (Buna; photo: Barudanović, S. 2022)

Image 16. "Ljesa" - part of a traditional fruit dryer (Bjelimići; Photo: Macanović, A. 2022)

Image 17. Traditional motifs on wool weavings (Bjelimići; Photo: Macanović, A. 2022)

Image 18. Dialogue in Srebrenik (Photo: Hatibović, E. 2021)

The dialogue with the local community in Srebrenik was held on July 6, 2021. The event was attended by local producers, nature lovers, and collectors of medicinal and aromatic plants. The discussion highlighted numerous NCPs that the people of this region have from their natural environment, among which the most recognizable are food supply, agricultural production, fishing, provision of materials from nature, etc. The inhabitants of this area are proud of the cultivation of fruit trees (apples, pears, cherries, figs, grapes, etc.), among which varieties of viljamovka, sarajka apples, Srebrenica apples, hard-skinned apples, takisha, etc. are especially cultivated. Even today, the traditional practices of drying plums (požegača, čačanska) are applied. In addition to fruit and the usual vegetable crops, the inhabitants also cultivate okra, dogwood, walnuts, etc. The benefits of collecting medicinal plants such as wild garlic, yarrow, black comfrey, dogwood, nettle and others are very well recognized, both in meeting one's own needs and for sale. There was also a discussion with the participants about the causes of evident changes in nature. In the conversation, the topics of water and land pollution, drying up of streams, and changes in the composition of the fishing stock were highlighted. Those present pointed out, as direct and indirect drivers: the lack of organized purchase of medicinal plants, the lack of education and solidarity in the use of protective means in fruit growing, the departure of the population (due to which fewer people are engaged in agriculture), the decrease in honey yields due to the impact of climate change on bee grazing, unplanned and inadequate afforestation, reduction of hunting stock, irresponsibility in waste management, etc. The participants especially pointed out that due to climate change, greenhouse production is increasingly being used.

Image 19. Dialogue in Brčko
(Photo: Hatibović, E. 2021)

The dialogue with the local community in the Brčko District of BiH was held on 06.07.2021. The workshop brought together local producers, hunters, fishermen, representatives of institutions and small businesses. The discussion highlighted numerous advantages of the District as an area whose nature supports strong agricultural production. On the other hand, the discussion highlighted numerous drivers in nature and the population that depends on it. According to the local community, one of the causes of the pressures is the weak representation of biology teaching in the educational process, and also the impossibility of transferring local knowledge through education. The local population very closely connects the state of nature with the effects of climate change, which are manifested, first of all, through the reduced amount of water for irrigation and cultivation. Invasive species are common both in terrestrial and aquatic ecosystems, and among plant and animal species. One of the most invasive species is the "Dunavac". The population is still engaged in the traditional fishing of catfish, pike, perch, bream, roach and barbel, with a note of a significant reduction in the fish stock.

Q11 When collecting plants, do you leave some parts for regeneration, or do you collect the whole plant?

This question sought to understand the application of sustainable practices in the collection of plant resources. Figure 35 shows that the largest number of respondents leave and replant a portion of the harvested resources in the habitat to regenerate, which indicates a high awareness level among the respondents on the need to preserve a regenerative part of the plant to avoid degrading the ecosystem. The analysis of the same question by age groups shows that those with most awareness are in the category of 25 to 60 years of age. The oldest respondents show a lower awareness than the younger generations (Figure 36). The analysis of this issue in relation to gender shows no differences between men and women.

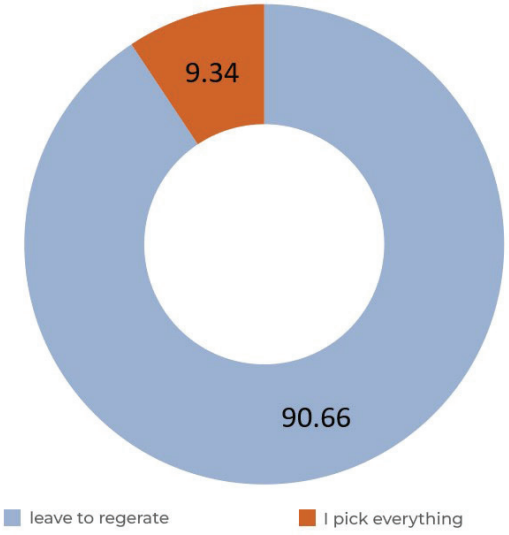


Figure 35. *Application of sustainable practices in the collection of plant resources (%)*

Image 20. Pollination of plants: pollinator *Iphiclides podalirius* L.
(Ozren; Photo: Hatibović, E. 2022)

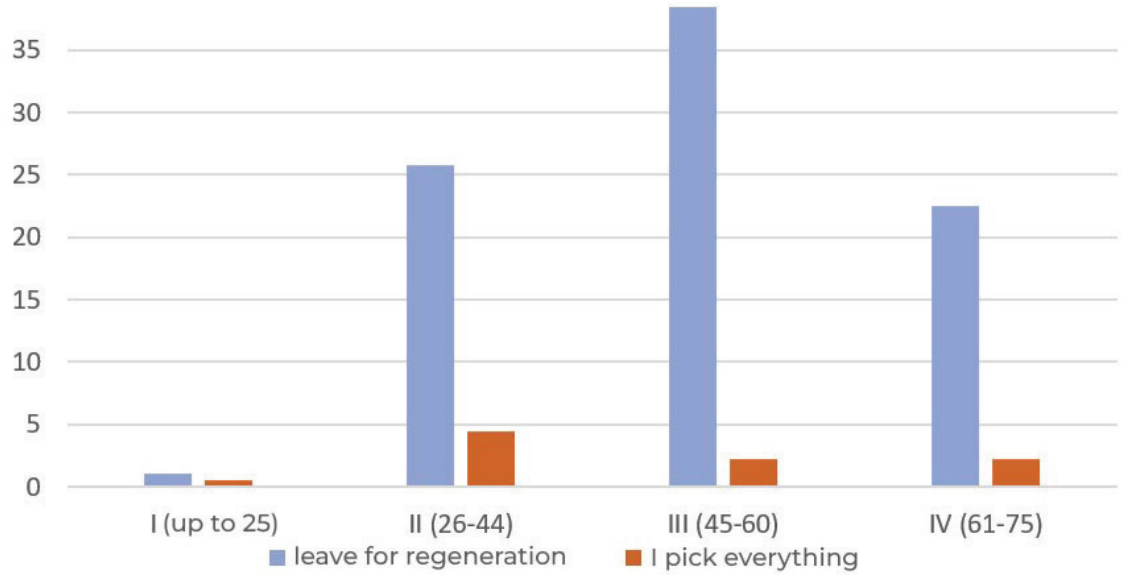


Figure 36. *Application of sustainable practices in the collection of plant resources by age (%)*

4.2.1.3. Analysis of traditional knowledge in local communities

Q12 How did you get information about plant species and their collection?

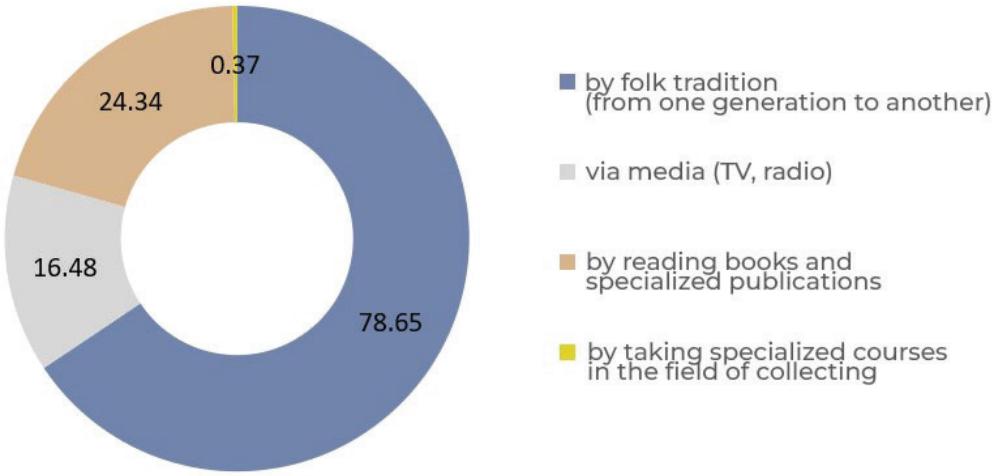


Figure 37. *Sources of knowledge about plant species and their collection (%)*

The analysis of responses about the sources of knowledge of plant species and their collection shows that oral transmission of traditional knowledge from generation to generation continues to play a significant role in intergenerational knowledge transfer. Access to written sources, especially specialized publications, is also of great importance today. Moreover, the use of new technologies was found to be of essential importance today in traditional knowledge transfer. Mainstream media was one of the options in the questionnaire, but it is clear that today social networks play an instrumental role, especially in the transfer of knowledge to the younger generations (Figure 37). This can also be seen in the responses of the age group II (25-44 years), which uses both written sources and all available media. The knowledge transfer analysis by age groups shows that there is a discontinuity in transmission of traditional knowledge through generations (Figure 38).

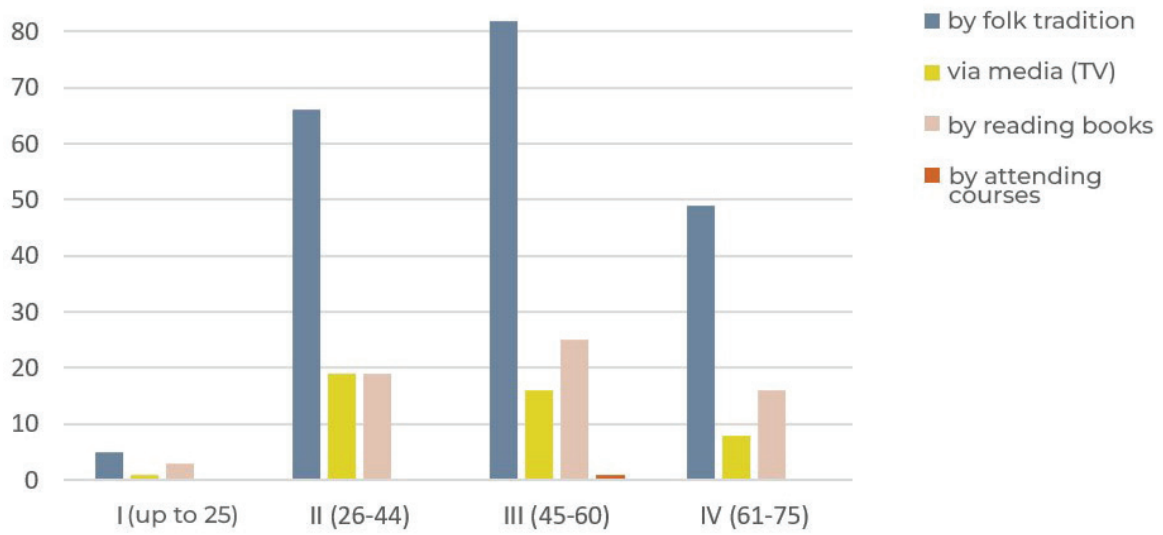


Figure 38. *Sources of knowledge on types of plants and their collection, by age groups (%)*

Q13 Which types of medicinal plants are you aware of?

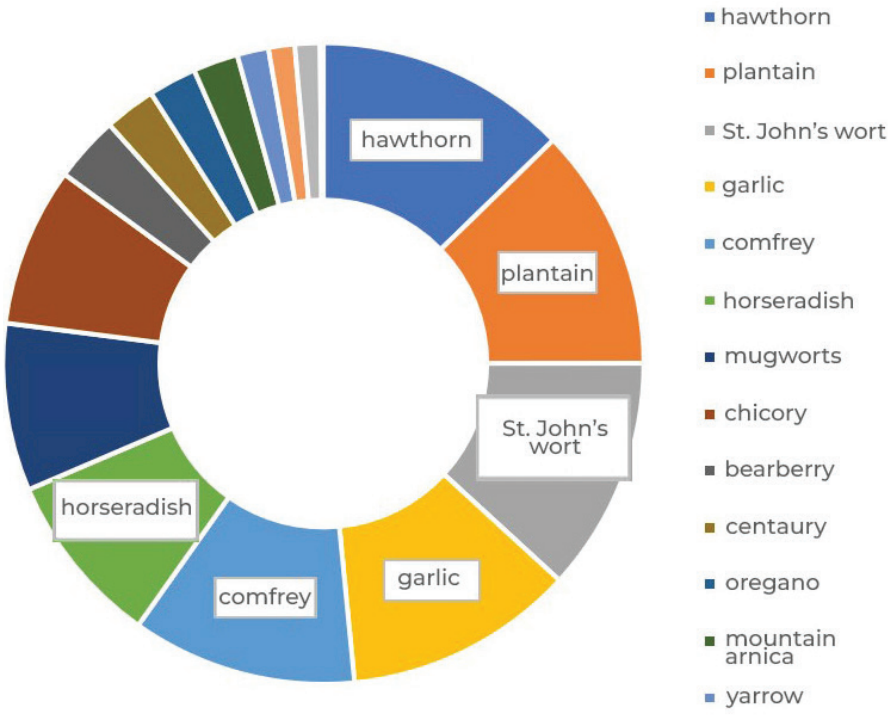


Figure 39. *General knowledge about medicinal plant species*

According to the respondents, the most famous medicinal plant species in BiH are hawthorn (*Crataegus monogyna*), plantain (*Plantago sp.*), St. John's wort (*Hypericum perforatum*), garlic (*Allium sativum*), comfrey (*Symphytum officinale*), horseradish (*Armoracia rusticana*), wormwood (Artemisia absinthium) and chicory (*Cichorium intybus)* (Figure 39). On average, respondents were aware of about seven medicinal plant species available in their surrounding ecosystems. By comparison, Macanović and Barudanović (2021) listed 748 plant species in BIH with medicinal properties.

Analysis of general knowledge about medicinal plant species between age groups shows that there has been a transfer of traditional medicinal knowledge over generations. Respondents in age groups IV, III and II had general knowledge of the same species (Figure 40). Age group III (45-60 years) had the highest knowledge of medicinal resources. The age group up to 25 years shows low level of knowledge about medicinal plant species in the study. The survey revealed that there is limited knowledge transfer to the younger populations. The analysis further revealed that there was no significant difference in traditional medicinal knowledge based on gender and education.

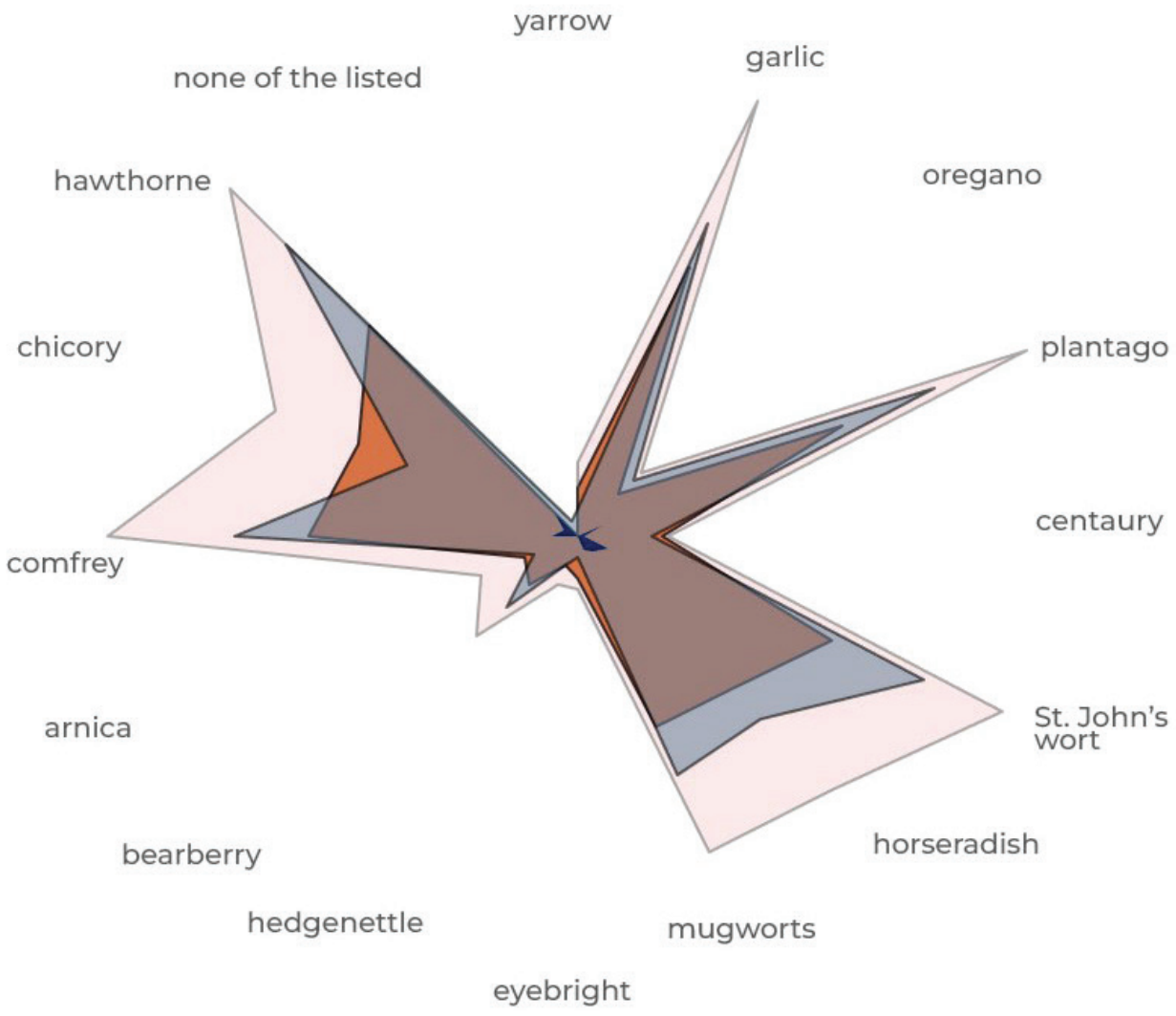


Figure 40. *General knowledge of medicinal plant species, by age groups*

Image 21. Dialogue in Drvar
(Photo: Velić, S. 2021)

The dialogue with the local community in Drvar was held on July 1, 2021. The participants highlighted the numerous resources that are present in the nature of this area, but also the numerous drivers that are undermining them. Of the natural resources, spruce, chamomile and heartwood stand out, which are collected regularly. Constant practices of growing dogwood, growing vegetables in greenhouses, growing fruit and traditional preparation of brandy are applied, and the production of meadow honey, etc., is also important. Mushrooms include boletus, chanterelles, milk mushrooms, red mushrooms, etc. The practices of preparing traditional dishes such as cicvara, puree, cream cheese, sauerkraut, and drinks such as dogwood pickle, liqueurs, etc. have been preserved. Many NCPs specific to this area have been recognised, which today are aimed at promotion and ecotourism. Among the areas with special natural values, the source of Bestašica and the canyon of the Unac river stand out. The tourist offer is enriched through the paragliding competition, which makes the entire area recognizable. Among the recognized drivers, representatives of the local communities of this area pointed out the presence of wild landfills in the immediate vicinity of the settlement, the lack of adequate staff (e.g. veterinarians), the presence of invasive species (American catfish), poaching, etc. The increasingly pronounced effects of climate change are especially highlighted. A decrease in honey yield was observed due to the impact of climate change on bee grazing.

Q14 Which medicinal plants can you recognize and identify in nature (Appendix I)?

As in the previous question, respondents had equivalent knowledge of identifying medicinal plant species in nature, with a similar trend across age groups (Figure 41). In general, today the local population can only recognize a small number of plant species in their surroundings. Respondents were only able to recognize and identify an average of six medicinal plant species. The knowledge of younger respondents is drastically declining (Figure 42).

In the identification of medicinal plant species, there was no significant difference across gender or education level. However, a difference was noted across geographical regions where respondents in the southern area of BiH were able to identify ten medicinal plant species in comparison to seven in the central region and six in the north, west and eastern regions.

Image 22. The most frequently used resources from nature: blueberry, *Vaccinium myrtillus* L.
(Visočica; photo: Barudanović S., 2022)

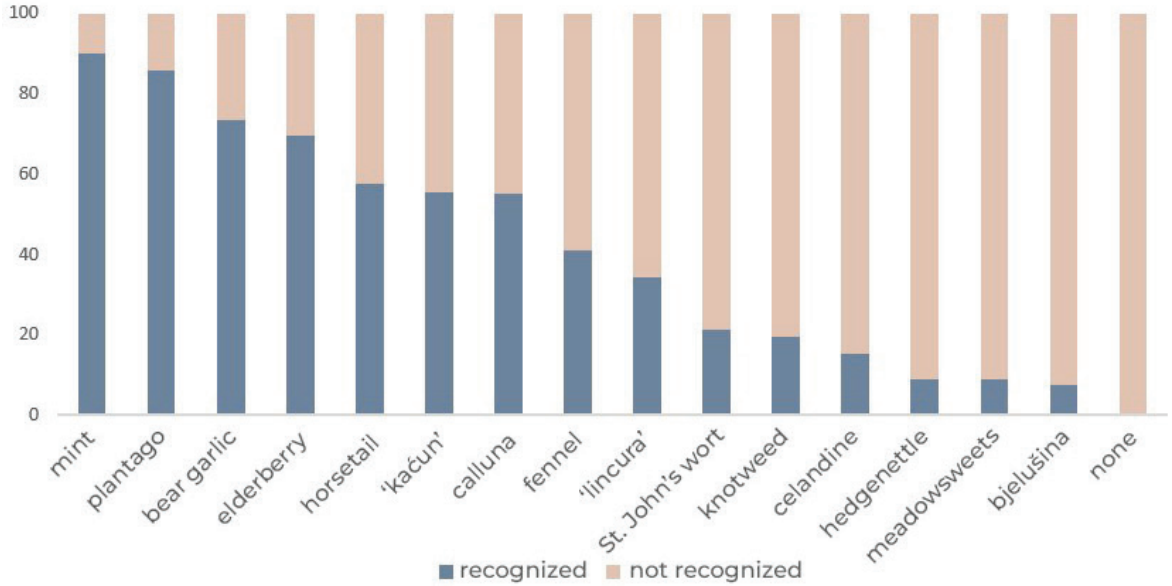


Figure 41. *Share (in %) of respondents who recognize/identify the listed plant species*

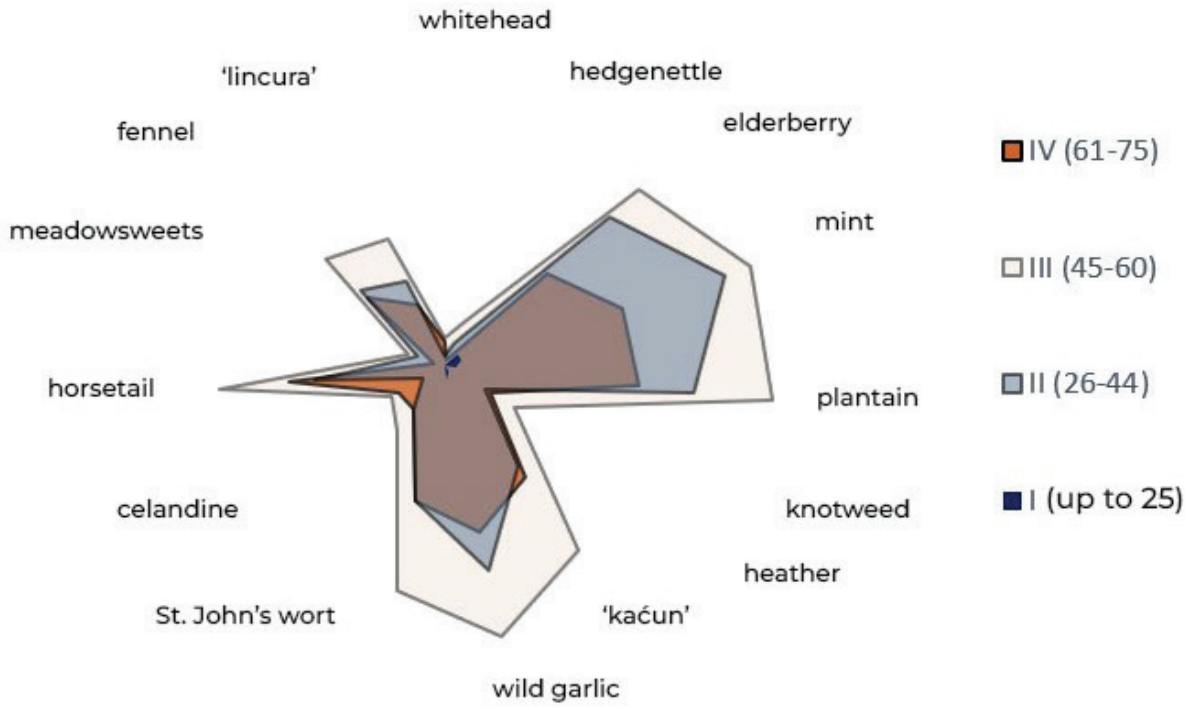


Figure 42. *Share of respondents who recognize/identify the listed plant species by age group*

Q15 In which type of habitats do you find most medicinal plant resources?

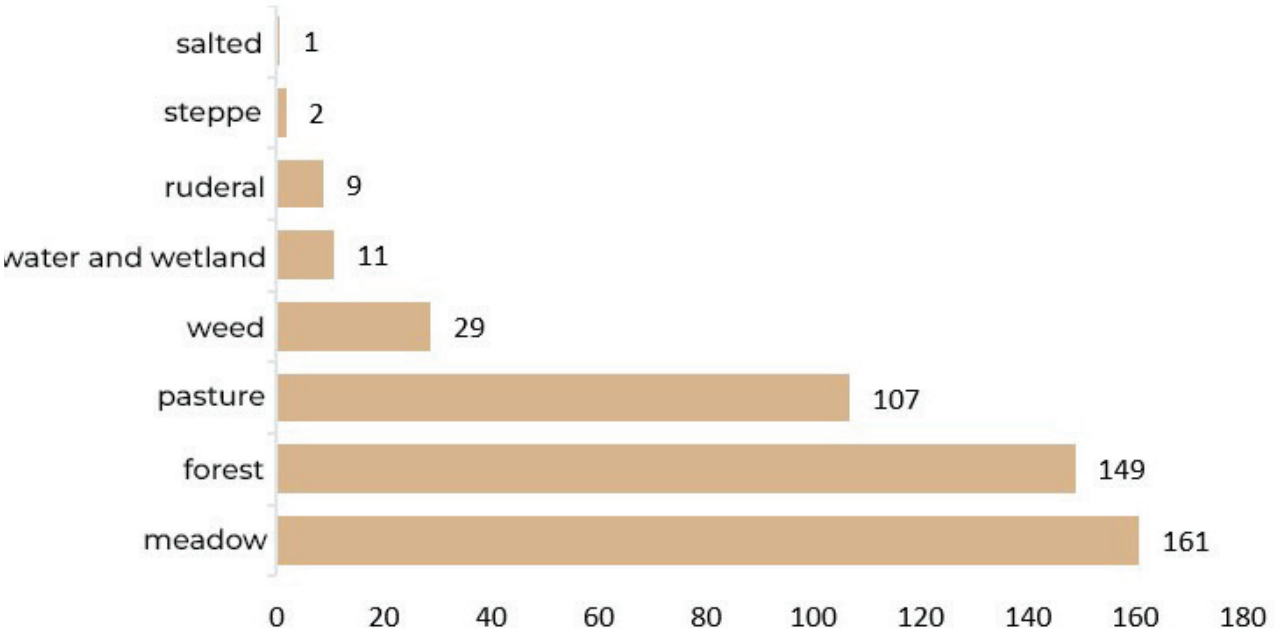


Figure 43. *Types of habitats with the most plant resources according to respondents (%)*

According to the questionnaire survey, most of the respondents believe that meadow ecosystems are the primary habitat for medicinal plant resources in BiH. The other most common habitats are forest and pasture ecosystems. Other ecosystems are less recognized (Figure 43). An analysis of the same question by age groups shows that age groups II and III have the most knowledge of natural habitats of medicinal plant species.

Q16 What natural resources are recognizable in your area?

The analysis of responses to this question shows that respondents, on average, recognized the names of nine plant species out of the 20 provided (Figure 44). Those within age groups I and II could on average name up to eight species, while those within age groups III and IV could name on average over ten species in their region (Figure 45). This reveals that the younger generations hold a significantly lower knowledge of plant species compared to the elderly.

The youngest age group only recognized a few plant species in their local environment. The same analysis at the regional level shows that respondents from central and southern BiH had greater knowledge of local natural resources compared to respondents from other parts of Bosnia and Herzegovina (Figure 46).

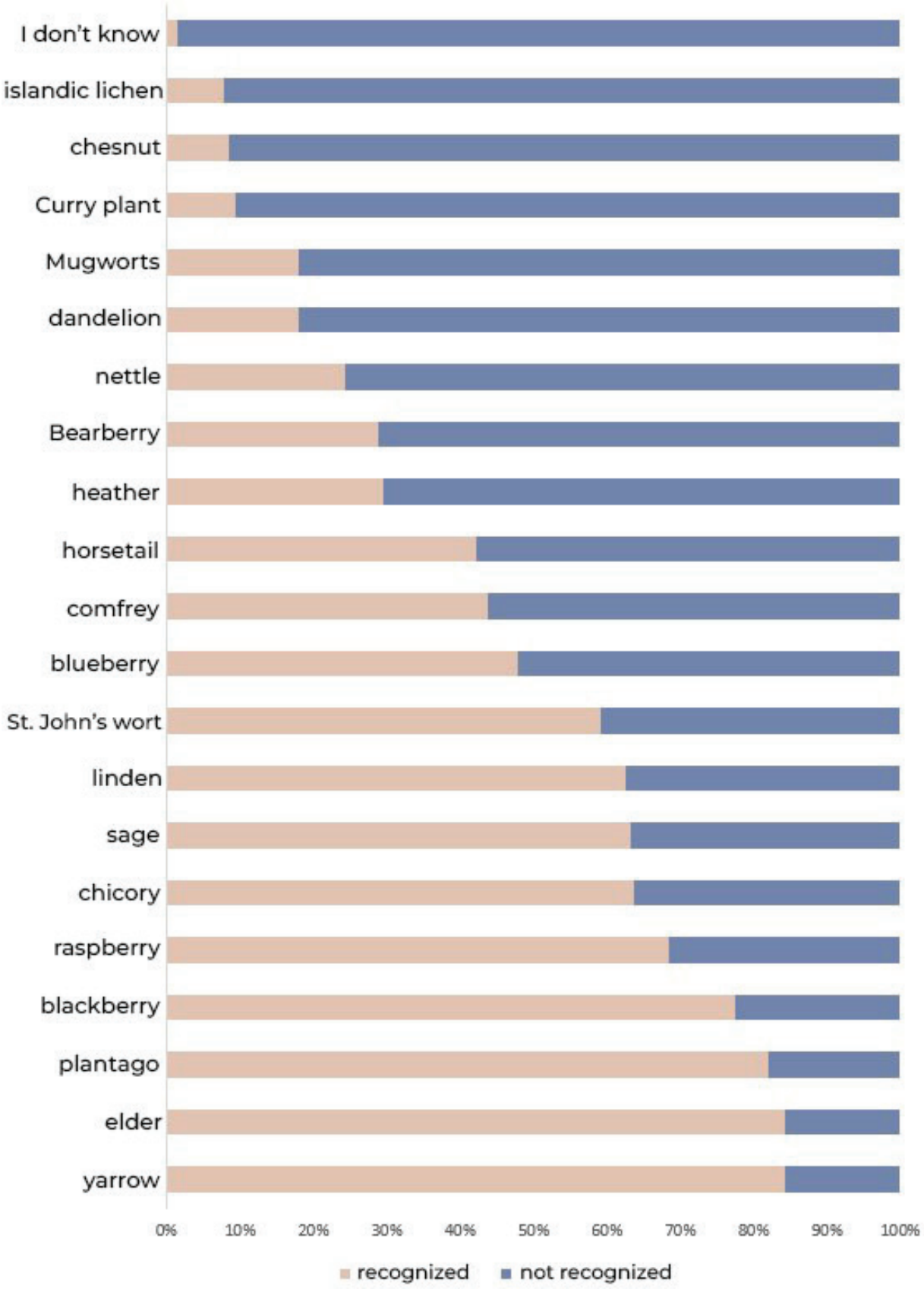


Figure 44. *Share of respondents who recognize the listed species as local resources*

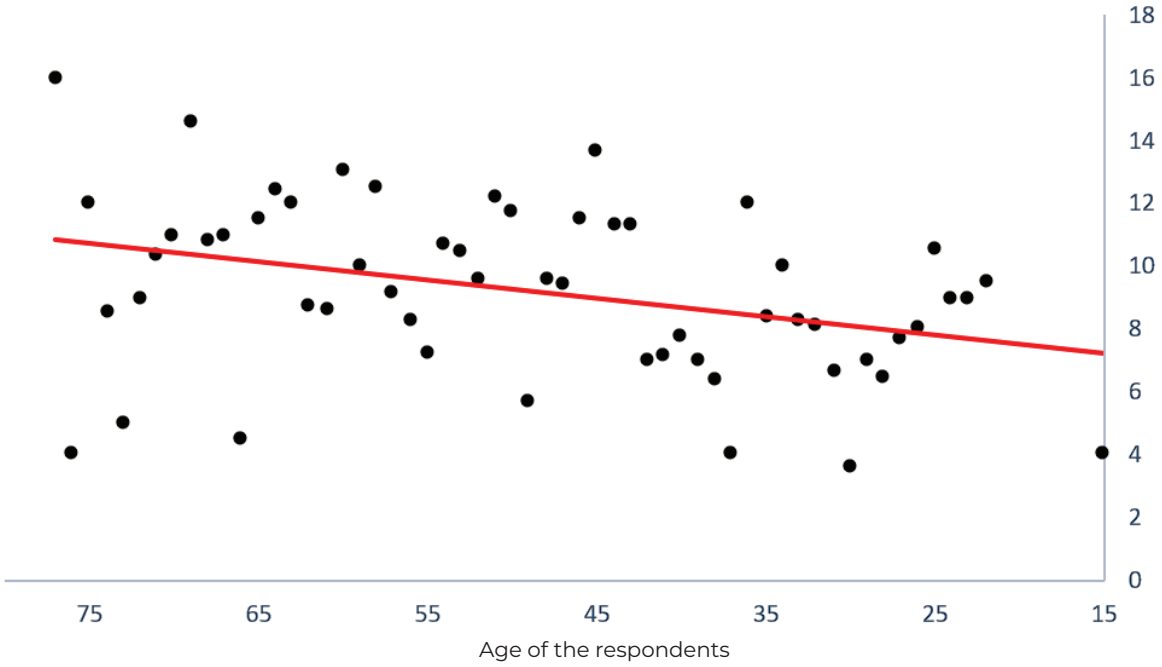


Figure 45. *Knowledge of local natural resources, according to age of the respondents in years*

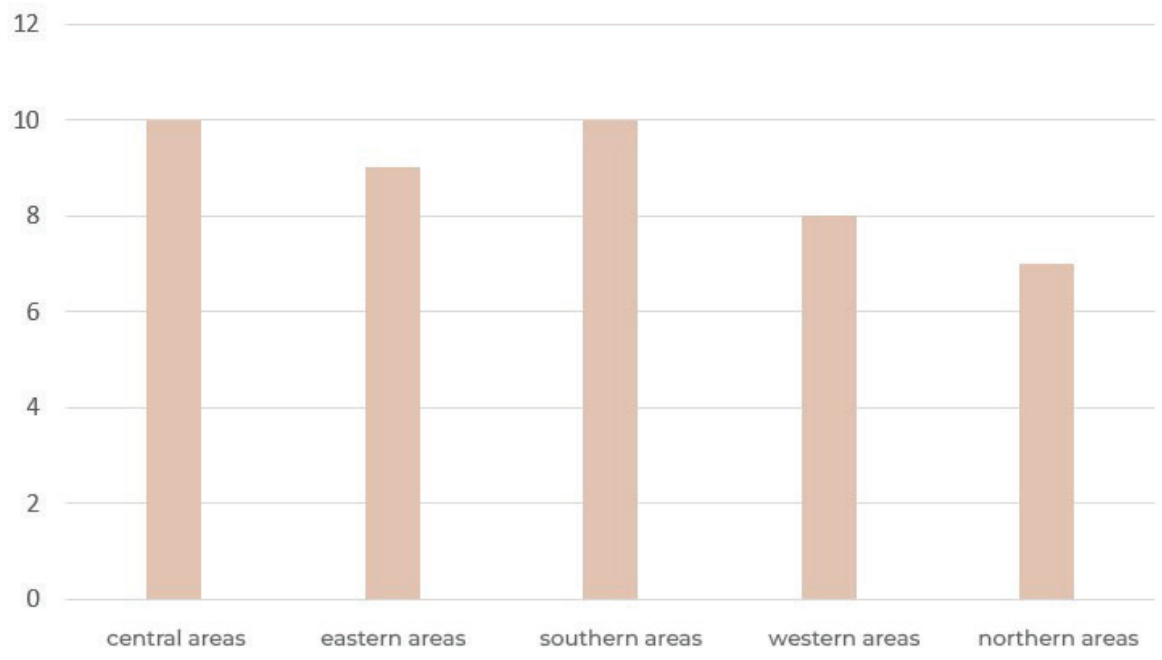


Figure 46. *Knowledge of local natural resources in different areas of Bosnia and Herzegovina (%)*

Q17 10 most economically significant plants

Out of a total of 271 respondents, only 196 respondents answered this question. Respondents listed 58 species in total that they perceived to be economically important. There is a correlation between the age of respondents and the answers given. The analysis shows that the oldest respondents have the greatest knowledge of economically significant plant species. Respondents aged 25 to 60 years appear to have less knowledge, and the youngest respondents have the least knowledge about the economic values of natural resources (Figure 47).

Analysis of the answers to this question according to the employment status of the respondents shows that the pensioners are the most knowledgeable on the number of economically important plant species/natural resources in BiH (Figure 48).

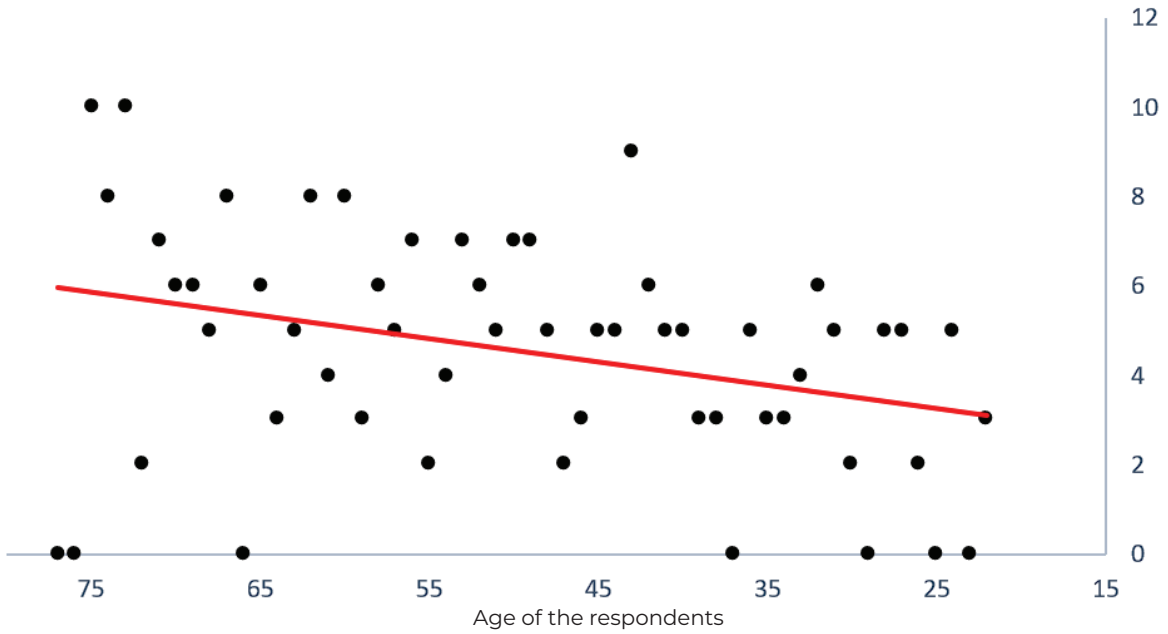


Figure 47. *Average number of economically important plants, according to the age of the respondents in years*

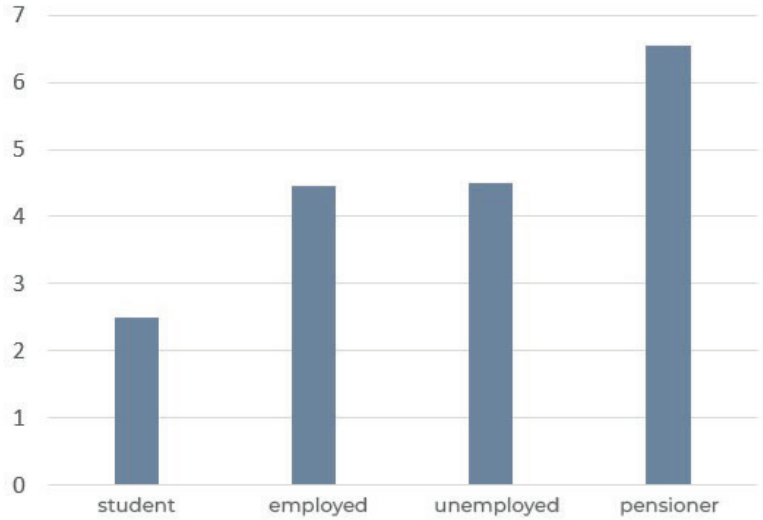


Figure 48. *Average number of economically important plants, according to employment status of the respondents (%)`*

Image 23. Interview in Konjic (Photo: Hatibović, E. 2022)

Several interviews with representatives of the local community in Konjic and surrounding settlements was held on November 1, 2022. years. The woodcarving shop "Braća Nikšić" in Konjic was visited, where the artisans highlighted the significant values of traditional "Konjic woodcarving", which is on the UNESCO Representative List of Intangible Cultural Heritage of Humanity since 2017. This practice of making wooden objects and furniture has existed in the town of Konjic for over 100 years, and is passed down through the generations exclusively within the family. The quality of the manufactured items is particularly significant, where maple, walnut, cherry and beech wood is used, which gives the manufactured items longevity. In addition to woodcarving, in this area there are also traditional Bosnian-Herzegovinian houses with gardens (courtyards, hamlets) where the basic building elements are stone, travertine and wood, and which the owners maintain and protect from decay (the settlements of Seonica, Argud, Jasenik, Solakova Kula, Kruščica, etc.). The NCPs in the supply of medicinal plants are recognized, among which blueberry, blackberry, raspberry, St. John's wort, dogwood and currant are in first place. Several types of drivers that have a significant impact on nature are highlighted, namely: insufficient interest of competent institutions in the promotion and control of the use of natural resources, the implementation of education and the inclusion of woodcarving in the studied trades in secondary education, mass emigration of the local population, irrational use of natural resources such as rivers, forests, fertile land, etc. .

Q18 Do you know any traditional recipes?

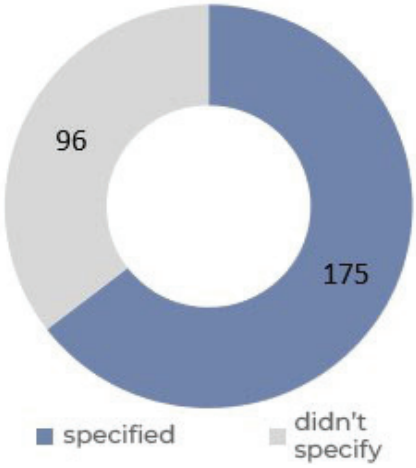


Figure 49. *Knowledge of traditional recipes (%)*

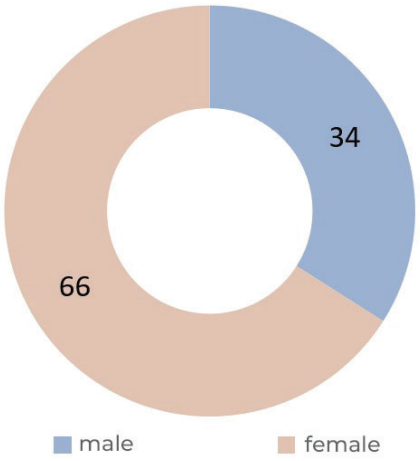


Figure 50. *Knowledge of traditional recipes by gender (%)*

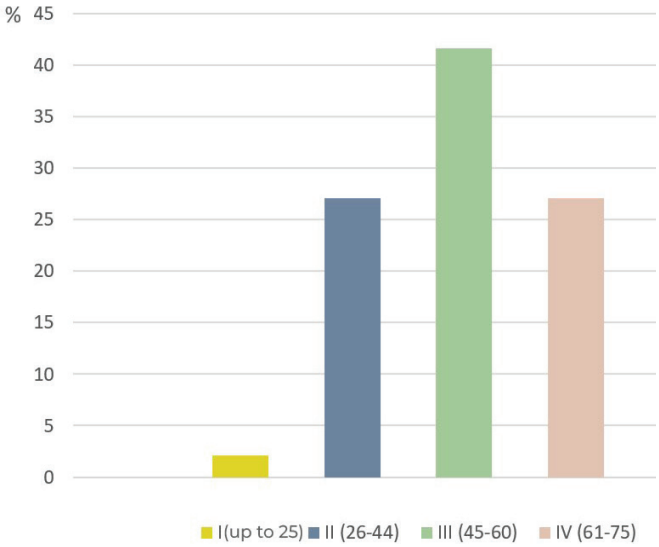


Figure 51. *Knowledge of traditional recipes by age groups (%)*

Out of a total of 271 respondents, 96, approximately one-third, listed some traditional recipes (Figure 49). Of these, more traditional recipes were listed by women (66%) compared to men (34%) (Figure 50). Analysis based on age groups shows that the highest number of recipes listed (41.67%) were provided by people in the third age group (Figure 51).

4.2.1.4. Analysis of opinions on the state and use of natural resources

Q19 Do we need more effective legal restrictions on the use of natural resources?

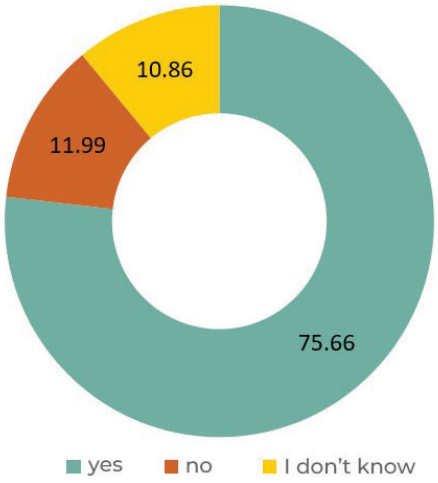


Figure 52. *Need for more effective legal restrictions (%)*

The analysis of responses on the need for more effective implementation of laws (Figure 52) shows that over 75% of respondents believe that strong and precise legal restrictions are necessary. The analysis of the same response by employment status shows that those in employment are most in favour of having more effective legal restrictions. It is interesting to note that those in the oldest and youngest age categories gave the least responses to this question (Figure 53).

Image 24. Traditional animal husbandry (Vlašić; Photo: Macanović, A. 2022)

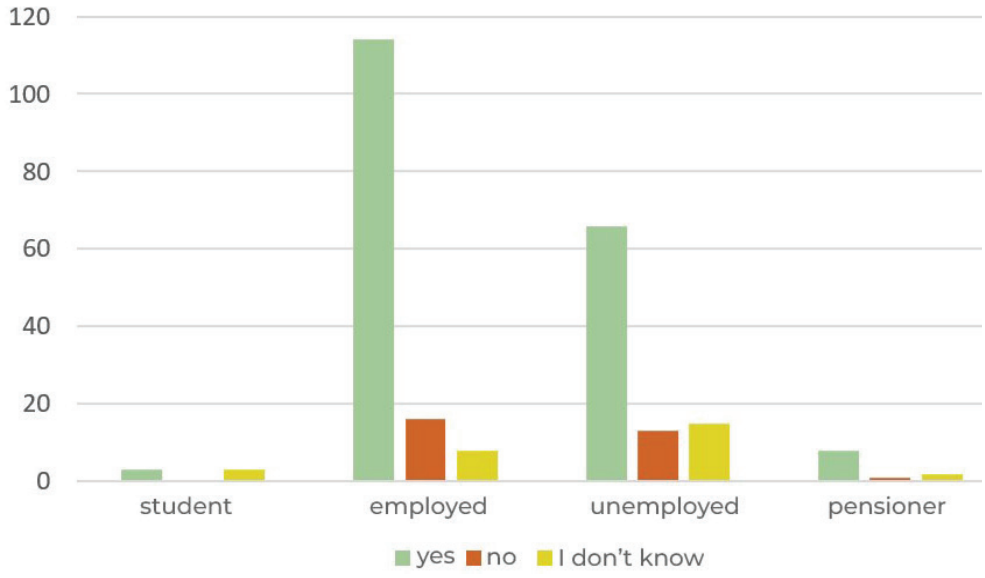


Figure 53. *The need for more effective legal restrictions, by profession (%)*

Q20 Are you afraid that in the future you will not have natural resources at your disposal?

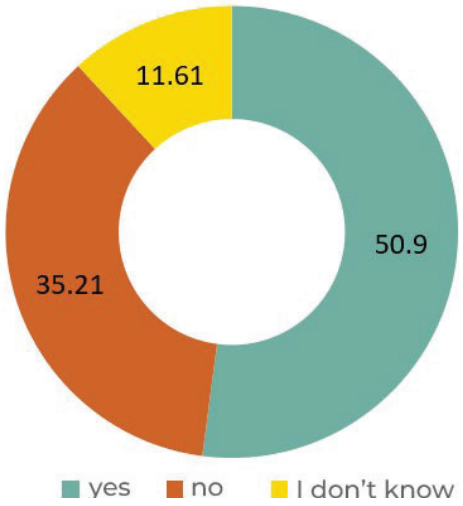


Figure 54. *Future availability of natural resources (%)*

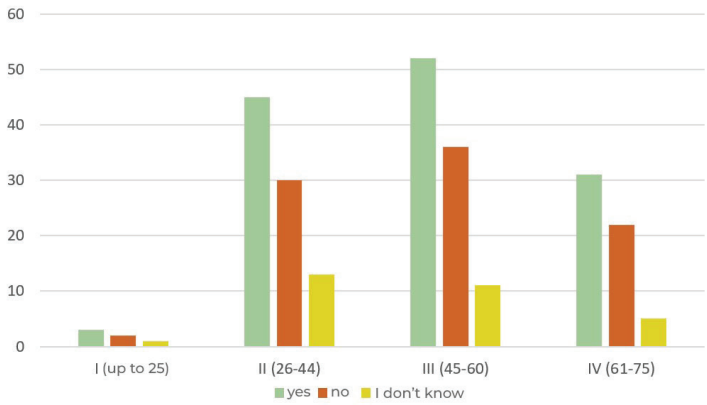


Figure 55. *Future availability of natural resources, by age groups in years (%)*

The analysis of opinions on future resource availability scenarios (Figure 54) shows a clear division in the responses. More than 50% of respondents state that they felt afraid that resources will not be available in the future. There are a range of possibilities for why these responses were given, for example, Figure 58 indicates that respondents perceive that the biggest factor leading to environmental change and reduction in plant species is climate change (72.61%), followed by excessive harvesting (21.66%). Compared to the relatively high number of responses showing that climate change is a perceived thr„eat to the availability of plant resources, it is interesting to note that comparatively fewer people expressed concern about the future availability of natural resources. Whilst we can only speculate about the reasons for this, the findings may, on the one hand, indicate a perception among respondents that the present state of nature is relatively good.

Alternatively, we could speculate that the answers to this question may correlate with cultural and/or religious beliefs. In an attempt to identify correlations in the distribution of responses, an analysis was performed according to age groups. This analysis does not confirm that these are religious beliefs, because the distribution of the answers "yes", "no" and "I do not know" is very similar in categories II, III and IV. The share of negative responses is not higher in the group of the oldest respondents, in which the strongest religious beliefs can be expected (Figure 55).

Q21 Do you think particular plants are less abundant now compared to the past?

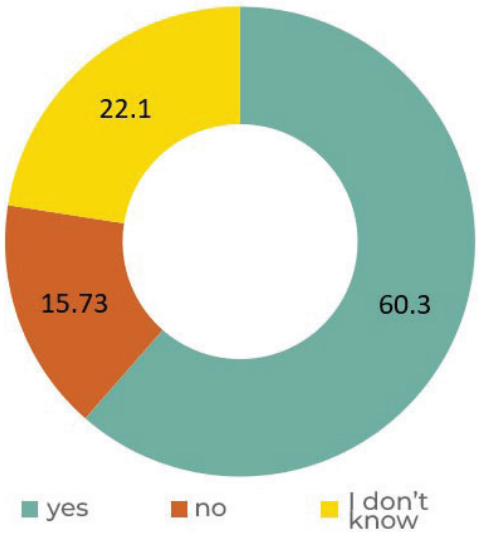


Figure 56. *Today's availability of plant resources compared to earlier periods (%)*

The analysis of opinions on the general state of nature shows that about 60% of respondents believe that there have been significant changes in nature and that plant resources are less abundant today (Figure 56). The analysis of the same question by age groups shows that the high-

est number of answers for “I do not know” were given by age group II (25 to 44 years), while fewer respondents in the older age groups stated, “I do not know”. In general, older respondents provided fewer “I don’t know” answers. This indicates a good reliability of the answers in the questionnaire, and it could suggest that knowledge about traditional practices and the general state of nature in BiH is higher among the older age groups (Figure 57).

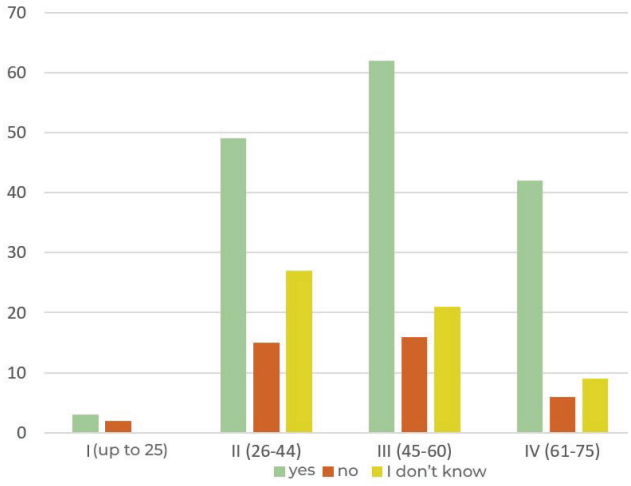


Figure 57. *Today’s availability of plant resources compared to earlier periods, by age group (%)*

Q22 If there are changes and reductions in plant resources in nature, what do you consider to be the main causes?

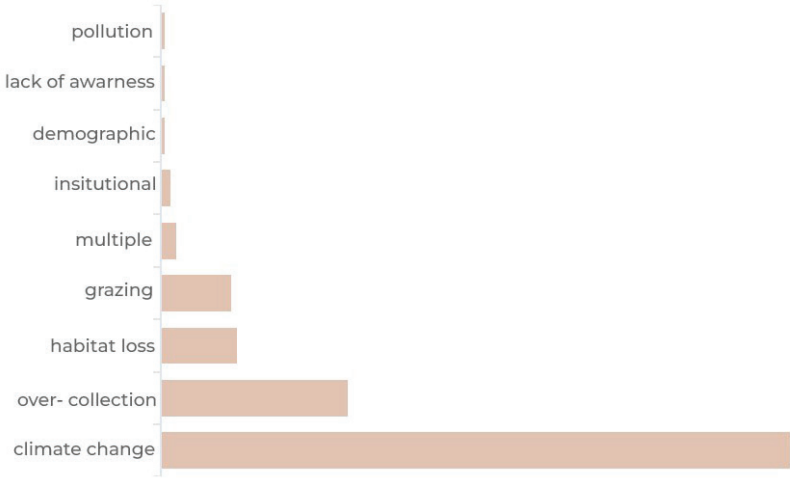


Figure 58. *Causes of changes in nature that affect the reduction of plant resources (%)*

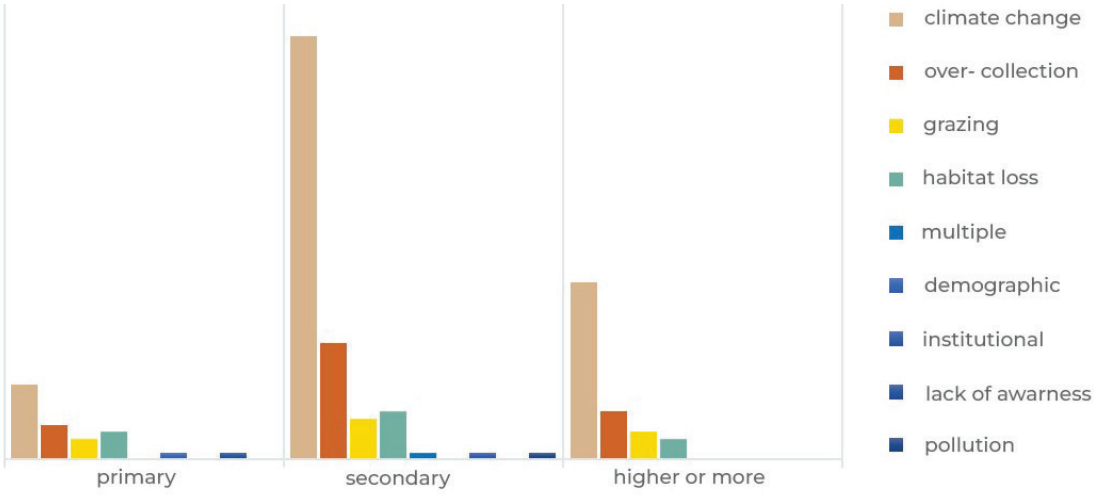


Figure 59. *Causes of changes in nature that lead to reduction of plant resources, according to education levels (%)*

Analysis of this open-ended question shows that respondents mainly associate changes in nature and decline in plant resources with climate change (72.61%). However, the findings also show that grazing (8.28%), habitat loss (8.92%), and over-collection (21.66%) are also commonly cited. Respondents also defined other answers. In response to this open-ended question, both direct and indirect drivers of biodiversity and ecosystem change are observed. Although rare, awareness of the existence of complex, multiple drivers on nature is significant (Figure 58). Analysis of responses according to degree of education shows the same results, where climate change is stated as the main cause of change in nature (Figure 59).

Q23 In your opinion, what is the biggest local problem related to natural resources?

Unlike the previous question, perception of problems related to local natural resources are associated with different examples of drivers. This survey question was open-ended, and responses were subsequently thematically grouped into defined categories of direct and indirect drivers. All types of direct drivers except invasive species were identified by the respondents.

Respondents cite overexploitation (15.2%) and loss of natural habitats (conversion) (12.6%) as the leading direct drivers (31.70%). Among indirect drivers, respondents highlight institutional (24.5%), demographic (20.5%), scientific (15.2%) and economic drivers (7.3%) as the main factors affecting natural resources at the local level. In the responses, cultural and/or religious beliefs and practices were rarely cited as a driver of negative environmental issues at the local level (Figure 60).

Q24 Do you consider harvestig of plant resources as an economically promising business?

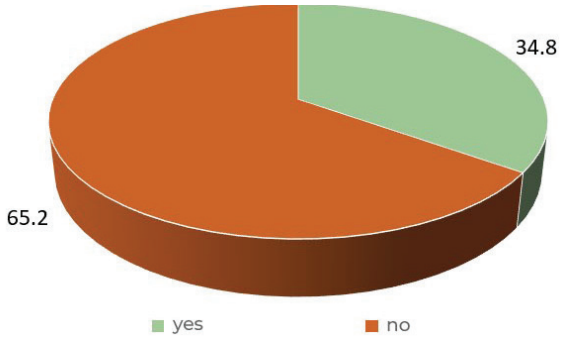


Figure 61. *Perceived economic profitability from harvesting plant resources (%)*

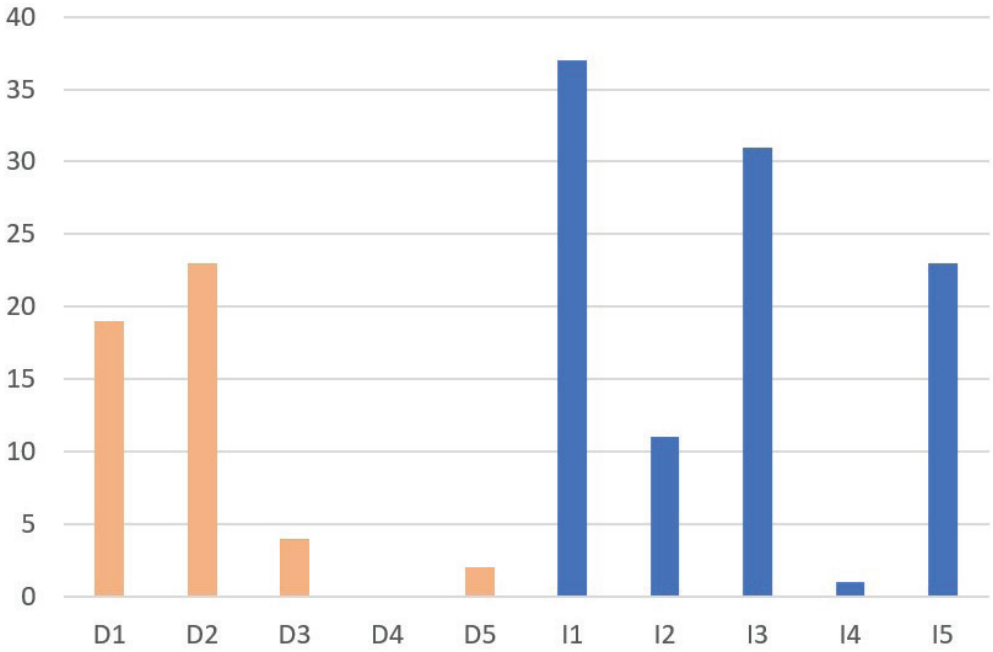


Figure 60. *Local drivers on nature (%)*

Analysis of responses shows that the majority of respondents feel that plant harvesting is not an economically promising business (65.2%) (Figure 61). Poor institutional infrastructure appears to be perceived as both a driver of environmental change, and a disincentive for engaging in plant harvesting as a viable business option.

The majority of respondents, both in the questionnaire and in interviews and dialogues, highlighted weak institutional support for developing economic prosperity in rural areas due to factors such as low purchase prices for harvested plant resources, poorly coordinated supply chains, lack of appropriate incentives, among others. Negative responses are evenly distributed in all age categories, while positive responses are not recorded at all in the youngest age group (Figure 62).

Q25 Do you want to know more about the traditional use of natural resources?

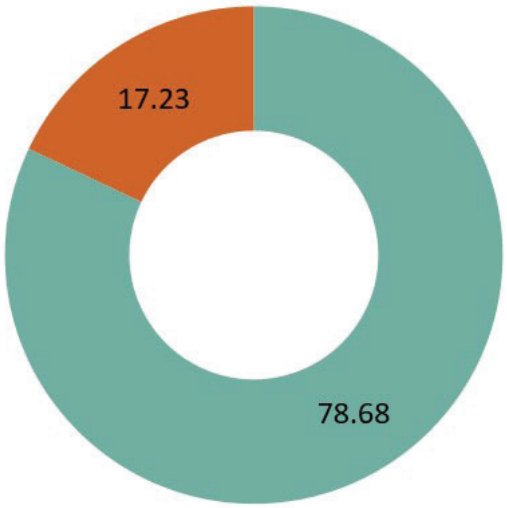


Figure 63. *Interest in learning about the traditional use of natural resources (%)*

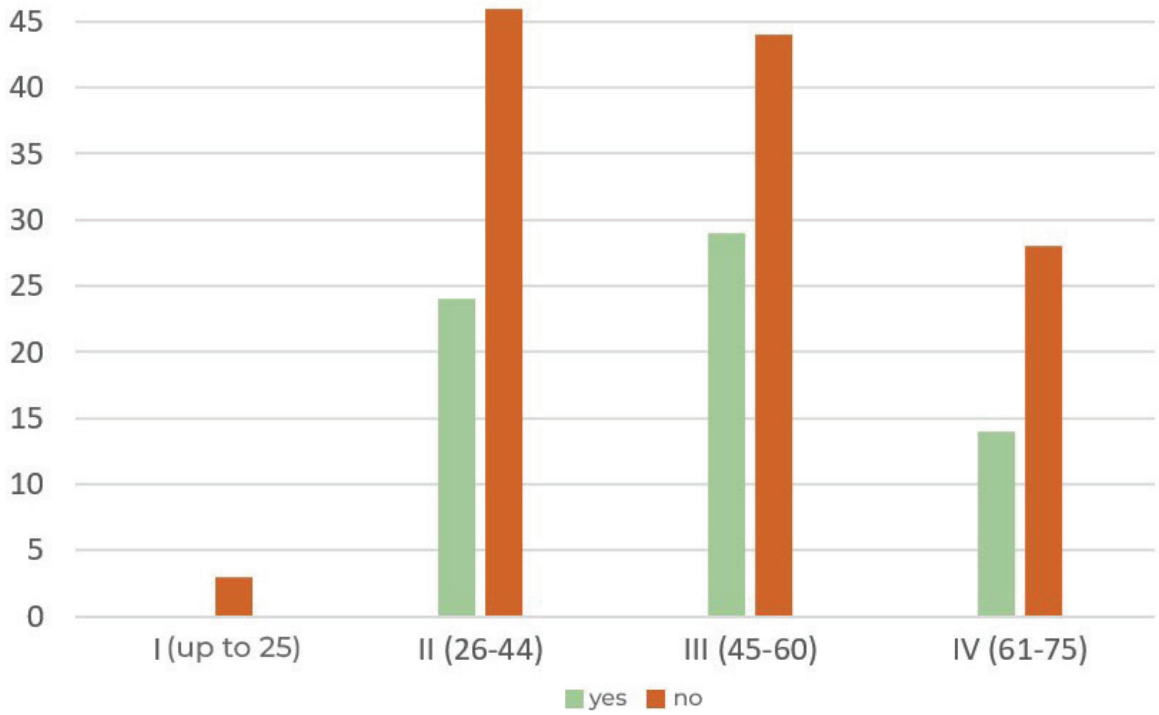


Figure 62. *Economic profitability from collecting plant resources, by age groups (%)*

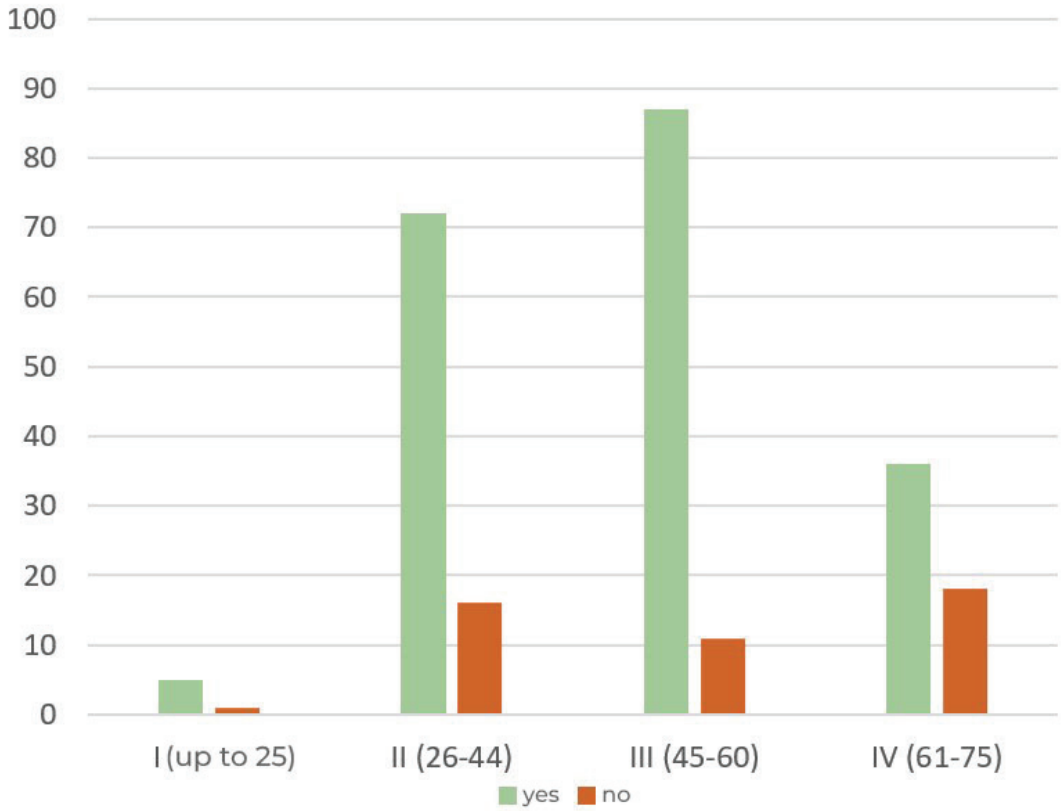


Figure 64. *Interest in learning about the traditional use of natural resources, by age groups (%)*

Results from this question show that more than 80% of respondents stated that that they want to know more about the traditional use of natural resources (Figure 63). The analysis of the same question by age groups shows that the majority of respondents between the ages of 25 and 60 are interested in acquiring this knowledge, while interest is smaller in the oldest age group.

In the youngest age group, there is almost no interest in acquiring new knowledge about traditional ways of using natural resources (5.0%) (Figure 64).

4.2.2. Analysis of the results of group research and interviews

As stated in the methodology section (4.1), for the purpose of modern insights into the state of traditional and local knowledge, a large part of the data was collected through dialogue with local communities, as well as through individual interviews. In this way, oral data were obtained and recorded with the consent of the interviewee, then thematically analysed and saved in a database. The qualitative data collected in the dialogues and individual interviews are presented together in this section.

4.2.2.1. Analysis of the results of the dialogue with local communities on the state of nature's contributions to people (NCPs)

Different types of NCPs are described in section 4.2 and Figure 65 below shows the three categories of NCPs (material, non-material, and regulating) and 18 services within those categories (Figure 65). The results of group and individual conversations on the NCPs are presented together (Figure 66).

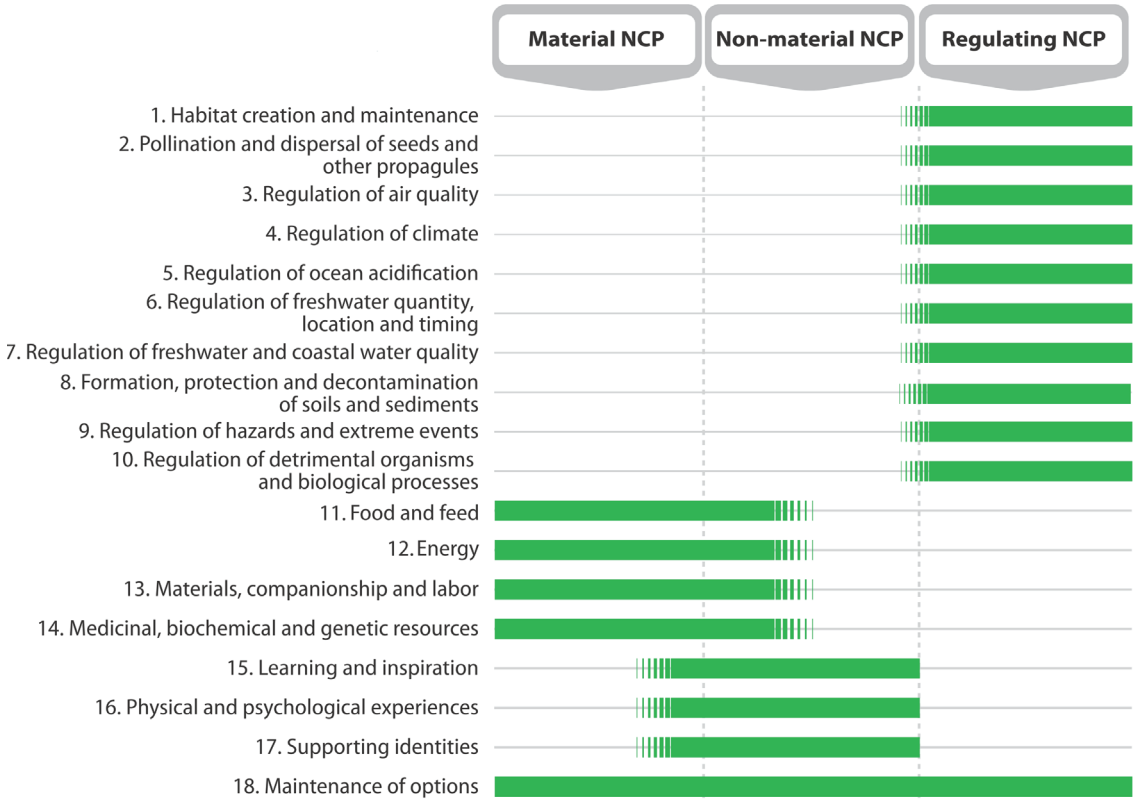


Figure 65. *Nature's Contributions to People Categories (Reproduced from Diaz et al., 2018)*

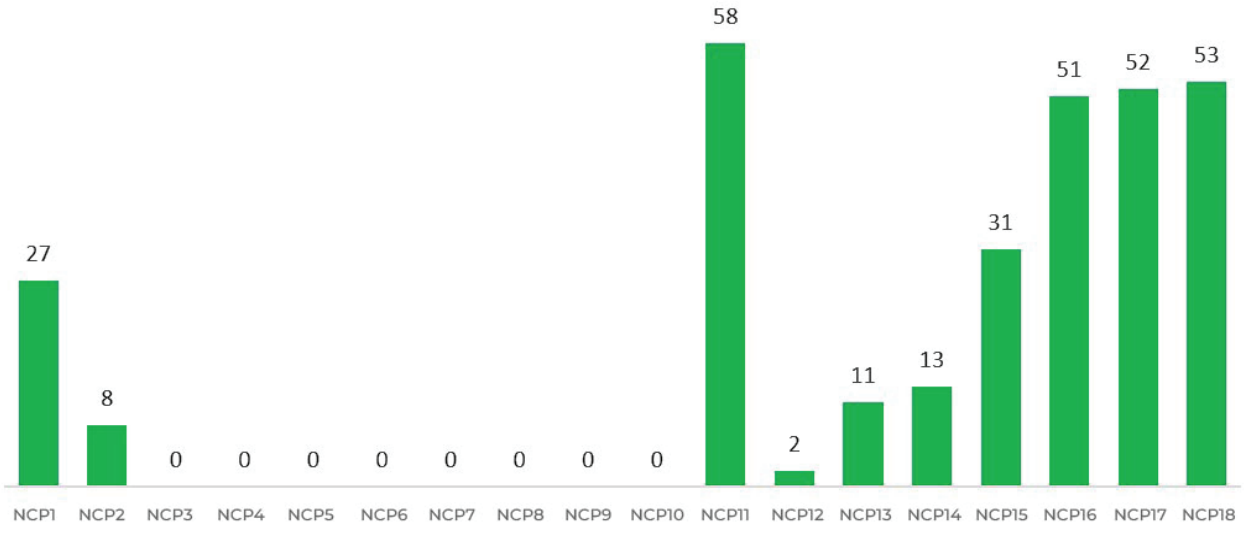


Figure 66. *Recognition of 18 types of NCPs through workshops with local communities and individual interviews (n)*

Analysis of the qualitative data collected in the dialogue with the local communities and in the individual interviews indicates the following:

- Holders of traditional and local knowledge largely emphasized the provisioning and cultural ecosystem services obtained from nature. They rarely mentioned regulating services. This could be an indication that local communities have little awareness of the regulatory NCPs (regulation of air quality, climate processes, regulation of ocean acidification, regulation of water flow, quality of fresh and salt waters, soil formation, buffer/control against natural disasters, pollination and decomposition of organic waste (Figure 65).

- Holders of traditional and local knowledge had divided opinions on the benefits of securing renewable energy from nature. A particularly important topic for BiH is the use of hydropower for producing electricity. Only one in 271 respondents highlighted the need and potential of exploiting water flows to generate electricity (NCP12). Most other respondents believed that watercourses and all other natural habitats must be kept in their existing state.

- A good portion (8.8%) of the respondents recognize the values and benefits of the diversity of habitats and species in Bosnia and Herzegovina.

- The most widely recognized example of NCP is the provision of food for people and animals.

- Examples of NCPs that are well recognized include: support for physical and psychological well-being and people's health (NCP16), providing a sense of personal identity and sense of community belonging (NCP17), ensuring the wellbeing of future generations (NCP18), and acquisition of knowledge (NCP15). These categories of NCPs were not presented to the participants before the dialogue and interviews, rather the emerged spontaneously during conversation and were subsequently categorised based on individuals' statements about the values and benefits of local nature.

- The direct use of natural materials and the supply of medicinal resources are recognized contributions (NCP14), but to a lesser extent than might be expected. Such a result may be indicative of the loss or decline of traditional and local knowledge and practices today.

- Compared to food and nutrition security as an example of nature's contributions to people, it is obvious that local communities today are more focused on obtaining healthy, nutritious, and safe food from nature (NCP11) than extracting natural materials to make items such as furniture.

When looking at the distribution of recognized NCPs in different areas of BiH (Figure 67 A, B, C, D), the following general observations can be made:

- The highest level of awareness of NCPs was recorded in the western area of BiH.

- A similar level of awareness of the NCPs was recorded in central and western BiH, and northern and southern BiH.

- In central and western BiH, examples of NCPs such as habitat diversity, food and medicinal resources, and the value of nature for human well-being and preserving the identity of communities were well recognized.

- Except for food provision, the NCPs listed above are less recognized in the northern and southern areas of BiH. A particularly poorly recognized contribution in the northern and southern areas of BiH (except in the Srebrenica area) is the provision of medicinal resources.

- In analysing the results of dialogue and interviews on the NCPs, it is worth considering that natural resources are abundant in Bosnia and Herzegovina and given the climatic, ecological, pedological and other conditions, there are no shortages in the supply of food, water, medicine, firewood, materials and raw materials, as in other areas of

the world.

- A perception of nature as an inexhaustible source of goods can lead to unsustainable behaviours and practices and degradation of biodiversity.

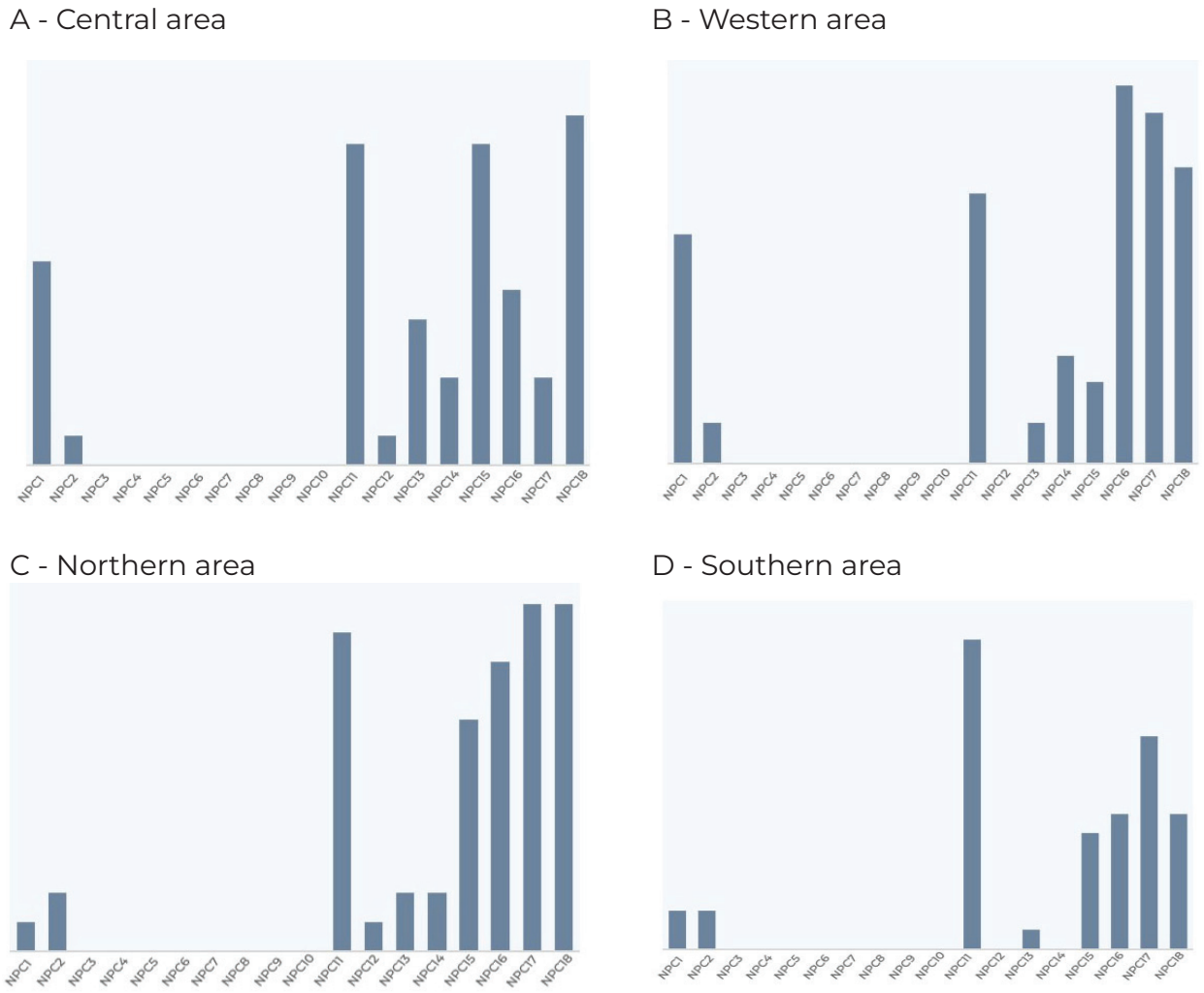


Figure 67. *Recognition of 18 types of NCPs in dialogue with local communities and interviews, in different areas of Bosnia and Herzegovina (A, B, C and D) (n)*

4.2.3. Analysis of the results of the dialogue with local communities on drivers which impact the environment

During dialogues and individual interviews, all respondents devoted a good part of their time to describing the drivers that affect biodiversity and ecosystem services. Through the description of the state of traditional and local knowledge and practices, respondents, in most cases, established a direct cause-and-effect relationship between the state of nature and human well-being.

Respondents' responses were classified into established categories of direct and indirect drivers (Figure 68).

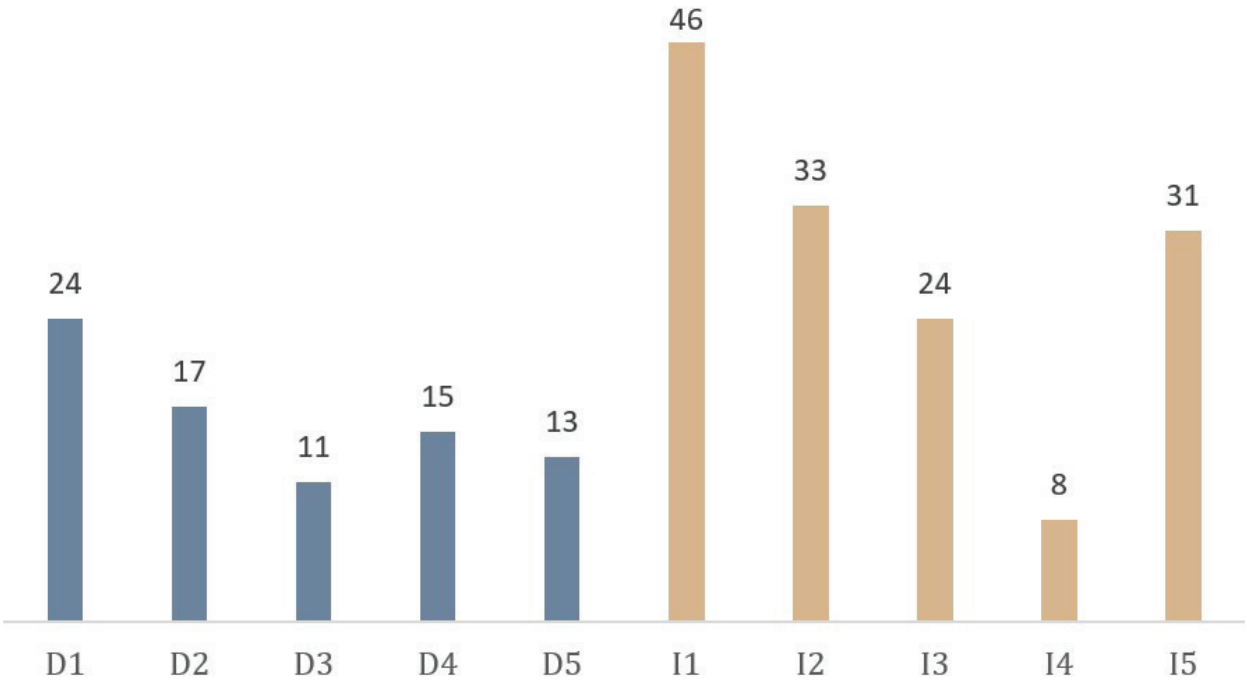


Figure 68. *Identification of direct (D1 - D5) and indirect (I1 - I5) drivers on nature in Bosnia and Herzegovina (%)*

Analysis of the results from dialogues with local communities and the individual interviews indicates the following:

- Respondents clearly associate social trends with impacts on biodiversity. As a result, responses are categorised into direct drivers and indirect drivers.
- Direct drivers include: D1 - conversion, loss of natural habitats; D2 - overexploitation of resources; D3 – pollution; D4 - invasive species; D5 - climate change. Indirect drivers include: I1 – institutional; I2 – economic; I3 – demographic; I4 - cultural and religious; I5 - scientific and technological.
- A significantly higher number of responses cited a range of indirect drivers. For example, the difficulty of influencing institutional decisions regarding construction of large infrastructure such as solar power plants in areas of Herzegovinian forests and pastures, the level of tax burden for small enterprises, the complex land ownership and transfer system regarding inheritance, declining workforce for the application of traditional practices, and the loss of agricultural cooperatives.
- There was no significant difference in the frequency of responses related to direct drivers.
- However, it can be observed that a large portion of respondents recognize the problem of conversion (loss) of natural habitats due to factors such as: overgrowth of meadows and pastures due to reduction of livestock and abandonment of rural areas, construction of infrastructure on agricultural and forest land, disappearance of water flows, drastic changes in fish fauna, and more.
- Overexploitation of resources is also a common response among respondents, with forest resources being most commonly cited. However, in the area of northern, eastern and central BiH, over-use of water resources was repeatedly highlighted. Respondents reported that water was needed for permanent and temporary settlements, or for private pools, etc.
- Despite the known problem of unregulated landfills in BiH, perceived pressures from pollution were not cited as frequently as other responses.

- Invasive species are recognized in equal measure with other direct drivers. Particularly common are responses related to the spread of ambrosia, tree of heaven, and invasive species of fish and insects that were not previously known in local ecosystems.

- Climate change was a particularly common topic in the area of northern (northeast) BiH, where the population placed particular emphasis on experienced and notable changes in climate and more frequent droughts (Figure 66). Also, the southern area of BiH has been experiencing fires, especially forest fires, largely attributed to droughts and climate change.

- In the group of indirect drivers, respondents very often referred to low levels of societal concern for rural development and well-being of the rural population, poor development of infrastructure in rural areas, inability to sell resources collected in nature as well as domestic products, migration out of rural areas, decreasing numbers of young people in rural areas, and insufficient awareness of and attention to the importance of education about the values of local nature.

- Residents often cited the occurrence of unsustainable practices and even unlawful actions that impact natural resources. Corruption and the inability to participate in decisions on the construction of private energy or major public infrastructures, as well as the illegal exploitation of natural resources, have been repeatedly mentioned. Several respondents expressed inadequate action for dealing with these social phenomena.

When looking at the distribution of recognized drivers on nature in different regions of BiH (Figure 69, A, B, C and D), the following general observations can be made:

- The lowest levels of recognition of direct drivers on nature were recorded in the central area and the highest levels were recorded in the southern area of Bosnia and Herzegovina.

- In western and southern BiH, the loss of natural habitats was highlighted frequently by respondents, while in northern BiH frequent reference was made to overexploitation of resources. In southern BiH, the majority of respondents referenced climate change as a major driver.

- Institutional indirect drivers were often cited in western, northern and southern BiH.

- Economic indirect drivers had a similar frequency in all areas of BiH.

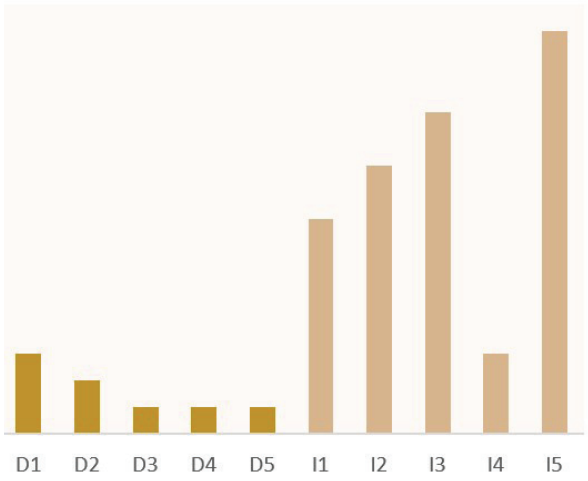
- Demographic indirect drivers were particularly prominent in central BiH.

- Cultural and/or religious indirect drivers were the least frequently mentioned group of indirect drivers in all areas of BIH.

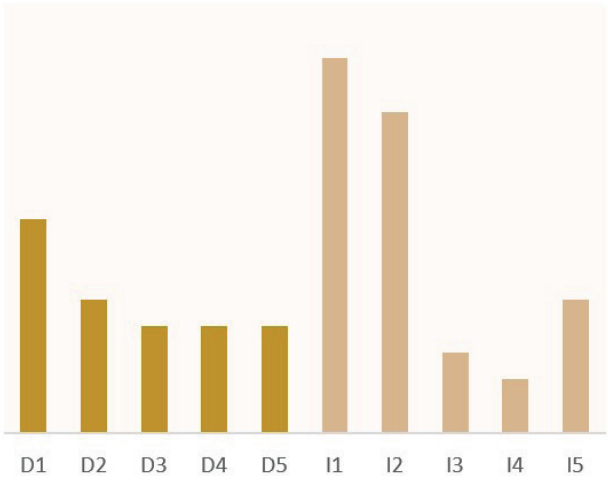
- Scientific and technological drivers (which include lack of awareness and knowledge, change of technologies and loss of economic and agricultural practices) were mostly listed in the central and southern area of BiH.

In general, in analysing the results of dialogues and interviews on drivers on nature, one should take into account the socio-economic opportunities in today's Bosnian Herzegovinian society and the state of dissatisfaction expressed by the participants in this research. The loss of traditional and local knowledge and practices is considered part of all the changes that have befallen the society of Bosnia and Herzegovina through the transition processes. On the other hand, in all the investigated areas, the dialogue participants appreciated, emphasized and affirmed the local wealth and diversity of traditional and local knowledge and practices, as well as the need and examples for its preservation.

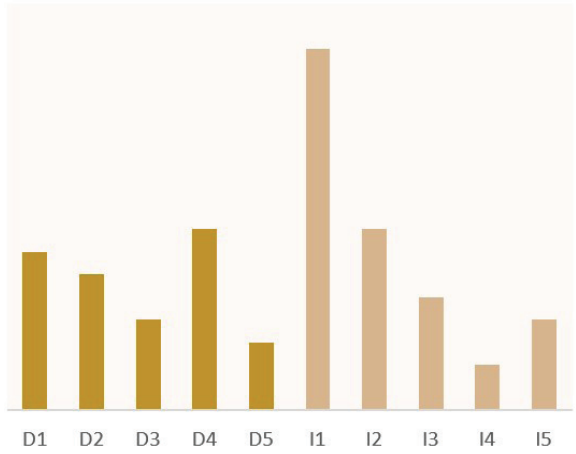
A - Central area



B - Western area



C - Northern area



D - Southern area

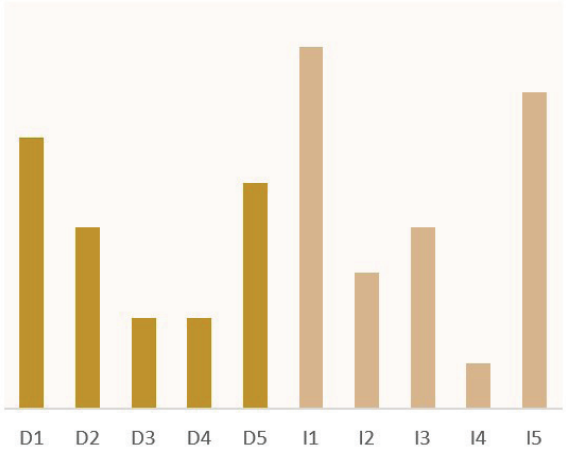


Figure 69. *Identification of direct (D1 - D5) and indirect (I1 - I5) drivers on nature in different areas of Bosnia and Herzegovina (A, B, C and D) (%)*

Image 25. Wildfires in Bosnia and Herzegovina (Photo: Macanović, A. 2022)

Image 26. Loss of natural habitats through the exploitation of gravel (Blidinje, photo: Macanović, A. 2022)

Image 27. Loss of natural habitats due to infrastructure construction (Photo: Velić, S. 2021)

5. TRADITIONAL AND LOCAL KNOWLEDGE IN PLANNING AND MANAGEMENT PROCESSES: THE RELATIONSHIP BETWEEN TRADITIONAL AND CONVENTIONAL KNOWLEDGE IN EDUCATIONAL PROCESSES

Image 28. *Traditional knowledge in Bosnia and Herzegovina is transmitted through art, culture and cultural monuments*

5.1. Introduction

Formal and informal education is a social instrument for spreading and sharing human culture through the transfer of societal values and accumulated knowledge. Education is not limited to transmitting new skills and knowledge but also involves acquiring knowledge, interpreting and giving meaning to concepts, creating links, understanding ideas, fostering critical thinking, and enabling transmission of values and cultural heritage. Education also implies ways of knowing, perceiving and interpreting the world, with the potential to develop innovative solutions to societal challenges, create advanced societies, discover and understand different dynamics, and explore values that can fundamentally challenge the existing social order.

Education plays a crucial role in the development of every nation. Any society without a formal education system is destined to rely on improvisation and runs the risk

of becoming a society without identity (Assié-Lumumba, 2016). In many cases, education leads to success in society when it is easily accessible and supported by and linked with people's culture (Sesanti, 2016).

Therefore, educational institutions have significant influence on the formation and development of society and societal values through educational curricula. Education is both a prerequisite and a tool for increasing students' ability to exercise their social, cultural, economic and political rights. Culture-based education focuses on understanding how a community relates to other systems of knowledge and cultural beliefs (Barnhardt and Ginns, 2014).

Blignaut et al. (2017) argue that the most important purpose of education is to form autonomous individuals who can think for themselves and are capable of making ethical judgments and decisions. A successful educational programme often requires a relevant curriculum that is implemented in the local language, which builds on the knowledge and experience of both teachers and students (UNESCO, 2000).

5.2. Schools as a factor in creating awareness of traditional and local knowledge

In the available domestic and foreign pedagogical literature on education, the term 'traditional knowledge' is used most often in connection with the term ecological education, and it is also considered here.

The current debate on formal education will not include all the necessary details about traditional and local knowledge. An environmentally educated society will be ready to adopt environmental policies that will prevent nature from being harmed. Without this type of education, Agbola, (2006) believes that an increasing number of people will live unsustainable lifestyles characterised by high levels of consumption. One cause of environmental degradation and depletion is the excessive use of resources which are readily available from the environment to all users free of charge. These types of resources are recognized as 'global/common goods' because they are the common heritage of humanity. Some of these resources and regulatory services are potentially renewable, such as clean air and the ozone layer.

When it comes to formal education, it should be pointed out that already primary (elementary) education separates certain parts of knowledge and content into distinct educational subjects. In BiH's primary level curriculum, environmental topics are sporadically spread across subject areas and most often are found under other subjects (i.e., biology, physics, chemistry). The categorisation of environmental education in this way tends to result in complex and interconnecting socio-ecological phenomena being portrayed in a reductionist way. By dividing across subjects, students may form an understanding "... that there are separate physical, biological and chemical worlds. Instead of putting the web of life at the centre, unique phenomena are being split into smaller sections" (Lüpke, 2012).

Another problem of environmental education today is the strong functional and instrumental setting of teaching intentions, which individuals need to realize through environmentally conscious and conscientious behaviour and action. Such an intention to directly influence actions by shaping behaviour is not applied in other areas of education, and ecological teachings and education should also trigger and release the primary intention of influencing environmentally conscious individual behaviour.

5.3. Traditional ecological knowledge

Examination of traditional ecological knowledge (TEK) explicitly leads to multicultural perspectives at the core of educational curricula. Our findings show that such knowledge is generally lacking in formal education.

How did curriculum developers and teachers neglect the growing importance of cultural diversity in the academic society? The question is particularly important given

the responsibility of educators to prepare students for productive participation in a complex and multicultural community, which bases and promotes development and education on multiple knowledge systems and different traditions. The Western education approach, for example, examines ecological relationships and intercultural perspectives and deepens awareness of other cultures. At the same time, it provides students with insights about cultural assumptions, which further contributes to their intellectual development. Given the great emphasis on ecological and cultural relationships by the Western education approach, why has there been such a devastating neglect of traditional knowledge and traditional values?

Since the beginning of the industrial revolution, TEK has been eroded in many parts of the world (Maffi, 2005). The continuous erosion of traditional knowledge is the result of complex and multifaceted factors, which include changes in formal education and the loss of Indigenous and local languages (McCarter and Gavin, 2011; Gómez-Baggethun and Reyes-García, 2013), dominant religions (Tang et al., 2010), land use changes (Kingsbury, 2001; Gray et al., 2008; Kingsbury, 2001), market integration (Godoy et al., 2005;1998, Godoy et al., 2005), loss of access to resources through conservation programs (Gómez- Baggethun et al., 2010), mechanization of resource systems, and, more generally, industrialization and globalization (Turner and Turner, 2008; Gómez- Baggethun, 2009).

The increasing scope and pace of global changes has raised the question of whether TEK will adapt or disappear in the face of urbanization, technological development and market globalisation.

In the second half of the 20 th century, the decline of traditional lifestyles and related knowledge was so widespread that many doubted whether TEK would survive by the end of the second millennium (Cox, 2000). However, over the last two decades, there has been a change and reshaping of social perceptions about TEK. In recent years, researchers have also changed their perceptions of TEK, in particular, its capacity to adapt and evolve in response to social and environmental change. TEK was previously generally perceived as a remnant of the past containing folklore influences. Nevertheless, recent research in both developed and developing countries reveals that there are significant impacts of TEK, and that despite modernization, this knowledge is useful and persists in many rural and urban areas (Godoy et al., 1998; Gómez Baggethun et al., 2010).

This dynamic nature is sometimes achieved by accommodating new forms of knowledge that complement traditional and local knowledge without necessarily jeopardizing its existence (Gómez-Baggethun and Reyes-García, 2013). For example, Eyssartier et al. (2011) document a case in Northwest Patagonia where local people have maintained traditional practices in their vegetable gardens but have also adopted greenhouse farming since this improves the conditions and productivity of certain crops.

5.4. Review of traditional and local knowledge in the education system of Bosnia and Herzegovina

5.4.1. Preschool education in Bosnia and Herzegovina

On the topic of the representation of traditional knowledge and intangible cultural heritage of Bosnia and Herzegovina in the curricula for preschool education, the analysis found that subjects addressing traditional and local knowledge usually appear in the curriculum of preschool students aged 5-6 years. In preschool curriculum in Republika Srpska, topics related to traditional and local knowledge introduce children up to 6 years to the ways of life in Republika Srpska, including folk customs, beliefs, traditional games and rituals with an elementary level explanation of their importance. Preschool pupils participate in events such as washing on a floral Sunday; *Lazarice*, a women's ritual procession; painting and egg tapping for Easter; *Vrbica*, Lazarus' Saturday; *Materice*, Mother's Day; *Očići*, Father's Day; and *Djetinjci*, Children's Day, etc. In the field of speech creativity, the following themes are represented: tra-

ditional language, puzzles and other mind games, word games that acquire special meanings, numerators, riddles, and puns, among others.

In the field of literature, folk and art literature for children is used such as poems, stories, fairy tales, fables, puzzles, riddles, tongue-twisters, numerators, lullabies, nursery rhymes, chants, proverbs and other literary genres. Through drawing, painting, modelling, children are introduced to the products of traditional folk creativity and art of sacral objects and their purpose, function and meanings are explained. Preschool curriculum in the Federation of BiH and Brčko District is developed by the Integral Developmental Programme developed by the Agency for Preschool, Primary and Secondary Education of Bosnia and Herzegovina (APOSO). According to this programme, preschoolers (5 -6 years old) should be able to:

- get acquainted with the impact of humans on the environment and the interconnectedness of living beings and inanimate nature,
- describe the emotions caused by works of art and cultural phenomena and events,
- interpret their experience of artwork, a cultural phenomenon and an event,
- show interest in folk tales and fairy tales,
- identify the most important examples of cultural and historical heritage in their immediate environment,
- speak in their own words about the examples of cultural heritage of BiH, and recognize the importance of their preservation,
- speak in their own words about other cultures and traditions.

The representation of these contents in the curriculum is presented in Table 9.

5.4.2 Primary education in Bosnia and Herzegovina

In order to determine how traditional knowledge is mainstreamed and represented in the national curriculum, curricula were analysed in the Federation of BiH in all 10 cantons, in Republika Srpska and Brčko District. Table 10 presents the representation of traditional knowledge in subjects from the 1st to the 9th grade of primary education in Bosnia and Herzegovina.

Table 9. *Representation of traditional and local knowledge in the Federation of BiH, Republika Srpska and Brčko District in preschool education*

	Republika Srpska	Federation of BIH	Brčko District
Total number of teaching areas/classes	40	40	40
Number of teaching areas with traditional knowledge	4	7	7

Table 10. *Number of teaching hours of subjects in which traditional knowledge can be incorporated, from grades I-IX of primary schools in the Federation of BiH, Republika Srpska and Brčko District*

			Federation of BiH		Republika Srpska		Brčko District
Grade	Subject	Number of classes	Teaching units with TEK	Number of classes	Number of teaching units with TEK	Number of classes	Teaching units with TEK
1 - 4	My Environment	32	8				
	Music	32	5				
	Nature and Social Studies	19	2				
	Art	30	4				
5 - 9	B/C/S language	32	11				
	Music	30	1				
	Islamic Religion	32	6			30	3
	Catholic Religion	32	4				
	Orthodox Religion					30	2
	Nature	32	1	32	3	32	1
	Social Studies	32	3				
	Art	30	1	19	1		
	Geography			29	1		
	History			30	2		
	Biology			20	2	32	1
	Optional classes			19	1		
	Nature and Social Studies			19	2		
	My environment					32	1
	Life skills					30	6

Primary education in the Federation of Bosnia and Herzegovina, 1st -4th grade

Content related to traditional knowledge are found in the following subjects: 'My Environment', 'Nature and Social Studies', 'Music', 'Fine Art' (from grades 1-4); 'Nature and Society' (in grade 5); 'Bosnian/Croatian/Serbian Languages' (BCS) (grades 5-9); and 'Islamic and Catholic Religious Education', 'Art', and 'Music' (in grade 6). Table 11 collates subjects from grades 1 to 4 whose content is related to traditional knowledge and intangible cultural heritage.

Table 11. *Teaching content related to traditional knowledge in primary education in the Federation of BiH from grades 1-4.*

Subject	Topics
My Environment	Growing different plant species e.g., grains, fruits, vegetables. The importance of plants in human nutrition. Growing and nurturing edible plants. Mutual dependence of humans, plants and animals – understanding of food chains. Understanding culture of life. Basic knowledge about environmental conservation. Past, present and future of homeland, monuments, buildings and written monuments as witnesses of the past. A tour of significant cultural monuments, significant buildings, museums, institutions. Collection of materials on their homeland's past. Understanding the need for people to get together and celebrate together. Celebrating and reflecting on Bread Day festivities. The joy of community and celebration. Understanding the need to attend cultural festivities at school and home and the culture of behaviour during the festivities. Suggestions for methodical processing: drawing and making a poster about the fruits of the earth, preparing bread and collecting fruits for the celebration of Bread Day; discovering the importance of this holiday with their family and community; recognizing some features of relevant holidays and how to participate in them; writing simple holiday congratulatory messages.
Nature and Social Studies	Learning about their homeland as a place of habitual residence and life. Special features of the country e.g., geographical features, plants, domestic and wild animals. Various people's activities in their homeland. Different practised occupations in their immediate environment. Extracurricular activities conducted in the immediate environment in which students get to know and name different professions, interact with people who showcase their services and activities, and finally get a chance to compare workspaces, clothing, tools, accessories and finished products. The interconnectedness of occupations, as well as the importance and value of human labour stands out. Students are able to learn about the significant economic activities of their homeland and recognize and understand the connection of people's activities with geographical appearance of their homeland and ecological conditions; to understand branches of agricultural production in the country: farming, cattle breeding, vegetable growing and their impact on the life of the population; to know the most famous branches of industrial production in the county: food, wood, metal, construction; to recognize present, past and future ancestors and descendants; to distinguish between the past, present and future based on events from their own past and that of their ancestors; and, to distinguish ancestors and offspring.

Music	Getting to know characteristic folk songs. Love for the musical and cultural heritage of Bosnia and Herzegovina, traditional songs of the people of Bosnia and Herzegovina, collecting traditional instruments from the region where the school is located. During the subject year, students are expected to learn at least 10 musical games that include life in nature, folk customs and more. Games and folk dances also help students to know about folk music traditions. Developing awareness of *kolo* (circle dance) as a traditional musical creation of BiH with established rules and choreography. Students are expected to listen to traditional music. Students need to find and collect images of traditional folk instruments and costumes of the people of BiH. During the subject year, 12 nursery rhymes should be taught. The proposed rhymes have different content, and as such are invaluable to child development.
Art	Within the topic of 'mass and space', students are supposed to get acquainted with the use of natural materials (chestnuts, acorns, pinecones, etc.); motifs and techniques – Correlation with other subjects – folk tale, fable, fairy tale, poem, proverb; cultural heritage of BiH; and folk customs: religious holidays, important dates, cultural heritage.

Table 12. *Teaching content related to traditional knowledge in primary education in the Federation of BiH from*

Subject	Topics
Nature	Teaching unit includes wild (self-seeded) and cultivated plants and the development of knowledge on wild and cultivated plants and their use for human nutrition and health preservation.
Social studies	Cultural heritage of BiH: cultural and historical sights, cultural and historical monuments of BiH, the most important monuments from the history of BiH; the past of the homeland; religious monuments of the people in BiH, geographical features of BiH, developing a positive attitude towards the environment, and cultural values.
Islamic and Catholic Religion	One of the topics studied is 'diversity in my neighbourhood'. The thematic unit on Christianity and Judaism aims to adopt an attitude of respect for all religions; to build an attitude of respect for the spiritual values of different cultures and civilizations; to develop the ability to respect others' views and opinions; to perceive the importance of knowing and respecting other cultures; to develop respect for other peoples and religious communities in a close environment.
B/C/S language	Oral literary heritage: an awareness of the existence of peoples and national and cultural values embodied by heroes sung in epic songs. The value of preserving cultural heritage. The value of the *stećak* (tombstone). The value of national heritage, especially the native. The importance of the linguistic tradition and its role in preserving linguistic integrity; awareness of the diversity of languages, dialects and native speech as a rich and an integral part of the cultural heritage of a nation; develop the desire to learn about the traditions, customs and speech of all people and regions of the country. Students are expected to develop love for all Croatian language speeches and dialects, to recognize and accept diversity and peaceful coexistence, to raise awareness of the need to cultivate native speech and the importance of its preservation for future generations, to recognize the value of diversity of native idioms as works of the culture of peoples and to encourage intercultural awareness and respect, to develop the desire to know the traditions, customs and speech of all people and parts of our country, and develop the love for all types of speech and dialects.
Music	Teaching values, attitudes and behaviour, developing love for the musical heritage of BiH, developing permanent interests and love for music.
Art	Motifs and techniques: from folk customs; holidays, significant dates, ethnographic heritage.

Primary education in Republika Srpska

Contents related to traditional knowledge have been identified in the following subjects: 'My Environment' (grades 1-3), 'Nature and Society' (grades 4-5), 'Nature' (grade 5), Biology, History, (grade 6), Religious Education (Catholic, Islamic, Orthodox), Geography, 'Life Skills and Attitudes', Music and Art (grades 5-9), additional classes (grade 7). Table 13 presents the teaching content related to traditional knowledge and cultural heritage in primary education in Republika Srpska, by subjects.

Table 13. *Teaching content related to traditional knowledge in primary education in Republika Srpska, by subjects*

Subject	Topics
My Environment	Getting to know and naming the significant events and holidays that are celebrated at school and how they are celebrated (school Saint Patron's Day, St. Sava, School Day). Naming significant events and holidays that are celebrated in the family (birthday, Christmas, Easter, Eid, New Year, Family Saint Patron's Day, etc.). Recounting a traditional custom that is marked in the family and perceiving and appreciating the diversity of traditional customs and accepting them. Topic: the place where I live and people's occupations. Here, students are required to list practiced occupations in the place where they live and name the tools/accessories that people use in their occupations. Topic: animal and plant life, designation and distinction of fruits. This topic covers the importance of fruits and vegetables in human nutrition; use of vegetables in the diet; recognition of characteristic plants in the field (corn, wheat); knowledge of flour products; process of bread preparation; purpose of grains in human and animal nutrition; benefits acquired from plants; a description of the appearance of old houses in the past; facilities being built in the place and the surrounding area; materials and machinery for construction; the purpose of facilities being built in the place; products or services of certain occupations.
Nature and Science	Customs and traditions of their own and other peoples living in the Republika Srpska; identification of the most important craft services and products in Republika Srpska and/or their homeland; recognition of the basic characteristics, customs and traditions of constituent peoples and national minorities, identification of witnesses of the past; recognition of material, written and oral historical sources (settlements, fortresses, religious objects, excavations, walls, cultural and historical monuments, tools, money, books, old dishes, clothing and decorative items).
Nature	Identification of meadow plants and their importance (grass, clover, fodder plants, medicinal plants of meadows), identification, significance and use of vegetable crops for people; identification of different fruits and grains, significance and method of use; assessment of interdependence of plants, animals and humans (food chains, producers, consumers and decomposers).
Biology	Topic: importance of plants to humans. It covers the most important groups of plants in human nutrition (grains, fruits, vegetables and spices); the most important groups of plants in animal nutrition; plants used in medicine e.g., teas; plants as a medicine, the most famous species and their importance. The importance of plants to humans: Usually, a teacher creates a poster with students that shows the importance and benefits of plants to humankind through their fundamental, practical, and aesthetic significance. Other issues covered include the concepts of selection and hybridization and their multiple significance and preparation of various teas which students consume, whilst learning the different types and their medicinal properties.

History	Topic: prehistory. Distinction of the basic characteristics of the late, middle and early Stone Age (method of processing stone, community, occupation, settlement); religion and culture of prehistoric man in our region. Topic: Balkan Peninsula in ancient times. Culture on the Balkan Peninsula in ancient times.
Geography	Topic: Republika Srpska. Exploration of natural beauties, cultural and historical monuments and intangible heritage of Republika Srpska
Additional classes	Topic: researchers of the homeland. Social life of the homeland, traditional food in my local area, traditions in my homeland, clothes of people in my area (in the past and today; folk costumes and clothes decorations) and folk games of my country. Topic: nature in the homeland. Medicinal herbs (cultivation) and developing interest in certain professions (e.g., medicinal herbs cultivator). Students are able to recognize medicinal herbs and understand their suitable use, to distinguish types of mushrooms. Topics: wild, edible, medicinal and poisonous herbs, identification of edible, medicinal and poisonous plants in the environment.
Art	Theme: nurturing love for the artistic values of the tradition and culture of the Serbian people and other people living in Republika Srpska.

Primary education in Brčko District

The contents related to traditional knowledge are found in the following subjects: 'My Environment', Nature, Biology (for 6 th graders), 'Life Skills and Attitudes' and Religion (grades 5-9). Table 14 presents the teaching content related to traditional knowledge and cultural heritage in primary education in the Brcko District, by subjects.

Table 14. *Teaching content related to traditional knowledge in primary education in Brcko District, by subjects*

Subject	Topics
My Environment	Living beings: Animals and plants, collecting natural materials from nature that can benefit our work, cleaning the school garden or school surroundings, growing flowers in the schoolyard.
Orthodox Religion	Traditions related to baptismal celebrations, different ways of celebrating them and celebratory customs.
Islamic Religion	Characteristics of the wider homeland, knowledge of the immediate and wider homeland, the unique significance of cultural and religious sights, agricultural, economic specificities of the homeland.
Nature	Plant observation and monitoring the development of plants in the vegetable garden and in the field. Orchard, forest and meadow, collecting plants for the herbarium. Searching for sources of knowledge about plants.
Biology	The importance of plants to humankind, the importance of different species, grains, edible, medicinal and poisonous plants, the principles of plant cultivation, visits to institutions engaged in the production of flowers.
Life Skills and Attitudes	Diversity in the areas of language, tradition, music, clothing, values, beliefs, art, and architecture.

5.4.3 Secondary education in Bosnia and Herzegovina

order to determine the representation of traditional knowledge in secondary education, a total of 64 courses in 28 secondary schools across BiH were analysed (Table 15). The subjects in which traditional knowledge could be incorporated were identified in 26 courses. Table 16 provides a comparative overview of the total number of fund of hours[6] of subjects in which traditional knowledge can be incorporated, in secondary schools in the territory of BiH.

Table 15. *Representation of programmes and subjects in which traditional knowledge can be incorporated in secondary schools in Bosnia and Herzegovina*

Total number of high schools analysed in BiH	The number of courses related to TEK	Number of general subjects analyzed	Number of general subjects related to TEK
64	26	9/62	6/ 14

Table 16. *Fund of teaching hours in which traditional knowledge can be incorporated in general subjects of secondary schools in the territory of the Federation of Bosnia and Herzegovina, Republika Srpska and Brčko District*

Administrative level	Federation of BiH and Brčko District		Republika Srpska	
Subject	**Total number of classes**	**Number of teaching units with TEK**	**Total number of classes**	**Number of teaching units with TEK**
B/C/S language	68	6		
Serbian language			32	9
Biology		0		
Geography	68	2	30	2
History	68	4	30	3
Music	30	4	30	1

6. Fund of teaching hours – the local law indicates the number of teaching hours in a year/semester/trimester

Secondary schools in the Federation of BiH and Brčko District (Sarajevo, Mostar, Bihać, Brčko, Tuzla, Zenica)

In the available secondary school subjects in the Federation of BiH and Brcko District, the following schools implement programmes in which traditional ecological knowledge can be incorporated: general gymnasium; secondary medical school; school for secondary professional education and vocational training; secondary school of civil engineering and geodesy; secondary school of agriculture, food processing, veterinary medicine and service industries; high school of environment and wood design; secondary mechanical engineering school; secondary textile and agricultural school; secondary hairdressing school. Traditional knowledge can be incorporated into the following subjects: B/C/S language, biology, geography, history, music and art.

Table 17. *Teaching content that may incorporate traditional knowledge in secondary schools in the Federation of BIH and Brčko District*

School	Subject	Topics
General gymnasium	B/C/S languages	Oral literary heritage of Bosniaks, Croats and Serbs. Bosniak oral lyrical poem. Sevdalinka. Oral Croatian lyrical song. Medieval Bosnian literature and language. Historic frame. First monuments. charter of Ban Kulin, Inscriptions on *stećci* (tombstones), Croatian medieval literature and language. Written monuments, Franciscan literature. Serbian manuscript and transcriptional literary tradition in BiH.
	Geography	Conducting field awareness classes in the surrounding areas (city or canton), rivers, lakes, forests, settlements, museums of the geological collection, institutes dealing with environmental protection and other facilities.
	History	The life, customs and culture of the Illyrians in ancient times in the territory of BiH and the Balkan Peninsula.
	Music	Music in medieval Bosnia, folk chants and dances, *nasheeds* and *qaseedas* and traditional musical instruments in BiH.
	Art	Neolithic megalithic architecture, metal age and archaeological sites in BiH.
	Fine art	Art in BiH; urbanism, towers, houses, bridges, *hans*, hammams, *bezistan* (old, covered bazaars), mosques, *turbets* (mausoleums) harems; epitaphs on tombstones (*nišan*); crafts.
	Biology	The current programme does not identify teaching units in which traditional knowledge could be incorporated.
Secondary Vocational Schools	Biology in Secondary vocational school	Multidisciplinary approach to environmental issues (social, institutional, technological, economic, sociological, political, biological, medical, cultural). Conservation as a specific form of environmental protection. Sustainable use of biological resources and healthy food production.

School	Subject	Topics
Wood-processing profession	Wood Technology	Production technologies, wood surface treatment, production preparation.
Secondary hairdressing school	Material technology	Chemical and biological sources. Use of plants for hair dyeing and making ingredients for skin and hair
Medical schools	Biology in healthcare	Algae, mushrooms, lichens, mosses, ferns, flowering plants. Work in the field in order to identify, collect and prepare the herbarium.
Secondary School of Agriculture, Food processing, Veterinary medicine and Service industries		Courses: Phytopharmaceutical agrotechnician, agricultural technician, food technician, nutritionist, veterinary technician, cosmetic technician, fruit grower, wine maker, florist, gardener, farmer, milk processor, baker, butcher, hairdresser. Such courses could cover multiple elements of traditional knowledge, including within practical and field teaching.
High School of Environment and Wood design	Professional subjects	Traditional forms of woodworking, protection of wood from pests, construction.

Secondary education schools in Republika Srpska

In the available secondary school subjects in the Republic of Srpska, general and vocational secondary schools implement the following programmes in which traditional ecological knowledge could be incorporated into the content (Table 18). For instance, traditional knowledge could be mainstreamed into the following general high school subjects: Serbian language and literature, history, geography and music. It could also be integrated into medical and secondary vocational courses teaching the following professionals: agrotechnician, food technician, veterinary technician, agro-producer, food processor, butcher, baker, woodworking technician on CNC (Computer Numeric Control) machines, nurseries, upholsterer, and forestry technician.

Furthermore, traditional knowledge can be incorporated into the following professional subjects: plant cultivation, functions of fixation and preservation of soil fertility, use of organic fertilizers, reproduction and care of plants, botany and pharmacognosy and pharmacology.

Table 18. *Secondary school subjects in Republika Srpska in which traditional knowledge can be incorporated*

School	Subject	Topics
General High School	Serbian language and literature	Folk epic poems: Dioba Jakšić, Slavery of Janković Stojan; folk ballad *Hasanaginica*; Serbian folk fairy tale of choice; folk stories of Slavic and other peoples (optional). Modernist expression, Ivo Andrić, The Journey of Alija Đerzelez revives the folk tradition (folk, mythical hero), The Bridge on the Žepa, realistic storytelling, reliance on the folk tradition, a modernist rethinking of the meaning of life.

School	Subject	Topics
	History	Understanding historical and contemporary changes, building democratic values that include respect for human rights, developing intercultural dialogue and cooperation, attitudes towards diverse cultural and historical heritage, tolerance towards different attitudes and views of the world. Everyday life, customs, occupations, food and culture of living. The civilization legacy of the epoch of antiquity should enable the merging of past, present and historical heritage – of what the people of antiquity have left us and what is present today, not only as a monument, for example on the territory of Serbia, but also as part of civilizations (institutions, laws, Christianity, literature, theatre, philosophy, medicine, art, architecture, democracy, vocabulary, Olympic Games, sports, alphabet, calendar, roads, water supply, sewage, spas, roman numerals, concrete, stadiums).
	Geography	Geographical knowledge of the elements of the environment (relief, climate, hydrography, living world, natural resources, economy, population, settlements, transport), their development, mutual relations, connections, preservation and rational use for planning and improving personal and social needs, national and European values.
	Music	Responsible attitude towards the preservation of the musical heritage and culture and for professional and personal development.
Secondary vocational school		
Agritourism technician course	Food technology	Provision of conditions for planting, crop rotation, implementation of plant protection measures, production of healthy food, implementation of traditional procedures for growing vegetables, medicinal herbs and spices.
Forestry technician course	Woodworking	Ecological and biological cultivation of forests, the main types of trees of BiH forests, natural forest restoration, the concept of thinning and basic types of thinning, the external and internal properties of forests and seeds, how to select and collect seeds, the necessary tools and protective measures, methods of drying and separating seeds from fruits (rotting and other processes), seed sampling procedure, methods of testing the properties of seeds, criteria for the selection of nursery locations, procedures for developing funnels and building greenhouses, the production process of seedlings in a generative and vegetative way, protective extraction drill bit, volume, vegetative growth, regenerative growth and structure of the dense tree variety.

School	Subject	Topics
Carpentry course	Professional subjects	Immediate selection, preparation and use of appropriate tools depending on the type of processing, assessment of the degree of sharpness of tools, procedures of sharpening and preparation of hand tools, manual processing (cutting, rendering, deepening, purification, grinding).
Course: The manufacturer of primary wood products;	Professional subjects	Preparation of roundwood for traditional ways of processing (peeling of the bark, cutting, washing, cleaning), protection of logs until the moment of processing (immersion in water, spraying).
Secondary school of Pharmacy	Botany and Pharmacognosy	Traditional use of plants for treatment.

5.4.4. Higher education

For the purposes of ongoing research, in order to determine the representation of traditional knowledge in higher education, curricula were analysed in a total of 48 courses from 32 faculties in Bosnia and Herzegovina. The content that incorporates traditional knowledge is set out in 21 programmes. Table 20 presents a comparative overview of the fund of hours in which traditional knowledge is or may be incorporated in the available curricula of higher education institutions in the Federation of BiH, Republika Srpska and Brčko District.

Higher education in Republika Srpska and Brčko District

Table 19 presents courses in which traditional knowledge is or may be incorporated in available higher education programmes in Republika Srpska and Brcko District.

Table 19. *Teaching content in which traditional knowledge in higher education institutions in the Republic of Srpska and Brcko District is, or may be, incorporated*

Faculty/ Department	Subject/ Course	Topics covered in the course
Faculty of Science-Geography	Revitalization of rural areas	Gaining science-based knowledge about the characteristics of rural areas, development factors and valorisation possibilities. Complex analysis of development restrictions, development opportunities (natural geographical basis, population, settlement system, infrastructure) in the function of revitalization of rural areas. Contents: 1. Concept and characteristics of rural areas; Characteristics of problem areas 2. Characteristics of the network of settlements in the rural area of Bosnia and Herzegovina (Republika Srpska) 3. Disposal of natural resources in the function of revitalization of rural areas.
	Economic geography 1	Adoption of knowledge on the main characteristics of natural and social potential in economic development and geographical distribution. Developing the ability of students to perceive the complex interdependence of natural elements and social factors in economic systems and their geospatial functioning.

Faculty/ Department	Subject/ Course	Topics covered in the course
Faculty of Science-Geography Teaching Department	Geography of the population	The course covers the following themes: Natural environment and population; the social environment as a factor of population, health aspects and population nutrition, population and the environment, and population policy – concept, significance and goals. Demographic development of the former Yugoslavia. Other themes include the demographic development of Bosnia and Herzegovina, demographic development and territorial distribution of the population of Republika Srpska. It also covers natural movement, spatial mobility and population structures of the Republic of Srpska, and population policy and the future of the population of Republika Srpska.
	Fundamentals of Ethnology	Forms of cultural life ("*horde*", gender, brotherhood, tribe, people, nation, classes, state); Forms of marriage; Other aspects of social life, norms and forms of behaviour (emergence of norms or customs, division of customs); fundamentals of technology (collection, hunting, fishing, farming, cattle breeding, crafts, trade); nutrition (raw food, food preparation, canning); apartments (development of the apartment depending on the nature, economy, degree of culture); clothing and decoration of the body (origin of jewellery and clothing, types of clothing, materials, way of decorating and hanging, other functions of costume), religion (beginnings of religion, beliefs, magic, cults, more developed forms of religion); art (branches and types of early artistic manifestations, significance and application of art); knowledge and roots of science (oldest knowledge, reminders and script); museology (basic tasks of museums, types of museums, significant museum centres in the world); protection of cultural monuments; ethno parks; ethno film; application of ethnological knowledge in education; application of ethnological knowledge in tourism (rural tourism, national cuisine, souvenirs, media); traditional motifs in modern life (fashion, interior design, etc.)
Ecology and environmental protection, teaching and general course	Protected areas	Application of acquired knowledge in habitat protection and sustainable use of biological resources within various activities. Course content includes: Protection of ecosystems, protected areas, their classification, size and spatial arrangement (*in situ*) protection of biodiversity in the territory of BiH, biodiversity management in protected areas, protection of corridors and fragmented natural habitats and ecosystems, conservation of biodiversity, and conservation of nature.
Faculty of Technology	Technology and food safety	Definition of quality and principles of food products quality management, characteristics and methods of obtaining food products of plant (grains, fruits and vegetables) and animal products (meat, milk, eggs and honey), defining the share of basic raw materials, auxiliary raw materials, auxiliary materials and energy in the technological process in order to determine the general value of obtained products.

Faculty/ Department	Subject/ Course	Topics covered in the course
Faculty of Architecture-Civil Engineering and Geodesy-Civil Engineering	Environmental Engineering	The concept and historical development of ecology, relationships between the living world and the environment, environmental factors (biotic and abiotic), humans as environment factor, historical aspects of the development of ecological thought, the impact of the development of human settlements on changes in the environment, ecological unity and ecological principles in the planning of spaces, settlements and landscapes. Energy and mineral resources, non-renewable natural resources, mineral resources, forest ecosystem and air quality, dryland plants and air quality, aerosediments, water and the importance of water, impact of processes in engineering and construction facilities on water quality, land and sustainable development.
Faculty of Forestry undergraduate academic studies	Forest seed production and nurseries	Acquiring basic knowledge about the use of forest seeds and the production of planting materials from the most important species of this area. Methods of sowing, the method of production of planting material and its manipulation, as well as the basic quality indicators.
	Animal products intended for consumption	Freshwater fish, river crayfish, vineyard snail and grey snail, eggs (pheasant, quail), feathered game (wild goose, wild duck, pheasant, partridge, forest snipe), low game meat (badger, rabbit, dormouse), high game meat (wild boar, deer, roe deer, bear).
	Animal Pharmaceutical products	Leeches, tallow (wild cat, badger, bear, dormouse), dried blister beetle (Spanish fly).
	Animal products intended for the leather and clothing industry	Fur (wild cat, jaundice marten, Caucasian marten, fox, rabbit, otter)
	Animal products intended for home crafts and decoration	Bones and horns (deer, roe deer), skin (bear), stuffed birds
Faculty of Medicine	Clinical toxicology	Mushroom poisoning, differences and importance of recognizing and adequately treating patients poisoned by mushrooms, important industrial poisons, household poisons, plant and animal poisons, mechanism of action, clinical presentation and treatment.
	Hygiene with medical ecology	Mastering knowledge and skills in the field of environment and nutrition in order to preserve and improve health, assessment of the impact of environmental factors on human health and to act preventively in the field of environmental protection and assessing the impact of nutrition on human health and proper nutrition promotion.

Faculty/ Department	Subject/ Course	Topics covered in the course
Sanitary engineering	Ecology basics	The place of humans in the biosphere, the relationship between humans and nature, humans and the global environmental problems of today, disruption and loss of biodiversity, bringing new species into areas where there were none before (benefits and harms), Use of natural resources and the possibility of regulating processes in ecosystems.
Faculty of Agriculture	Medicinal plants	The conditions for storing fruits and grapes and getting acquainted with classic (conventional) production will introduce students to the technology of organic production of plant species and domestic animals, all with the aim of producing healthy food and preserving the environment
Faculty of Agriculture and Food Sciences Plant production, I cycle Plant Sciences, II cycle Faculty of Agriculture and Food Sciences and Faculty of Sciences, II cycle combined master study programme Preservation and sustainable use of genetic resources	Plant genetic resources	Introduction to the possibilities of conservation and ways of conservating species from the following groups of plants: fruit and vine, vegetables, medicinal plants, spices and aromatic plants, forage plants, grains and corn. Introduction to *ex-situ, in-situ* and on farm methods of conservation and procedures in gene banks (seed and field collections). The course involves acquiring knowledge in the field of legal regulation at the international and domestic level, in the field of preservation of genetic resources in general, and plant genetic resources in particular as well as acquiring knowledge about the possibilities of applying traditional knowledge and skills.
Faculty of Agriculture and Food Sciences I cycle All orientations- All plant-based orientations, production, Animal production	Beekeeping	Introduction to the anatomical structure of the honey bee, the principles of reproduction and development, as well as the importance of bees as pollinators, introduction to various types of beehives, beekeeping equipment and accessories, as well as practical introduction to beekeeping society and beekeeping technology.

Faculty/ Department	Subject/ Course	Topics covered in the course
Faculty of Agriculture and Food Sciences I cycle Plant production, plant protection	Agroecology	Introduction to abiotic and biotic environmental factors within the agroecosystem, importance of agrotechnical measures, loss of agrobiodiversity, interaction relations in the plant community and basic concepts of phytocenology. Agroecology aims to adjust the vegetation factors within the agroecosystem for quality and economical production. Acquiring knowledge about the relationship between ecology and agronomy.
Faculty of Agriculture and Food Sciences, I cycle Plant production, farming and vegetable growing	Locally grown arable crops	Getting acquainted with the possibilities of growing local arable crops that can be produced in the existing agro-ecological conditions, their economic and agrotechnical significance, chemical composition of the target organs of production, origin, systematics, morphological and biological properties, relation to external environmental factors, technologies for production and harvesting, possibilities of use for the production of traditional products.
Faculty of Agriculture and Food Sciences, I cycle Plant production, horticulture	Medicinal, aromatic plants and spices	Introducing students to the most important types of wild and cultivated medicinal herbs in BiH, which are increasingly in demand on the domestic and foreign markets, for use as raw materials in the pharmaceutical and food industries. Unsustainable practices in the collection of medicinal plants from nature which contribute to the endangerment of very important plant species. The goal is to get acquainted with the basic morphological characteristics of important medicinal, aromatic and spice plants and their active substance.
Faculty of Agriculture and Food Sciences, I cycle Plant production, horticulture	Forest fruit	Introduction to the biology of growth and development of forest (wild) fruit trees, their distribution, range and morphological characteristics, as well as requirements for preserving and using the fruits of forest fruit trees, nutritional values, benefits of use and planting methods for these species.
Faculty of Agriculture and Food Sciences Safety of food of animal origin in the chain of agricultural production, II cycle Rural development I, II cycle	Preservation of Native Species of Domestic Animals	Introduction to native breeds of domestic animals and their importance for livestock breeding, as well as methods for their conservation. Native breeds are important for genetic resilience and are adapted to living conditions in BiH, which in the future may be invaluable for preserving genetic diversity within the species of domestic animals, without which there is no progress in livestock production.

Faculty/ Department	Subject/ Course	Topics covered in the course
Faculty of Agriculture and Food Sciences II cycle: Agribusiness Rural development I Animal husbandry	Environmental protection	Getting acquainted with various aspects of the environment, the basic problems of pollution and degradation, activities that demonstrate the complexity of issues regarding environmental protection. In this course, special attention is paid to the analysis of the consequences of anthropogenic factors and activities that can protect against further degradation. Various components of the environment (water, air, soil, food) are studied.
Faculty of Agriculture and Food Sciences Food safety of animal origin in the agricultural production chain, II cycle	Vertebrate biodiversity	The emergence of life and zoogeographical areas on Earth, habitats and characteristic vertebrates in certain zoogeographical areas.
Faculty of Agriculture and Food Sciences and Faculty of Sciences II cycle combined master study programme in Conservation and sustainable use of genetic resources	Traditional knowledge and on farm Conservation of genetic resources	Introduction to the characteristics and importance of farm conservation of genetic resources, as well as its importance for rural areas and modern agriculture, as an important element of *in situ* conservation. Conservation of biodiversity, through its active use, has multiple benefits because old populations of plants and domestic animals are preserved in their natural environment through application of traditional knowledge. At the same time, conservation of genetic resources in farming is dynamic in terms of biological, social and cultural interactions with great importance for rural development.
Faculty of Agriculture and Food Sciences and Faculty of Sciences, cycle II combined master study programme in Conservation and sustainable use of genetic resources	Multifunctional agriculture and sustainable development	Introduction to the concepts of multifunctionality and sustainability and the basics of the emergence and development of the common agrarian policy and rural development policy. The specific objective of the study is to consider the importance and role of protecting genetic resources in the context of modern policies and approaches in the development of agriculture and rural areas. The aim is also to develop a project of valorisation of autochthonous products.

Faculty/ Department	Subject/ Course	Topics covered in the course
Faculty of Agriculture and Food Sciences II cycle combined master study program in Conservation and sustainable use of genetic resources	Animal genetic resources	Introduction to animal genetic resources as an important component of overall agrobiodiversity or biodiversity in general, the degree of endangerment and the importance of conservation of endangered breeds of livestock and poultry, phenotypic and genotypic characteristics of native and local traditional breeds, methods for their conservation, inventory and characterization of animal genetic resources, conservation measures – (in situ, ex situ, ex situ in vivo; ex situ in vitro), gene bank, monitoring as an integral part of the AGR conservation procedure, economic sustainability of breeding of native breeds, as well as the cultural and historical significance of native livestock and poultry breeds.
Faculty of Agriculture and Faculty Science, II cycle combined master study programme in	Aquatic genetic resources	Introduction to natural and anthropogenic aquatic resources that have genetic significance and represent security in food production and agriculture. Mastering methods of testing, conservation and use of aquatic animal genetic resources, especially in fish breeding.
Faculties of Agriculture and Faculty of Science, II cycle combined master study programme in Conservation and sustainable use of genetic resources	Forest genetic resources	Getting acquainted with the importance of conserving forest genetic resources. Recognizing threats to their existence, learning about the methods for their preservation, and possibilities for their use. Getting acquainted with the advantages and disadvantages of different methods for conserving forest genetic resources and their pros and cons. Getting acquainted with international procedures regarding conservation and benefit sharing of forest genetic resources.
Faculties of Agriculture and Food Sciences and Faculty of Sciences, II cycle combined master study programme in Conservation and sustainable use of genetic resources	Genetic resources of microorganisms and invertebrates	Getting acquainted with the application of microorganisms in different human activities, their role in bioremediation of ecosystems and the environment, diversity of higher fungi and assessment of their vulnerability and protection issues, biodiversity of terrestrial invertebrates.

Faculty/ Department	Subject/ Course	Topics covered in the course
Faculties of Agriculture and Food Sciences and Faculty of Sciences, III cycle Agricultural sciences, conservation of genetic resources	Genetic resources for food and agriculture	Considering the role and importance of agrobiodiversity for maintaining species diversity and for providing safe food, getting acquainted with the importance and degree of endangerment of crop varieties, especially genetic resources for food and agriculture and their pressures. Reviewing the existing legal and institutional framework at the international and national level and critical analysis and evaluation of relevant policies and regulations in BIH, through supervised scientific research.
Faculties of Agriculture and Food Sciences and Faculty of Science, III cycle Agricultural sciences, preservation of genetic resources	Conservation and sustainable use of genetic resources	Methods for conservation, characterization and expansion of genetic resources as well as independent scientific research in the field of sustainable use of genetic resources.
Faculties of Agriculture and Food Sciences Agricultural sciences (III cycle)	Evaluation of plant genetic resources	Methods for the evaluation and use of (plant) genetic resources and independent scientific research in the field of genetic resources. Introduction to centres of genetic diversity and genetic variability, evolution and domestication of species; strategic, political and economic aspects of the evaluation of genetic resources; programmes for the conservation of genetic resources in the world and BiH; gene banks and storage methods; factors that threaten genetic resources; genetic research and techniques for evaluating genetic resources (morphological, biochemical, molecular); evaluation of agronomic characteristics; reproduction of genetic resources; basic material in selection and breeding; erosion of genetic diversity, management of genetic resources; documentation and electronic databases; ethnobotany.
Faculties of Agriculture and Food Sciences	Evaluation of animal genetic resources	Knowledge of the institutional and legal framework and methods for evaluation and use of animal genetic resources (AGR), and independent scientific research in the field of animal genetic resources (AGR).

Higher education in the Federation of Bosnia and Herzegovina

Table 21 presents teaching content in higher education curricula in the Federation of BiH, in „which traditional knowledge is, or can be incorporated.

Table 20. *Number of classes in which traditional knowledge is or can be incorporated in available curricula and programmes in higher education institutions in FBiH, RS and Brčko District*

	Federation of Bosnia and Herzegovina		Republika Srpska and Brčko District	
	Total number of classes	Number of teaching areas with TEK	Total number of classes	Number of teaching areas with TEK
Faculty of Natural Sciences and Mathematics			37	6
Faculty of Sciences - Biology Department	48	2		
Faculty of Mining, Geology and Civil Engineering			28	0
Faculty of Forestry	20	2	20	2
Faculty of Medicine	60	1	60	2
Faculty of Architecture, Civil Engineering and Geodesy	36	2	36	1
Faculty of Agriculture	54	5	54	2
Faculty of Agriculture at the University of Banja Luka			506	19
Faculty of Architecture, Civil Engineering and Geodesy			36	2
Faculty of Pharmacy				

Table 21. *Teaching content in which traditional knowledge in higher education institutions in the Federation of BiH is or can be incorporated*

Faculty/ Department	Subject/ Course	Topics covered in the course
Art history	Architectural composition	The origin of links with other designs and art, the disadvantages of traditional measurement of architectural composition today. The art of medieval Bosnia: exploring the development of settlements of architecture, sculpture, painting and *stećak* (tombstone) culture.
Faculty of Pharmacy	Systematics and biogeography of plants	Basic botanical concepts and biological diversity of plant life. Ecological characteristics and distribution of individual systematic orders: Rosales, Fabales, Myrtales, Rutales, Sapindales, Dipsacales, Santalales, Rhamnales, Gentianales, Oleales, Solanales, Polemoniales, Scrophulariales, Lamiales, Asterales, representatives, of the most important medicinal species. Idioecological characteristics of the most important types of medicinal plants. The ecological basis of planting economically significant species of plants, monastery hospitals and pharmacies, old Slavic witchcraft and treatment with medicinal herbs, religious, apocryphal and empirical medicine and pharmacy, the influence of east and west on the development of pharmacy in BiH, pharmacy of the Dubrovnik Republic and influence on pharmacy in BiH, the role of the Franciscans and monastery pharmacies, the development of pharmacy in an independent Bosnian state, the development of pharmacy in the Ottoman era, the influence of faith in pharmacy.

Faculty/ Department	Subject/ Course	Topics covered in the course
	Pharmacognosy and drug chemistry II	Selected chapters in pharmacognosy and chemistry. Natural medicinal raw materials and drugs of natural origin.
	Drugs - isolation of natural medicinal substances	Knowledge and skills to obtain chemically defined and pharmacologically active substances found in various natural medicinal raw materials.
Faculty of Medicine	History of medicine	History of folk knowledge on common diseases (chronological review of the development of folk medicine – beliefs, methods of treatment, identification of diseases). Magic and beliefs in folk medicine.
Faculty of Agriculture, Plant Production	Pedology	Students are to be introduced to the numerous natural and dynamic properties of soil that make up its constituent phases: solid (mineral and organic), liquid and gaseous.
	Plant breeding	Native genotypes as a plant genetic resource.
Zootechnics	Autochthonous breeds	Conservation of animal genetic resources, the importance of providing a genetic base for future selection work, the importance of preserving endangered breeds as cultural heritage. Autochthonousness and opportunities for the preservation of native breeds through the creation of programmes for the protection of genetic resources, cultural significance, cultural heritage and traditions of people in Bosnia and Herzegovina in terms of keeping and breeding domestic animals.
Nutrition	Medicinal plants and spices	Use of medicinal plants and spices in the food, pharmaceutical and cosmetic industries.
Faculty of Forestry	Systematics of plants	Basic woody and herbaceous plants characteristic of forest communities, methods for identifying plant species in the field and in the laboratory based on the characteristic morphology of plant species, techniques for identifying plant species based on the morphological characteristics of plants and forming collections of plant species.
	Wood forest products - assortments	Definition of wood assortments, traditional wood cladding sorting systems, standards for forest wood assortments and their classification.
	Non-timber forest products	Resins and juices from wood, essential oils, wood greenery, bark and forest waste, mushrooms as forest products.
Faculty of Sciences-Biology	Biology of natural resources	Biology of edible and toxic mushroom species and resource potentials, algae as a resource, edible vitamin, medicinal, honey and decorative plants, biology of invertebrate and vertebrate species originating from different types of ecosystems. Resource potentials and methods for their use. Use, improvement and protection of bio-resources protection.

Faculty/ Department	Subject/ Course	Topics covered in the course
	Landscape ecology	Knowledge of vertical and horizontal landscape profile as a basis for improving landscape planning, landscape capacity assessments, knowledge of traditional planning i.e., practices for using space while preserving ecosystem functions in natural habitats.

5.5. The state of traditional knowledge in Bosnia and Herzegovina

Based on our analysis of available curricula for preschool, primary, secondary and higher education, the total number of classes where traditional ecological knowledge in included is very low. We conclude that the integration of traditional knowledge in the Bosnian and Herzegovinian education system is at the very margin and is almost completely omitted or excluded from the formal school curricula at all levels.

It is evident that at higher levels of education, traditional knowledge is sometimes used in combination with conventional knowledge. However, in such a situation it is usually recognized exclusively in specialist programmes and much less in the co-production of general knowledge in society.

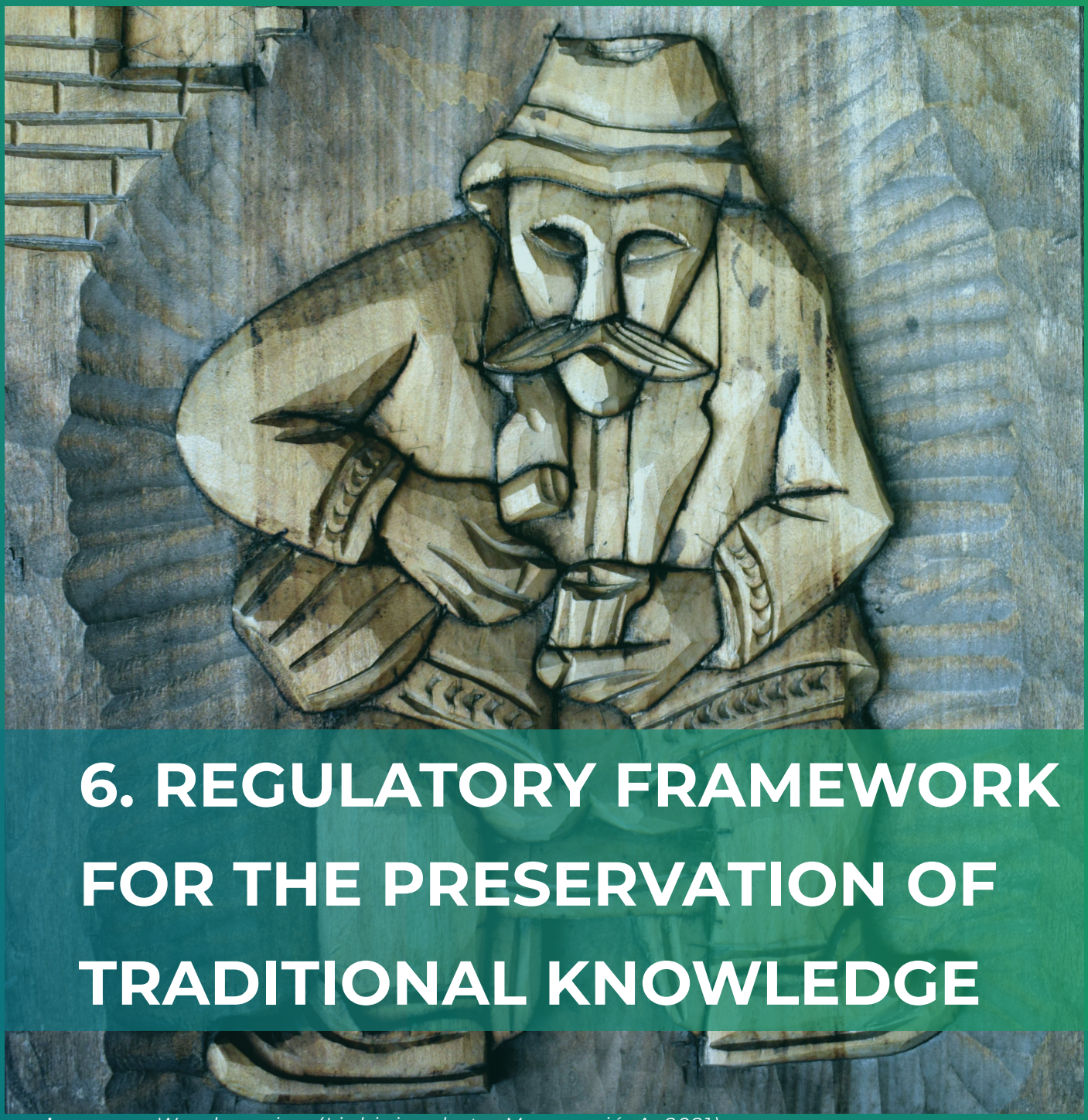
Getting to know and learn about traditional knowledge from the earliest period of schooling is of great importance for developing students' awareness of their own culture, historical relationship with nature, the resources available to Bosnia and Herzegovina, and the sustainable ways of promoting, conserving and protecting them.

The role of education and related educational institutions at all levels - pre-school, primary, secondary and higher education - is extremely important for preserving traditional knowledge and practices through learning and use.

Given that traditional knowledge and practices have strong elements of sustainability, the education system is an important means of ensuring its preservation. In this way, future generations can fully understand the pressures impacting the environment. The braiding of traditional knowledge with modern knowledge creates new opportunities to develop innovative solutions for averting the negative consequences of environmental decline.

The issue of integrating traditional knowledge in school curricula must be approached seriously and efficiently, through effective amendment of existing curricula to transparently and ethically mainstream traditional knowledge within the relevant academic subjects, courses and programmes.

One of the best times to acquire and retain traditional knowledge is at a young age, with continuous learning throughout higher levels of education. To promote and preserve a healthy and quality environment that is based on the best available knowledge and values of our tradition and customs, it is necessary to establish an inclusive curriculum, including guiding materials such as textbooks and to train teachers and lecturers to effectively deliver an inclusive curriculum. It is also essential to introduce special social activities to enrich cultural heritage and sensitize the public. In other words, it is necessary to reform the curriculum and the entire social landscape in order to value and use all forms of knowledge and practices which can contribute to sustainable development.



6. REGULATORY FRAMEWORK FOR THE PRESERVATION OF TRADITIONAL KNOWLEDGE

Image 29. *Wood carving (Ljubinje; photo: Macanović, A. 2021)*

6.1. Introduction

Traditional knowledge systems of Indigenous Peoples and local communities have been and are of immense value to society. Over millennia, they have provided food and medicine, and practiced sustainable methods for managing biodiversity and natural resources. These systems of knowledge have made great contributions to feeding, clothing and healing the world, and today they still offer solutions for addressing complex environmental challenges, such as biodiversity loss and climate change[7] . Today, traditional knowledge systems are marginalized and in danger of disappearing. Threats such as inadequate international and national legal frameworks and poor recognition of the rights of Indigenous Peoples and local communities at the national level are currently challenges which hinder opportunities for identifying and upscaling sustainable management of natural resources (Nijar, 2013).

7. https://www.iucn.org/resources/grey-literature/role-indigenous-peoples-and-local-communities-effective-and-equitable

There is no concise and generally accepted definition of traditional knowledge (TK). The most concise definition of TK was given by the World Intellectual Property Organization (WIPO). According to WIPO[8] , TK refers to the content or essence of knowledge resulting from intellectual activity in a traditional context, which includes practical knowledge, skills, innovations, practices and learning that are an integral part of traditional knowledge systems, as well as knowledge into which traditional ways of life of Indigenous Peoples and local communities are woven or which is contained in systems of modified knowledge that is transmitted from generation to generation (Srinivas, 2008).

Traditional knowledge is also part of intangible cultural heritage, as it includes, among other things, oral tradition, expression and Indigenous language, performing arts, social rituals and celebrations, and knowledge and practices related to traditional crafts. Traditional knowledge is a manifestation of the identity of the community, their way of life and a reflection of their values. As such, traditional knowledge must be protected by appropriate legal mechanisms (Alija and Hasić, 2014).

6.2. International regulatory framework

The issue of legal protection of traditional knowledge has become topical in the last 40 years, and only in the last 10-20 years has there been a significant increase in interest and recognition of the value of Indigenous and local knowledge in Western science. There are several international legally binding instruments to protect traditional knowledge as an intellectual property of the community (UNESCO/WIPO, 1985; United Nations, 1992; Brink and van Hintum, 2020; Salī & Filipo, 2020), such as:

- Convention on Biological Diversity (1992), and in particular Working Group on Article 8j (WG8j); Under Article 8j, Parties are expected to undertake measures to respect, preserve and maintain the knowledge, innovations and practices of Indigenous Peoples and local communities relevant for the conservation of biological diversity and to promote their wider application with the approval of knowledge holders and to encourage equitable sharing of benefits arising out of the use of biological diversity.

- Nagoya Protocol (2010) on the Fair and Equitable Sharing of Goods from the Utilization of Genetic Resources (Access and Benefit Sharing Model of Access to Genetic Resources with Sharing of Goods);

- International Agreement on Plant Genetic Resources for Food and Agriculture of the Food and Agriculture Organization of the United Nations – IT-PGRFA (2001[9]);

- UNESCO Convention on the Conservation of Intangible Cultural Heritage (2003);

- UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage[10] (1972);

- Form of provisions for national laws for the protection of the expression of folklore against illicit exploitation and other prejudicial actions (UNESCO, WIPO);

- Protection of Intellectual Property Rights (IPR) regulated through the WIPO.

More than a dozen United Nations (UN) agencies are currently working on activities to protect, preserve and promote traditional knowledge, within their specific mandates and spheres of expertise. Most UN processes, with the exception of the United Nations Permanent Forum on Indigenous Issues, often deal with traditional knowledge separately from traditional resources and territories and ordinary laws, i.e., deal with traditional knowledge issues within the property paradigm and marginalize the holders of ancestral decision-making rights (Swiderska, 2012).

Other international instruments, such as the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP[11])

8. https://www.wipo.int/tk/en/tk/
9. https://www.fao.org/3/i0510e/i0510e.pdf
10. https://en.unesco.org/about-us/legal-affairs/convention-concerning-protection-world-cultural-and-natural-heritage
11. https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf

and United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas (UNDROP[12]) also highlight the preservation of traditional knowledge and its inclusion in the development of biodiversity policies.

The 2030 Agenda for Sustainable Development and its Sustainable Development Goals, and the Kunming Montreal Global Biodiversity Framework (CBD, 2022[13]) recognize the critical role of traditional knowledge for the conservation and sustainable use of biodiversity, as well as for protecting cultural diversity. Despite this, there are still few examples of national policies that explicitly consider and effectively incorporate traditional knowledge. Thirty years ago, the Convention on Biological Diversity (CBD) recognized the inseparable link between Indigenous Peoples and local communities with biological resources and the value that their traditional knowledge and practices have for the conservation and sustainable use of biodiversity. Article 8(j) of the Convention on Biodiversity requires governments to take action not only to respect, preserve and maintain such knowledge, but also to promote its application with appropriate involvement of knowledge holders (United Nations, 1992).

The Strategic Plan for Biodiversity 2011-2020 and the Aichi Targets included Indigenous Peoples and local communities, as well as their traditional knowledge, in their priority goals and targets. Aichi Target 18 sets an ambitious global goal to respect and fully integrate traditional knowledge in the implementation of the Strategic Plan by 2020. However, the Global Biodiversity Review 5 has shown that progress is not sufficient to achieve Target 18.

The latest national reports under the CBD show that only 16% of countries have reached or exceeded their national targets for traditional knowledge, with 66% not reporting on this target at all.

Of the 112 National Biodiversity Strategies and Action Plans (NBSAPs) that have a national target regarding Aichi Target 18, only a fifth (21%) have targets similar to the scope and ambitions set out in Aichi Target 18 per the Secretariat of the Convention on Biological Diversity (CBD, 2020).

National reports submitted to the CBD draw attention to the lack of national capacity and resources to take action to preserve and integrate traditional knowledge. Furthermore, they highlight that communication between Indigenous Peoples and local communities, governments, scientists and other national stakeholders which was a key condition for achieving Aichi Target18 is difficult and limited. Analysis of national reports shows that many countries identify the lack of participatory, transparent and evidence-based methods and capacity building as key obstacles to progress.

In response to global trends that undermine family farming and traditional agricultural systems, during the 2002 World Summit on Sustainable Development (Gollin, 2020), the Food and Agriculture Organization of the United Nations (FAO) launched the Global Partnership Initiative for Conservation and Adaptive Management 'Globally Important Agricultural Heritage Systems' (GIAHS)[14] . This programme was officially adopted at the 2015 FAO Conference. The overall objective of the programme is to identify and preserve globally important agricultural heritage systems and associated landscapes, agricultural biodiversity, knowledge systems and cultures.

Traditional knowledge and the ways of life of Indigenous Peoples and local communities play a key role in the protection and maintenance of biological and cultural diversity. Recognizing and integrating traditional knowledge into decision-making processes related to biodiversity protection policy and management of protected areas provides a number of benefits: 1) the use of a rights-based participatory approach leads to better and more cost-effective conservation results; 2) supporting the use of traditional knowledge helps to protect this unique system of knowledge and cultural heritage of the community; and, 3) progress in achieving global biodiversity conservation and development goals is achieved when all knowledge systems are respected and included in the evidence base (UNEP-WCMC, 2021).

12. https://www.geneva-academy.ch/joomlatools-files/docman-files/UN%20Declaration%20on%20the%20rights%20of%20peasants.pdf
13. https://www.cbd.int/doc/c/abb5/591f/2e46096d3f0330b08ce87a45/wg2020-03-03-en.pdf
14. https://www.fao.org/giahs/background/a-global-partnership/en/

There is a growing recognition of the need to secure the rights of Indigenous Peoples and local communities and their traditional knowledge. Many Indigenous Peoples and local communities are concerned about unauthorised commercial use of traditional knowledge and bio-resources, violations of their rights and exploitation of resources in their lands and territories, and absence of Free, Prior and Informed Consent (FPIC) or compliance with customary laws. Intellectual property regimes such as patents[15] and plant variety protection - PVP[16] are becoming increasingly powerful and pervasive as a result of World Trade Organization trade agreements and bilateral free trade agreements, which accelerate the unauthorised commercial use of traditional knowledge and resources.

On the other hand, rapid changes in socio-ecological conditions have led to a decrease in traditional knowledge around the world, which requires further and continuous development of international frameworks to ensure its protection. The efforts of IPBES to create synergies between classical and traditional knowledge have led to the formation of an integrated knowledge base for informed decisions making on the protection and sustainable use of biodiversity around the world.

6.3. Traditional knowledge in Intellectual property rights (IPRs [17]) and Access and Benefit Sharing (ABS [18] systems)

The current debate shows that the existing intellectual property rights (IPRs), such as patents, PVP, copyright, etc., are not suitable for the protection of traditional knowledge, and that alternative *sui generis* systems – a separate kind of system outside the existing classifications - are required for this. Intellectual property rights are designed to protect commercial inventions and generally grant individual and exclusive rights. In contrast, traditional knowledge serves the community for everyday life and is mainly maintained collectively, through ancestral legacy (Swiderska, 2012).

Parties to the CBD see *sui generis* systems as mechanisms for ensuring that benefits arising from the commercial use of TK are shared equitably with communities. Many Indigenous organizations, on the other hand, believe that new approaches are needed which correspond better with common laws and accommodate different world views. For some Indigenous organisations, the proliferation of intellectual property rights is a cause for concern, as it undermines local control over resources and development paths. There is a fear that intellectual property rights will eventually replace these 'common' values with private property values. If less industrialized countries and communities are forced to accept intellectual property rights from which they themselves can derive little benefit, it seems only fair that industrialized countries adopt mechanisms to protect traditional knowledge based on customary laws. Despite different perspectives, there is a certain acceptance in international political forums of the need to recognize ordinary laws and practices as part of measures to protect traditional knowledge. However, there is little understanding of what this means in practice (Swiderska, 2012).

The Access and Benefit Sharing (ABS) framework of the CBD recognizes the sovereign rights of states over natural resources and the power of states to decide on the use of genetic resources. While the principle of national sovereignty is important in promoting fair sharing of benefits between countries, it is generally interpreted as government ownership, along with the rights of other actors, especially Indigenous Peoples and local communities, but recognition of these rights is often vague or absent altogether. Unless otherwise determined by the Party, the CBD requires the free, prior and informed consent (FPIC) of Member States to access genetic resources, not the consent of Indigenous Peoples and local communities. Thus, the CBD- ABS framework separates the rights over natural and genetic resources, which are 'owned' by the state, from the rights over traditional knowledge, which are 'owned' by Indigenous Peoples and local communities.

Although ABS regulations require FPIC

15. https://www.wipo.int/patents/en/
16. https://food.ec.europa.eu/plants/plant-variety-property-rights_en
17. https://www.wto.org/english/tratop_e/trips_e/intel1_e.htm
18. https://www.cbd.int/abs/

from Indigenous Peoples and local communities to access TK, only a few national laws require abidance of FPIC to access genetic resources. The ABS framework effectively facilitates access to community resources for external persons, as opposed to facilitating access to community in-situ resources, many of which originate in their traditional territories.

FAO's International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA[19]) also adopted the ABS framework of the CBD. Like the CBD, ITPGRFA separates genetic resources from the customary laws of Indigenous Peoples and local communities that govern their access and use and ensures continuous access to these resources for food safety, health, poverty reduction, and people's cultural and spiritual lives.

The World Intellectual Property Organization (WIPO) has developed useful guidelines for the protection of traditional knowledge. However, since these guidelines are within the framework of an intellectual property body consisting mainly of representatives of national patent offices, a deviation from the model instruments for the protection of intellectual property has been expressed. In essence, the WIPO system promotes intellectual property regimes which separate traditional knowledge from cultural and spiritual values, and which fundamentally establishes collective ownership of it. While WIPO acknowledges customary law to some extent as a matter under discussion, a number of parties continue to stress the need for the protection of traditional knowledge to be in line with intellectual property standards.

Swiderska (2012) highlights some fundamental differences between the ABS and intellectual property regimes on the one hand and the usual laws relating to the protection of TK and genetic resources on the other. Common laws often have a strong spiritual character and are closely related to belief systems associated with natural resources and landscapes. They are often based on the fundamental values of respect for nature, social equality, harmony, and service to the common good. Traditional knowledge and resources are seen as the collective legacy of ancestors that no individual can possess, because they are believed to come from God.

6.4. Traditional knowledge in geographical indication systems, Slow Food [20] and GIAHS

The role of geographical indications which indicate the geographical origin of products has a number of common objectives with the protection of traditional knowledge (Blakeney, 2009). The protection of traditional knowledge through the use of geographical indications (GI) seeks to preserve the collective rights of the community. GI is a collective right owned by all producers in a geographical region who adhere to the production regulations in that region. Geographical indications are described as a means of 'enabling people to translate their long-standing, collective and inherited knowledge into livelihoods and income' (Bérard and Marchenay, 1996; cit. Blakeney, 2009) which has also been identified as one of the key objectives of traditional knowledge protection in accordance with the protection of intellectual property (IP). GI can be maintained as long as the community maintains a practice that guarantees the recognizable quality of the local product. In this way, GI goes beyond the limited conditions for protection provided by other forms of intellectual property protection.

Slow Food Presidia is also a mechanism for protecting traditional knowledge in the sense that it focuses on biodiversity protection, small farmers and artisanal producers, as well as related agricultural practices.

The GIAHS (Global Important Agricultural Heritage Systems) is an FAO programme that enables the acquisition of labels which subscribe suitable agricultural territories and agricultural systems as agricultural heritage sites where agricultural practices and products are based on sustainable and integrated agricultural approaches connecting social traditions as well as economic and environmental characteristics.

19. https://www.fao.org/plant-treaty/en/
20. https://www.slowfood.com/

While biodiversity, landscape conservation and sustainability are fundamental to GIAHS and Slow Food Presidia, GI systems do not legally oblige stakeholders to contribute to these aspects. Similar to Slow Food Presidia, GIAHS focuses mainly on agroecosystems that have a positive impact on biodiversity and preservation of cultural heritage. However, Slow Food Presidia turns the spotlight on real products that become a tool to help consumers and chefs choose those food products that help preserve the local and sustainable ecosystem and traditional knowledge (Fernandez et al., 2020).

Many researchers agree that the most targeted protection of traditional knowledge would be the international adoption of the mandatory *sui generis* system. However, in the absence of this, other existing mechanisms for the protection of intellectual property should be used.

6.5. Regulatory framework for the preservation of traditional knowledge in Bosnia and Herzegovina

The sustainable use of biodiversity has a very good basis in traditional knowledge, innovation and practices in BiH. Ongoing processes of ethnogenesis in BiH's history have led to significant growth of cultural diversity, and with it the development of traditional knowledge and practices regarding the sustainable use of natural resources. In BiH, traditional knowledge about the use of biodiversity is mostly related to food production and collection of medicinal plants, which, in the rich and climate-friendly conditions of BiH, has led to continuous development of new practices in land cultivation. Available publications in the field of traditional knowledge and practices refer precisely to food preparation (Ivanovska et al., 2018; Samardžić et al., 2021) and folk remedies (Pećanac, 2010; Redžić, 2010a). In today's economic climate, traditional knowledge about the use and preservation of native genetic species and good methods for production are the basis for intensive food production.

BiH's NBSAP 2015-2020 states that traditional knowledge on the use of biological diversity in BiH is largely related to food production and the use of medicinal plants. The rapid loss of this traditional knowledge was also noted (BiH NBSAP, 2019). As a national strategic plan regarding Aichi Target 18, a Centre for the Preservation and Application of Traditional Knowledge and Practices was planned to be established by 2017, especially in rural areas of special interest, and a certain number of scientific and professional papers related to traditional knowledge and practices are foreseen as indicators of its implementation. According to the Secretariat of the Convention on Biological Diversity (UNEP, 2019), BiH's sixth national report states that the expected result has not been achieved in relation to this Target. Although certain activities of several associations and cooperatives related to traditional practices are listed, they are primarily on the preparation of food and folk remedies. Legislation in BiH ensures the protection of intellectual creations by individuals through intellectual property rights. However, regarding intellectual activities, knowledge, discoveries, beliefs, and values and creations that exist collectively within social groups, legislation in BiH is not adequate or effective for the protection of such traditional knowledge.

The issue of adequate and ethical legal protection of traditional knowledge in Bosnia and Herzegovina has been completely neglected, and at present, no systematic or concrete system for the protection of traditional knowledge (*sui generis*) has been proposed. This is evidenced by the fact that the textbooks of prominent legal experts and professors in BiH do not mention traditional knowledge and protection mechanisms at all (Alija and Hasić, 2014).

Furthermore, the existing regulatory framework in BiH enables the protection of TK through intellectual property protection instruments such as the protection of designations of origin and trademarks, as well as the protection of intangible cultural heritage. However, there is no mechanism for the protection of genetic resources and related traditional knowledge, because BiH is not currently a member of ITPGRFA or the ABS Nagoya protocol. There is also no *sui generis* law in the country that would pro-

vide such protection. BiH has not reported any GIAHS agri-environment system in the country. A positive development is the establishment of three Slow Food communities in Trebinje, Kozarska Dubica and Goražde; and two Presidia products, namely, cheese from the bellows and prune plums sweet dishes, and 27 'Arc of Taste' products that have been registered[21] .

In 2017, BiH ratified the UPOV - International Convention for the Protection of New Varieties of Plants from 1991. Prior to this, the lack of regulations for the conservation and overuse or demand for cultivated plants had led to endangerment of plant species, which threatened genetic erosion and hampered the rights of small farmers and local communities in the access, production and use or sale of seeds. Current regulations in the phytosanitary field including regulations on seeds and planting material do not cover the production of small quantities of seeds of local populations and indigenous plant varieties for the local market. This means that farmers' rights to grow and sell traditionally maintained, indigenous plant varieties are not yet regulated or protected. With regard to the protection of traditional products and the geographical origin of products as a means of improving the sustainable use of agrobiodiversity, it is important to note that there are currently two parallel legal frameworks in BiH: the Food Safety Agency of BiH and the Institute for Intellectual Property of BiH. The Food Safety Agency has created a number of regulations based on the Law on Food (O.G. of BiH, 50/2004), while the Intellectual Property Institute applies the Law on Protection of Geographical Origin (O.G. of BiH, 53/2010), the Law on Trademark (O.G. of BiH, 53/2010) and the Law on Wine, Brandy and Other Wine and Grape Products (O.G. of BiH, 25/08).

The Food Law was passed in 2004. Pursuant to the provisions of this Law, the Council of Ministers of Bosnia and Herzegovina, at the proposal of the Food Safety Agency of BiH and in cooperation with the competent authorities of the Entities and the Brčko District of BiH, adopted the Rulebook on quality systems for food products (O.G. of BiH, 90/18), which is harmonized with the Commission Regulation (EU) No. 1151/2012 of 21 November 2012 on quality systems for agricultural and food products and the Commission Implementing Regulation (EU) No. 668/2014 of 13 July 2014 laying down rules for the application of Regulation (EU) No. 1151/2012.

This Rulebook prescribes a procedure for the designations of origin and geographical indications and the procedure for the protection of traditional speciality guaranteed labels in the territory of Bosnia and Herzegovina, as well as the procedure for submitting applications for registration and submission of objections for designations of origin, geographical indications and traditional speciality guaranteed labels at the level of the European Union. The ordinance entered into force on December 26, 2018.

After the establishment of the commission, the Rulebook on the appearance and manner of use of the trademark of designation of origin, geographical indication and guaranteed traditional food speciality label (O.G. of BiH, 82/19) was adopted, which prescribes the appearance and manner of use of the trademark of designation of origin, geographical indication and guaranteed traditional food speciality label, as well as the procedures for issuing labels. In order to support producers whose food products have the potential to acquire one of the registered designations of origin, the Food Safety Agency of Bosnia and Herzegovina, with the support of the United States Agency for International Development (USAID) for the development of sustainable tourism in Bosnia and Herzegovina (USAID TOURISM), has prepared a 'Guide to Obtaining Geographical Indications and Traditional Food Specialties in Bosnia and Herzegovina', which is intended for all food producers and processors in BiH who want to protect the designation of origin, geographical indication or the label of the traditional speciality guaranteed for their food products.

At the beginning of June 2020, representatives of associations that produce 'Livno original cheese', 'Nevesinje potato' '*Visočka pečenica*' (a dried beef product) and 'Livno cheese' were assigned decisions on the registration of the designation of ori-

21. https://www.slowfood.com/nazioni-condotte/bosnia-and-herzegowina/

gin and geographical origin. 'Livno original cheese' is protected by a designation of origin, while the other three products are protected by a geographical indication.

In September 2021, they were joined by 'Woodworm whipped jam made of dogwood', which is protected by the designation of origin. These are the first Bosnian-Herzegovinian products protected in accordance with the Rulebook on quality systems for food products, which enables producers of these traditional products to submit applications and acquire the appropriate label at the level of the European Union. In light of the benefits offered by the Rulebook, the Association for the Protection of the Origin of Livno Cheese formally submitted an application in December 2022 for the acquisition of a designation of origin at the level of the European Union. It would be the first product from a non-EU Balkan country to carry the label. Also, two products are currently in the process of protection at the BiH level, '*Krajiški omac*'(tagliatelle) and '*Krajiška trahana* (small pasta type)', which have submitted requests for the label for guaranteed traditional specialty (Food Safety Agency, 2022).

The Intellectual Property Institute also protects designations of origin. Protection combines two separate procedures: a procedure for registering a name of origin or geographical indication and a procedure for recognizing the status of an authorised user of a geographical indication of origin. The Law on the Protection of Geographical Origin was adopted in 2010. The law regulates the manner of acquisition, maintenance, content, termination and legal protection of geographical indications in Bosnia and Herzegovina. This Law also applies to names of origin and geographical indications that are internationally registered to BiH but does not apply to those products for which the system of acquisition and protection is established, or to the use of geographical indication on products that are explicitly regulated by a special law.

The Law on Protection of Geographical Indications (O.G. of BiH, 53/10) distinguishes the name of origin and geographical indication. The name of origin is the geographical name of a country, region or locality from which a product originates, the special properties of which are exclusively or substantially conditioned by the geographical environment, including natural and human factors and the production, processing and preparation processes. A geographical indication is a designation identifying a specific commodity as originating in the territory of a particular country, region or locality from that territory, where a particular quality, reputation or other characteristic of the commodity is essentially attributable to its geographical origin. The procedure for the registration of these rights is conducted by the Institute for Intellectual Property of BiH. In accordance with the law, the following marks are registered: geographical indication of controlled origin and quality 'chestnut honey of Cazinska Krajina', young potatoes 'Ljubuški rani', sour cream 'Romanijski skorup'.

The Institute also applies the Trademarks Act, which regulates the manner of acquisition, maintenance, content, commercial records, termination and protection of trademarks in the territory of BiH. A trademark protects a commercial brand name to provide clear distinction from other brands.

For traditional agricultural food and craft products that are important for regional tourism, but which do not meet the conditions of protection according to established European geographical indicators, more and more businesses are seeking trademark guarantee for their products and services. The main motivation for this is to obtain distinct product branding, increase the appeal of local products to tourists, encourage the development and production of local product groups, raise the level of quality of labelled products, preserve authenticity and tradition, and innovate through integrated promotion of regional products. The Association of Potato Producers 'Borike' has passed all the necessary procedures for the recognition of the trademark at the Institute for Intellectual Property of BiH. On this basis, all producers, members of this Association, who meet the prescribed requirements on the quality of potatoes, have the right to

declare and sell their potatoes on the BiH market under the name '*Boričk*i potato'. Such a product will have a Trademark Document and a trademark symbol.

In addition to the opportunities offered by the Intellectual Property, Trademark and GI certifications, implementation of the FAO project between 2021-2022 on 'Strengthening the administrative system for the management and support of marks of geographical origin protection in BiH - TCP/iIH/3801/C1', which was aimed at determining the potential of agricultural products for the protection of geographical origin, led to a greater interest and desire among producers of recognized foods to apply for these certifications. Through research in the field, based on the approved FAO methodology, 68 products met the criteria to be described as products with the potential of geographical marks in BiH[22] . These are products that are obtained from locally sourced raw materials and have a specific production process. They are already recognized by domestic consumers from those regions. Supporting their protection would increase their visibility in other areas and significantly enrich tourism opportunities and contribute to the development of the rural areas from which the products originate.

For this reason, the Food Safety Agency of BiH sent a request to the FAO to support a number of producers of these products. FAO has officially approved, through the FAO's Technical Cooperation Programme (TCP), the project 'Preparation of the request for the registration of the first six priority GI products' - TCP/BIH/3903/C2 (736862), which should be implemented in the period from January 02, 2023, to June 30, 2024. FAO stated that there was a clear need for this project because BiH has many food products with the potential for geographical marks, but currently, the GI certification has not been utilized to its full potential in BiH. Some of the stated reasons for the underutilization of GI markers are the high logistical implications related to the processes of designating GI markers and the development of product technical specifications, the lack of knowledge about the advantages of such quality marks which guarantee the origin of the product, and the connection between the characteristics and the geographical area among the producer groups. GI applications and certification require time, funding and the expertise of technical staff who can manage the overall certification process, cooperate with competent institutions and coordinate producer groups. Using a product specific approach, the project aims to support six traditional food producers from different geographical regions to prepare and submit their GI applications: Semberija cabbage, Fojnica potato, Hercegovina škripavac (cheese), Poljak beans, Majevica smoked cheese Zarac and Herzegovina *ćupter* (sweet).

The Agency's obligation is to support the implementation of the Project to fulfil all the prescribed conditions and facilitate the submission of applications to the Agency for the registration of geographical marks for the six listed food products and the submission of requests to the Commission for the registration of marks of origin, marks of geographical origin and the awarding of marks of guaranteed traditional specialty food products in Bosnia and Herzegovina appointed by the Council of Ministers of BiH (O.G. of BiH, 84/19).

Low levels of understanding about the process of obtaining geographical origin labels for products either through the Food Safety Agency or through the Intellectual Property Institute, is a likely reason for the uncertainty and apprehension of producers to apply for product certifications (Golub and Đurić, 2018). However, this is not the only reason why BiH lags behind when it comes to certifying products. The importance of protecting products through certification and the benefits this can bring for producers and consumers and the geographical regions from which the products originate are not fully recognized in BiH. At the level of the European Union (EU), until the end of 2021, a total of 1,635 names of agricultural and food products were protected and registered, of which 668 names are marks of origin, 905 names are marks of geographical origin, and 62 names are marks of guaranteed traditional specialty. The EU recognizes the importance and value of certifying products that have distinct geographical origin and traditional spe-

22. https://fsa.gov.ba/hr/fao-projekt-u-bih-jacanje-administrativnog-sustava-za-upravljanje-i-podrsku-zastite-oznake-zemljopisnog-podrijetla/

Mark: protected label of origin

Mark: protected label of geographical origin

Mark: guaranteed traditional specialty

cialities. Products protected by marks of geographical origin are more recognizable on the market, therefore more competitive and, as a rule, have a higher price on the market than similar related products (Food Safety Agency/ Agencija za bezbjednost hrane, 2022).

6.6. Traditional knowledge and practices as cultural heritage in Bosnia and Herzegovina

Traditional knowledge and practices related to nature, apart from agricultural and food products, refer to a number of activities that are usually managed as cultural intangible heritage, and which are protected by instruments of cultural heritage through the UNESCO World Heritage Convention (also known as the 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage) and the 2003 UNESCO Convention for Safeguarding of the Intangible Cultural Heritage, of which BiH is a party.

Nationally, the Law on Cultural Assets (O.G. of RS, 38/22) regulates the protection of tangible and intangible cultural assets. Material assets can be physical or intangible. Physical cultural assets can be archaeological, geological, botanical, zoological, zoographic, ethnographic, ethnomusicological, technical, cultural-historical objects or works of art or collections of objects and works, created by nature or created by humans from prehistoric times to the present day e.g., rare products of nature, for example, minerals, ores, plant and animal species, as well as products of human labour such as tools, weapons, cloth-

ing and decorative items, products of home crafts and handicrafts, traditional musical instruments, works of art or numismatic materials. They may include documents and other testimonies about phenomena and processes in society, life and customs of human communities, life and work of prominent personalities, historical events, cultural, scientific, political, economic, technical development, as well as objects that testify to the development of nature and human communities throughout history. Intangible cultural property includes practices, representations, expressions, knowledge, skills and cultural spaces, which communities, groups and individuals pass on from generation to generation, which they adapt and innovate in response to their environment. They include people's relationship with nature and history as part of their cultural heritage, which gives people a sense of identity. Intangible cultural property can also include language and speech, oral traditions, literature and other forms of language expression, performing arts, traditional music, song and dance, events about phenomena and processes in society that testify to the development of the nature and society from prehistoric times to the present day, knowledge and social practices about customs, rituals and ceremonies and skills acquired on the basis of that, skills related to traditional crafts, original procedures and ways of making a work of art, and original and traditional practices in gastronomy. The Law on Cultural Assets clearly describes the objectives and methods of protection as well as the institutions responsible for the care of protected cultural assets.

In the Federation of BiH, the Law on the Protection and Use of Cultural-Historical and Natural Heritage (O.G. SRBIH, 20/85) is still in force, because the constitutional authority for cultural property is at the cantonal level, and each canton has its own law on the protection of cultural property.

The responsible ministries in the Federation of BiH and Republika Srpska maintain open lists of intangible heritage, which together form the Preliminary Open List of Intangible Cultural Heritage of Bosnia and Herzegovina[23]. These include:

1. Zmijanje embroidery (registered on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity in 2014);

2. Konjic woodcarving (registered on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity in 2017);

3. Picking willow grass on Ozren (registered on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity in 2018);

4. Custom of the grass-mowing competition on Kupres (registered on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity in 2020);

5. Nevesinje Olympics (proposed for the registration in the Register of Best Conservation Practices);

6. Breeding of Lipizzaner horses (registered on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity within the serial nomination 'Tradition of Lipiz-

23. http://unescobih.mcp.gov.ba/konkursi/?id=15125

zaner Horse Breeding" in 2022);

7. *Sevdalinka*, the city's musical and poetic form (nominated for registration on the UNESCO Representative List of Intangible Cultural Heritage of Humanity);
8. Custom of egg shoeing in Kreševo;
9. Art of lace making – embroidery, Banja Luka embroidery;
10. Pilgrimage to Ajvatovica – Prusac;
11. Pilgrimage to St. Ivo – Podmilačje;
12. Pottery making in Liješevo;
13. Ganga, rural polyphonic musical-poetic form;
14. Art of making and playing the instrument *karaduzen*, a type of lute;
15. Village polyphonic form of singing 'In three';
16. Jumps from the Old Bridge in Mostar;
17. The art of preparing and serving *Puračka ćaska*, a type of dish with meat;
18. Singing with gusle, and oral tradition – epic folk poetry;
19. Slava – saint patron's day;
20. Blacksmiths of Mrkonjić Grad;
21. Igniting charcoal kiln;
22. Osaćanski language;
23. Burning of dry birch
24. Masla – village's patron saint feast day;
25. St. Vitus Day Olympics;
26. Thick kolo – circle dance;
27. Banja Luka *ćevap* (meat dish);
28. Mowing at Balkana;
29. Hey, girl (ojkača-polyphonic);
30. Serb cyrillic;
31. Sarajevo-Romanija woollen sock;
32. *Teslić* embroidery;
33. *Derventa* fair;
34. Cheese from the bellows;
35. Culture of making *rakia* (traditional way of making rakia);
36. Masonry craft at Ozren (Ozren stonemasons);
37. *Vrbas dayak* boat;

6.7. Protection of old and artistic crafts in Bosnia and Herzegovina

Traditional crafts represent different artisanal skills of different forms of production of products essential for everyday use in households, as well as repair or maintenance services for household items and certain economic activities (Institut za intelektualnu svojinu BiH/Institute for Intellectual Property of BiH, 2022).

The Law on Trades in the FBiH (O.G. of FBiH, 75/21) regulates domestic handicrafts as the activity of making and finishing items involving manual labour and household services. Traditional and old crafts are also defined as trades that require special knowledge of craft skills that are mainly performed by hand. In order to preserve the tradition, the Government of the Federation of Bosnia and Herzegovina, upon the request of the Federal Minister for Development, Entrepreneurship and Crafts, will establish a list of traditional and

old crafts that can be performed under the conditions specified by this law. Also, it is stipulated that for the performance of traditional and old trades, the Government of the Federation, Cantonal Governments and local self-government units will prescribe appropriate subsidies, each within their jurisdictions, which will stimulate the preservation of traditional and old trades and increase interest and a sense of value for them.

Under the Law on Craft-Entrepreneurial Activities in RS (O.G. of RS, 117/2011, 121/2012, 67/2013, 44/2016 i 84/2019), old crafts include the activities of making and finishing items predominantly by hand, under specific conditions and in a manner that preserves and reflects the expression of traditional folk creativity, knowledge and skills. This law also defined artistic crafts as the activity of shaping precious materials, stone, metal, textiles, glass and other materials to reflect the distinct artistic expression of the creator. Domestic crafts are understood as the activity of making, finishing and refining objects using mainly hand work and which have the aesthetic characteristics of folk art. It is also stipulated that in order to preserve tradition, the minister will adopt a rulebook that prescribes activities that are considered old and artistic crafts and handicrafts, the method for their certification and record keeping of issued certificates.

Building trades and monuments of traditional culture are also considered traditional and old crafts: construction and reconstruction using the dry wall technique; construction and reconstruction in the technique of charges, rammers; construction and reconstruction using the *bundwerk* technique; production of shingles for covering houses, commercial buildings and log cabins. The following are considered to be old crafts: lime baking and tar making; making lanterns; production of clay furnaces and refractory bricks; making and restoring traditional musical instruments such as *gusle*, flutes, doubles, bagpipes, *ocarinas*, violins, etc.; silk production in the traditional way; production of brushes, brooms and other similar products made of hair, wicker, strings, etc.; digging wells; feather cleaning; manual gold washing in the traditional way; hand knitting fishing nets; *fijaker rife* (carriage ride); handmade wooden boats in the traditional way. The following are considered to be artistic crafts: the shaping of precious materials, stone, metal, wood, textiles, glass and other materials, during the production of which personal taste and skill of the producer comes to the fore according to the artist's idea or design; production of tapestries and other artistic weavings; artistic processing of wood, stone, glass, clay, plaster and similar materials; artistic treatment of precious metals; processing of precious and semi-precious stones including breaking, cutting, grinding, polishing; handmade artistic engravings and stamps; calligraphic writing of letters; painting and decorating carriages with hand writing, drawing coats of arms, etc.; artistic production of objects from wrought iron, copper and other metals; painting on textiles and textile fibres; artistic embroidery. The following are considered to be handicrafts or handiwork that have an aesthetic feature expressed by folk art: knitting; thread and wool winding; production of souvenirs; production of items with folk embroidery; embroidery of various textile products; production of wooden home accessories such as spindles, horsehair, rolling pins, wooden troughs, bowls, etc.; and crocheting including making lace, tablecloths, decorative details, clothing, etc.

Many barriers to sustainable development exist in BiH, and as this research demonstrates, some of the barriers are specifically linked to the lack of legal protection for traditional crafts in BiH, many of which promote sustainable methods of resource use. According to entrepreneurs, the most prominent problems are the performance of multiple activities by one trade, and the problem of education. The opinion of the association of entrepreneurs is that the challenge of preserving traditional crafts largely stems from the fact that craft folk are choosing to stop practicing these crafts, meaning that knowledge about these traditional practices is no longer being transferred to younger generations. The need to adapt the legal legislation to the conditions on the ground and market dynamics, as well as to ensure better coordination between different ministries and

chambers was emphasized. The need for a unique register of tradespeople was also highlighted, for the purpose of improved monitoring and for marketing their ser-

6.8. State of the regulatory framework for the protection of traditional knowledge and practices in Bosnia and Herzegovina

International instruments such as the Convention on Biological Diversity; 2030 Agenda for Sustainable Development and the Kunming Montreal Global Biodiversity Framework recognize the critical role of traditional knowledge for the conservation and sustainable use of biodiversity. Despite this, there are still few examples of national policies that effectively incorporate traditional knowledge into decision-making. It is commonly acknowledged that rapid changes in socio-ecological conditions have led to a decline in traditional knowledge worldwide. Until now, there has not been enough attention focused on the development and use of participatory, transparent, evidence-based methods and tools to address these challenges in Bosnia and Herzegovina. At the same time, traditional knowledge represents a significant economic resource and is a major part of social and cultural identity as well as sense of community. As such, traditional knowledge must be fully, effectively and ethically protected by legal instruments. Research on traditional knowledge in BiH, objectively speaking, is still in its infancy. Research into the actions required to systematically protect traditional knowledge using legal mechanisms is needed. BiH is still not a member country of the ITPGRFA and the Nagoya Protocol, nor does it have identified GIAHS areas, which represents a significant problem for access to larger international funds. In order to protect traditional knowledge, decision-makers at all levels of government in BiH should initiate a reform of intellectual property rights. The reform should respond to specific needs through *sui generis* system of protection of all forms of traditional knowledge, which would be compatible with the purpose and framework of intellectual property rights.

At the same time, such systems for the protection of traditional knowledge can help Bosnia and Herzegovina to meet its obligations under the Convention on Biological Diversity and its obligations towards the protection of intangible cultural heritage. Also, BiH should realize the status of a member of the ITPGRFA and the Nagoya Protocol on ABS as soon as possible. The legal framework for the protection of traditional products and products with marks of origin in BiH is still not entirely clear to potential applicants, which is probably a factor for the current limited number of certifications, whether they be a protected geographical origin (PGI) product, protected product originality (PDO) or guaranteed traditional specialty (TSG). That is why it is necessary to educate producers and local communities about the possibilities of protecting traditional knowledge, practices, and products produced based on this knowledge through the Food Safety Agency and through the Institute for Intellectual Property. The existing legal framework for the protection of traditional knowledge, practices and skills is unfortunately not sufficiently recognized and used. The main reason is insufficient awareness of the importance of this knowledge in relation to contemporary scientific knowledge, as well as the small number of citizen associations and foundations that deal with this issue.

7. THE STATE OF TRADITIONAL KNOWLEDGE AND PRACTICES IN BOSNIA AND HERZEGOVINA: KEY MESSAGES

Image 30. *The most frequently used resources from nature: wild pomegranate Punica granatum L.*

Findings from our research into the state of traditional knowledge and practices in Bosnia and Herzegovina indicate the following:

- In Bosnia and Herzegovina, there is a significant wealth of traditional and local knowledge and practices in the use of biodiversity. The holders of this knowledge in BiH are mostly aged between 45 - 60 years, who consider their rich and diverse nature-related traditions to be part of their identity.
- Women play a significant role in the preservation of traditional practices, particularly practices related to the preservation of natural resources and their traditional use in human diets.
- In Bosnia and Herzegovina, there is a proven loss of traditional knowledge and practices. This finding is largely demonstrated in the 271 questionnaire responses. Among the questionnaire respondents, the youngest age group have the lowest level of knowledge and

interest in the traditional use of biodiversity. The transfer of this knowledge through folk traditions (from generation to generation) has been impacted by the movement of the population from rural to urban areas and subsequent changes in lifestyle habits.

- Medicinal flora, as well as other material benefits from nature, such as feed for grazing, are not used despite their wide availability. Traditional methods for their use are also not practiced. The traditional use of medicinal flora is practiced at the household level. In contrast, traditional knowledge that is part of cultural identity is often practiced by local communities, most often for the purpose of tourism.
-
- The economic potential of traditional knowledge and practices is best recognized through the production of food products. Conversely, perceptions about the economic potential of sustainably collecting and selling other (e.g., plant) resources is extremely low.

- Presently, holders of traditional knowledge in BiH recognize well the material and intangible benefits of nature, but poorly recognize the regulating services that nature provides which also contribute to good quality of life.
-
- The same pressures that affect nature in BiH also affect the state of traditional knowledge and practices in BiH. In particular, migration of the population from rural areas to urban centres leads to decline in traditional practices and intergenerational knowledge transfer.

- The regulatory framework for the preservation of traditional knowledge and practices is incomplete. Institutional support for the preservation of traditional knowledge is negligible and the support of institutions at the local level varies from one area to another.

- Traditional knowledge and practices are not part of formal education, except in specialist higher education study programmes.

- In Bosnia and Herzegovina, there is a strong interest in learning and returning to traditional knowledge and practices.

- Non-institutional learning and knowledge transfer still exists today, especially in the middle- aged generation, through social networks. In this way, traditional and local knowledge about biodiversity and its sustainable use in Bosnia and Herzegovina is mainly transferred at the local level.

BIBLIOGRAPHY

- Agbola, T. (ed). (2006). *Environmental Planning and Management: Concept and Application to Nigeria*. Ibadan. Constellation Books.
- Agencija za bezbjednost hrane. (2022). Vodič za dobijanje oznaka geografskog porijekla i tradicionalnih specijaliteta hrane u Bosni i Hercegovini. https://academy.turizambih.ba/wp-content/uploads/2022/03/vodic-za-dobivanje-oznaka-geografskog-porijekla_usaid-turizam.pdf.
- Alija, I. and Hasić, H. (2014). *Pravna zaštita tradicionalnih znanja*. Gračanički Glasnik, 19(38), 33-46.
- Anđelić, P., Basler, Đ., Benac, A., Čović, B., Miletić, N., Pašalić, F. (1966). *Kulturna istorija Bosne i Hercegovine od najstarijih vremena do početka turske vladavine*. Veselin Masleša, str. 1-547.
- Assié-Lumumba, N. T. (2016). Harnessing the empowerment nexus of afropolitanism and higher education: Purposeful fusion for Africa's social progress in the 21st century. *Journal of African Transformation*, 1(2), 51-76.
- Avdibegović, M. (2006). Reinženjering poslovnih sistema šumarstva u funkciji zadovoljavanja sociooloških aspekata gospdarenja šumskim resursima u Bosni i Hercegovini, doktorska disertacija, Šumarski fakultet Univerziteta u Sarajevu.
- Bajić, S. (1983). Tekstilana radinost u Drežnici. GZM - etnologija NS 38: 163-180.
- Bajić, S. (1985). Narodna nošnja u trebinskoj Površi. GZM - etnologija NS 40: 45-115.
- Ballian D. and Baotić, K. (2012). The importance of the basket willow (*Salix* x *americana* hort.) for the inhabitants of the Sava Valley Canton. International poplar Commission, 24th Session, Dehradun, India, 30 October-2 November 2012. Abstracts of Submitted Papers, st. 134.
- Ballian, D. and Kraigher, H. (2021). Tisa (*Taxus baccata* L.) u Bosni i Hercegovini. Ušit-Silva slovenica. (Str. 1-432).
- Barnhardt, B. and Ginns, P. (2014). An alienation-based framework for student experience in higher education: new interpretations of past observations in student learning theory. *Higher Education*, 68, 789-805.
- Baudyš, E. (1918). Prinos flori gljiva Bosne i Hercegovine, GZMBiH XXX, str. 317-328, Sarajevo.
- Begović, B. (1960). Strani kapital u šumskoj privredi Bosne i Hercegovine za vrijeme otomanske vladavine. Radovi Šumarskog fakulteta i Instituta za šumarstvo i drvnu industriju u Sarajevu, 5: 1-243.
- Begović, B. (1978). Razvojni put šumske privrede u Bosni i Hercegovini u periodu austrougarske uprave (1878-1918) sa posebnim osvrtom na eksploataciju šuma i industrijsku preradu drveta. Akademija nauka i umjetnosti Bosne i Hercegovine, Djela, Knjiga LIV, Odjeljenje društvenih nauka, 31: 1-204.
- Beljaškić-Hadžidedić, Lj. (1966). Nošnja na Bjelašnici. GZM - etnologija NS 20: 117-133.
- Beljaškić-Hadžidedić, Lj. (1972/73). O terzijskom zanatu u Sarajevu. GZM - etnologija NS 27/28: 155-182.
- Benac, A. (1951). O ishrani prehistrojiskih stanovnika Bosne i Hercegovine. Glasnik Zemaljskog Muzeja u Sarajevu, Nova serija 6: 271-279.

- Bèrard, L. and Marchenay, P. (1996). Tradition, regulation and intellectual property: local agricultural products and foodstuffs in France. *Valuing local knowledge: indigenous people and intellectual property rights*. Island Press, Washington, DC, 230-243.
- Berkes, F. (2004). Traditional ecological knowledge in perspective, in *Traditional Ecological Knowledge: Concepts and Cases*, ed J. T. Inglis, (International Program on Traditional Ecological Knowledge: Ottawa, QC), 1-6.
- Berkes, F. (2012). *Sacred Ecology*, Third Edition. New York, Routledge.
- Bešlagić, Š. (1979). Stećci - kultura i umjetnost, IRO Veselin Masleša, Sarajevo.
- BiH NBSAP (2019). Šesti Nacionalni Izvještaj Bosne i Hercegovine prema Konvenciji o biološkoj raznolikosti. http://bih-chm-cbd.ba/wp-content/uploads/2020/11/VI-nacionalni-izvjestaj-BiH_BHS.pdf
- Bjelić, V. (2012). Vodič za uzgoj ljekovitog i aromatičnog bilja u Bosni i Hercegovini. Udruženje GEA - Centar za istraživanja i studije, str 42.
- Blakeney, M. (2009). Protection of traditional knowledge by geographical indications. *International Journal of Intellectual Property Management*, 3(4), 357-374. https://doi.org/10.1504/IJIPM.2009.026912.
- Blignaut, A. J., Coetzee, S. K., Klopper, H. C., Ellis, S. M. (2017). Medication administration errors and related deviations from safe practice: an observational study. *Journal of clinical nursing*, 26(21-22), 3610-3623.
- Bratić, T. (1903). Pribirci iz narodne medicine u Hercegovini. GZM, knjiga 1: 154-180.
- Bratić, T. (1907). Narodno lječenje. Iz vremena jedne ljekaruše iz 1843 g. GZM, knjiga 3: 342-362.
- Brink, M. and Van Hintum, T. (2020). Genebank operation in the arena of access and benefit-sharing policies. *Frontiers in Plant Science*, 10, 1712.
- Brkić Midžić, S. (2017). Katalog zbirke narodne medicine Hrvatskog muzeja medicine i farmacije HAZU. U: Narodna medicina. Izvori i istraživanja. Rasprave i građa za povijest znanosti knjiga 17. Pećina M, Fatović-Ferenčić S, urednici, Zagreb, HAZU, str. 1-329.
- Bugarski, A. (1964). Naselja, zgrade i pokučstvo. GZM - etnologija NS 19: 63-73.
- Bugarski, A. (1967). Krovne konstrukcije u seoskoj arhitekturi istočne Hercegovine. GZM - etnologija NS 22: 77-91.
- Bugarski, A. (1970). Seoska arhitektura Lištice. GZM - etnologija NS 24/25: 135-183.
- Bugarski, A. (1971). Dašćani krovovi u Bosni. GZM - etnologija NS 26: 88-115.
- Bugarski, A. (1972/73). Kuća sa čardakom u podbjelašničkim selima. GZM - etnologija NS 27/28: 231-247.
- Bugarski, A. (1974). Skeletni sistem gradnje u bosanskom seoskom graditeljstvu - Prilog poznavanja gradnje zidova i objekata drvene skeletne konstrukcije. GZM - etnologija NS 29: 123-191.
- Bugarski, A. (1976). Razvoj seoske stambene zgrade u okolici Dervente od polovine devetnestog vijeka do naših dana. GZM - etnologija NS 30/31: 131-173.
- Bugarski, A. (1979). Narodno graditeljstvo Zmijanja. GZM - etnologija NS 34: 121-162.
- Bugarski, A. (1980/81). Spratna seoska kuća centralne Bosne. GZM - etnologija NS 35/36: 1-56.
- Bugarski, A. (1983). Naselja, stambene zgrade i pokučstvo. GZM - etnologija NS 38: 81-117.
- Bugarski, A. (1986/87). Seoske stam-

bene zgrade i kultura stanovanja u tešanjskom kraju. GZM - etnologija NS 41/42: 91-134.

- Bugarski, A. (1988/89). Nastambe stočara u sezonskim naseljima. GZM - etnologija NS 43/44: 61-94.
- Bugarski, A. (1990). Kamene kuće Livanjskog polja. GZM - etnologija NS 45: 73-100.
- Bugarski, A. (1991). Spratne seoske kuće Bosne i Hercegovine - Prilog tradicijonalne kulture stanovništva u Hercegovini. GZM - etnologija, NS 46: 89-126.
- Bugarski, A. (2008). Starobosanska seoska kuča sa čardakom u potkrovlju. Art 7, Sarajevo. Str.1-110.
- Bugarski, A. (2009). Bosanske brvnare, drvo-čuvar najstarijih graditeljskih vještina stanovnika Bosne. Zemaljski muzej Bosne i Hercegovine. Str. 1-147.
- CBD (2020) Secretariat of the Convention on Biological Diversity, Global Biodiversity Outlook 5. Montreal.
- Chang, J. S. (2016). The Docent Method: A Grounded Theory Approach for Researching Place and Health. *Qualitative Health Research* 27(4): 1–11.
- Cox, K. R. (2000). *Representation and power in the politics of scale*, 51
- Čaušević, A. and Rustempašić, N. (2014). Rekonstrukcije zidanih objekata visokogradnje. Univerzitet u Sarajevu, Arhitektonski fakultet.
- Čelić, Dž. (1976). Drvorezbarstvo u Bosni i Hercegovini. Časopis Most - Mostar, 11/76.
- Čulić, Z. (1962). Narodna nošnja. GZM - etnologija NS 17: 99-116.
- Čulić, Z. (1963). Neki stari slovenski elementi u nošnjama Bosne i Hercegovine. GZM - etnologija NS 18: 121-131.
- Čulić, Z. (1964). Narodna nošnja. GZM - etnologija NS 19: 131-143.
- Čurčić, V. (1912). Narodno ribarstvo u Bosni i Hercegovini. GZM, knjiga 3:421-514.
- Čurčić, V. (1915a). Narodno ribarstvo u Bosni i Hercegovini. GZM, knjiga 1: 37-108.
- Čurčić, V. (1915b). Narodno ribarstvo u Bosni i Hercegovini. GZM, knjiga 3: 313-358.
- Čurčić, V. (1916). Narodno ribarstvo u Bosni i Hercegovini. GZM, knjiga 2: 397-426.
- Dajić Stevanović, Z., Petrović, M., Aćić S. (2014). Ethnobotanical Knowledge and Traditional Use of Plants in Serbia in Relation to Sustainable Rural Development, U: A. Pieroni, C. L. Quave (eds.): *Ethnobotany and Biocultural Diversities in the Balkans*, DOI 10.1007/978-1-4939-1492-0_12.
- DeRoy, S. (2016). *Direct-to-digital mapping methodology: A hands-on guidebook for applying Google Earth*.
- Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R. T., Molnár, Z., ... & Shirayama, Y. (2018). Assessing nature's contributions to people. *Science*, 359(6373), 270-272.
- Dragičević, T. (1909). Narodno ribarstvo u Bosni i Hercegovini. GZM, knjiga 2: 379-488.
- Draškić, M. (1958). Samarđiski zanati u Bosni i Hercegovini. GZM - etnologija NS 13: 99-114.
- Dyussenbayev, A. (2017). Age Periods Of Human Life. *Advances in Social Sciences Research Journal*, 4(6). https://doi.org/10.14738/assrj.46.2924
- Džubur, A. (2017). Smilje. Univeritet Džemal Bijedić, Agromediteranski fakultet. Str.1-192.
- Đug, S., Hasanbegović, A., & Drešković, N. (2013). Crvena lista gljiva Federacije Bosne i Hercegovine: Vol. Knjiga 4 (Knjiga 4, Issue 1). EU „Greenway" Sarajevo

U; Prirodno-matematički fakultet Sarajevo. http://journal.um-surabaya.ac .id/ index .php/JKM/ article/ view/2203

- Đuričić, A. and Elizar, S. (1964). Lekovito i jestivo bilje i gljive Bosne i Hercegovine, Republički zavod za za zdravstvenu zaštitu Sarajevo, str. 157-168 i 193-195, Sarajevo.

- Eyssartier, C., Ladio A. H. and Lozada, M. (2011). Traditional horticultural knowledge change in a rural population of the Patagonian steppe. *Journal of Arid Environments* 75:78-86. http://dx.doi.org/10.1016/j.jaridenv.2010.09.006

- Fabijanić, R. (1976a). Narodna medicina stanovništva Dervente s okolinom. GZM - etnologija NS 30/31: 89-104.

- Fabijanić, R. (1976b). O narodnoj ishrani u okolini Dervente. GZM - etnologija NS 30/31: 105-120.

- Fabijanić, R. (1982). Narodna medicina Drežnjaka. GZM - etnologija NS 37: 33-45.

- Fabijanić, R. (1983). Narodna ishrana u Drežnici. GZM - etnologija NS 38: 181-193.

- Fabijanić, R. (1986/87a). Narodna ishrana u tešanjskom kraju. GZM - etnologija NS 41/42: 69-90.

- Fabijanić, R. (1986/87b). O narodnoj medicini u tešanjskom kraju. GZM - etnologija NS 41/42: 249-274.

- Falanruw, M.C.V. (1989). Nature intensive agriculture: the food production system of the Yap Islands. In: R.E. Johannes (ed.) *Traditional Ecological-Knowledge: A Collection of Essays.* Gland, Switzerland, International Union for Conservation of Nature (IUCN), pp. 43-50.

- Fernandez, A., Liu, B., Galante, A. P., Slattery, S., Sekine, K., Ponzio, R., Palandri, C., Pantzer, Y., Barletta, M. T., & Martin, G. (2020). Globally Important Agricultural Heritage Systems, Geographical Indications and Slow Food Presidia. November, 1-20. http://www.fao.org/3/cb1854en/cb1854en.pdf.

- Ferrier, J., Djeffal, S., Morgan, H. P., van der Kloet, S. P., Redžić, S., Cuerrier, A., Balick, M. J., & Arnason, J. T. (2012). Antiglycation activity of Vaccinium spp. (Ericaceae) from the Sam Vander Kloet collection for the treatment of type II diabetes1. In *Botany* (Vol. 90, Issue 5, pp. 401-406). NRC Research Press. https://doi.org/10.1139/B2012-026.

- Ferrier, J., Šačiragić, L., Chen, E. C. H., Trakić, S., Saleem, A., Alikadić, E., Cuerrier, A., Balick, M. J., Arnason, J. T., & Redžić, S. (2014). Ways the lukomir highlanders of Bosnia and Herzegovina treat diabetes. In *Ethnobotany and Biocultural Diversities in the Balkans: Perspectives on Sustainable Rural Development and Reconciliation* (pp. 13-27). Springer New York. https://doi.org/10.1007/978-1-4939-1492-0_2.

- Ferrier, J., Šačiragić L., Trakić S., Chen, E. C., Gendron, R. L., Cuerrier, A., Balick, M., Redzic, S., Alikadic, E. and Arnason, J. T. (2015). An ethnobotany of the Lukomir highlanders of Bosnia & Herzegovina. *Journal of ethnobiology and ethnomedicine*, 81(11): 1-17.

- Filipović, M. (1958). Nekoliko misli o zaštiti spomenika etnološkog karaktera. Naše starine, 5: 5-12.

- Filipović, M. (1962). Potreba etnološkog snimanja u dolini Trebišnjice. Naše starine, 8: 57-60.

- Filipović-Fabijanić, R. (1964). Narodna medicina i narodno vjerovanje. GZM - etnologija NS 19: 209-236.

- Filipović-Fabijanić, R. (1970). O narodnoj medicini stanovništva Lištice s okolinom. GZM - etnologija NS 24/25: 319-335.

- Filipović-Fabijanić, R. (1971). ''Domaći liekovi'' iz 1968 godine sa Širokog Brijega. GZM - etnologija NS 26: 117-178.

- Finn, S., Herne, M., Castille, D. (2017). The Value of Traditional Ecological Knowl-

edge for the Environmental Health Sciences and Biomedical Research. Environmental Health Perspectives. 125(8):085006. doi: 10.1289/EHP858.

- Focht, I. (1979). Gljive Jugoslavije, NOLIT, str. 1-311, Beograd.
- Fočo, M. (2014). Drvene džamije - tipologija, rasprostranjenost, karakteristike, Naše starine 23: 157-176.
- Ford, J. D., Berrang-Ford, L., King, M. and Furgal, C. (2010). Vulnerability of aboriginal health systems in Canada to climate change. *Global Environmental Change*, 20: 668-80.
- Freeman, M. and Carbyn, L. (eds.) (1988). *Traditional Management and Renewable Resource Management in Northern Regions*. Edmonton, Boreal Institute for Northern Studies, University of Alberta
- Gajić, M. and Kilibarda, M. (1968). Prilog ekologiji nekih lekovitih biljaka u šumama severnih padina Vranice (Centralna Bosna). Ljekovite sirovine, Zbornik radova VI, Institut za proučavanje lekovitog bilja u Beogradu, 69-74.
- Gatarić, Dj., Radanović, D., Cvikić, Z. and Durman, P. (1988). Expirience in cultivation and production economy of medicinal and aromatic plants in Banjaluka region, Republic of Srpska, Lek. Sirov Vol. XLVII No.18 PP 33-40 Belgrade
- Giunio, D. (1981). Jela od gljiva, "Svjetlost", str. 1-256, Sarajevo.
- Gluck, L. (1892). Narodni lijekovi iz bilinstva u Bosni. Glasnik zemaljskog muzeja Sarajevo. Knjiga 2, god IV, Sarajevo.
- Godoy, R., Reyes-Garcia, V., Broesch, J., Fitzpatrick, I. C., Giovarmini,P., Rodriguez, M. R. M., Huanca, T., Leonard, W. R., Mcdade, T. W., and Tanner (1998). Long-Term (Secular) Change of Ethnobotanical Knowledge of Useful Plants Separating Cohort and Age Effects. *Journal of Anthropological Research* 65: 51-67.
- Godoy, R., Reyes-Garcia, V., Byron, E., Leonard, W. R., and Vadez, V. (2005). The Effect of Market Economies on the Well-Being of Indigenous Peoples and on their Use of Renewable Natural Resources. *Annual Review of Anthropology* 34: 121-138.
- Gollin, D. (2020). Conserving genetic resources for agriculture: economic implications of emerging science. *Food Security*, 12(5), 919-927. https://doi.org/10.1007/s12571-020-01035
- Golub, D. and Đurić, G. (2018). Biobiodiversity in Southeast Europe -Assessment and Policy Recommendations, REPORT - ENTITY REPUBLIC OF SRPSKA. Banja Luka (http://seerural.org/wp-content/uploads/2018/09/Agrobiodiversity-Study-BiH-RS.pdf)
- Gómez-Baggethun, E. (2009). Perspectivas del conocimiento ecológico local ante el proceso de globalización. Papeles de relaciones ecosociales y cambio global 107:57-67
- Gómez-Baggethun, E., Mingorria, S., Reyes-García, V., Calvet, L., and Montes, C. (2010). Traditional ecological knowledge trends in the transition to a market economy: empirical study in the Doñana natural areas. *Conservation Biology*, 24(3), 721-729.
- Gómez-Baggethun, E. and Reyes-García, V. (2013). Reinterpreting change in traditional ecological knowledge. *Human Ecology*, 41(4), 643-647.
- Gray, C. L., Bilsborrow, R. E., Bremner, J. L., Lu, F. (2008). Indigenous Land Use in the Ecuadorian Amazon: A Cross-Cultural and Multilevel Analysis. *Human Ecology* 36: 97-109.
- Grđić, B. (1971a). Kako treba brati gljive, U: Praktični radovi iz biologije, Zavod za izdavanje udžbenika Sarajevo, BIGZ Beograd, str. 160, Sarajevo
- Grđić, B. (1971b). Upoznajmo neke gl-

jive, U: Praktični radovi iz biologije, Zavod za izdavanje udžbenika Sarajevo, BIGZ Beograd, str. 160-162, Sarajevo.

- Grlić, Lj. (1990). Enciklopedija samoniklog jestivog bilja. August Cesarec, Zagreb

- Grujić-Vasić, J., Pilipović, S., Bosnić, T., Redžić, S. (2006). Antimicrobial activity od diferent extracts from Rhizome and Root of Potentilla erecta L. Raeuschel and Potentilla alba L. Rosaceae. Acta Medica Academica 35: 9-14 12.

- Haggan, N., Neis, B. and Baird, I.G. (eds.) (2007). Fishers' Knowledge in Fisheries Science and Management. *Coastal Management Sourcebooks* 4. Paris, UNESCO Publishing.

- Halilović-Šarić, E. (2010). Tradicionalna Bosanska hrana. Tradicija sjevero istočne Bosne VIII. Str. 83-92.

- Hasanbegović, R. H. (2008). Gljive šumsko bogatstvo Bosne i Hercegovine, Izdanje I, 299, Šahinpašić, Sarajevo

- Hickey, F.R. (2006). Traditional marine resource management in Vanuatu: acknowledging, supporting and strengthening indigenous management systems. *SPC Traditional Marine Resource Management and Knowledge Information Bulletin*, 20: 11–23, www.spc.int/DigitalLibrary/Doc/FAME/InfoBull/TRAD/20/TRAD20.pdf

- Huseinović, S., Bektić, S., Čivić, S. (2017). Inventarizacija i upotreba ljekovitog bilja u tradicionalnoj fitoterapiji. "XXII SAVETOVANJE O BIOTEHNOLOGIJI". Zbornik radova, Knjiga 2, Sarajevo Kathe W., Honnef S., Heym A. (2003). Medicinal and Aromatic Plants in Albania, Bosnia-Herzegovina, Bulgaria, Croatia and Romania, BfN, WWF, TRAFFIC

- Ilić, Ž. (1972/73). Torkulja ili žećka - Prilog proučavanju tehnologije prerade voća. GZM - etnologija NS 27/28: 199-230.

- Inglis, J. (ed.) (1993). *Traditional Ecological Knowledge: Concepts and Cases*. Ottawa, Canadian Museum of Nature/ International Development Research Centre

- Institut za intelektualnu svojinu BiH. (2022). Vodič za zaštitu zanatskih proizvoda u Bosni i Hercegovini.

- IPBES (2013*). Initial elements of an IPBES approach: Towards principles and procedures for working with Indigenous and Local Knowledge (ILK) systems*, United Nations Environment Programme, ntergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Dostupno na https://www.ipbes.net

- IPBES (2017). Report of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on the work of its fifth session, Annex II to decision IPBES-5/1. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Dostupno na http://enb.iisd.org/ipbes/ipbes5/

- IPBES (2018). The IPBES regional assessment report on biodiversity and ecosystem services for Europe and Central Asia. Rounsevell, M., Fischer, M., Torre-Marin Rando, A. and Mader, A. (eds.). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. 892 pages.

- IPBES (2019): Draft Methodological guidance for recognizing and working with indigenous and local knowledge in IPBES (Dostupno na: https://ipbes.net/sites/default/files/inline-files/IPBES_ILK_MethGuide.pdf).

- Ivanovska, S., Jankulovska, M., Jani, S., Đurić, G., Zečević, E., Đorđević Milošević, S., Jovović, Z., & Fetahu, S. (2018). Food Beyond Borders (S. Ivanovska & I. Djimrevska (Eds.)). Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. https:// seerural.org /news/cook-book-food-beyond-borders*/. Journal of Research in Environmental Science and Toxicology* (ISSN: 2315-5698) Vol. 2(8) pp. 150-153

- Johannes, R.E. (1978). Traditional marine conservation methods in Oceania. *Annual Review of Ecology and Systematics*, 9: 349-64

- Jovanović, B. (2000). Dendrologija, Univerzitetska štampa, Beograd, str.1-536.

- Jukić, N. and Omerović, N. (2017). Gljive reda Pezizales u Bosni i Hercegovini - Ugroženost, ekologija i biogeografija. Amatersko mikološko udruženje, Sarajevo. Str. 206.

- Karamatić, M. (1984). Uloga franjevaca u povijesti bosansko-hercegovačkog zdravstava. Croatica Christiana periodica, 8:61-74.

- Karanović, M. (1937). Duborezna soba u jednoj hercegovačkoj kuli. GZM, sveska 1: 93-104.

- Kazazić, M., Đapo, M., Ademović, E. (2015). Antioksidatvina aktivnost vodenih ekstrakta pet ljekovitih biljaka sa područja Hercegovine. Treći naučno-stručni skup sa međunarodnim učešćem ''5. juni - Svjetski dan zaštite okoliša''. Bihać

- Kingsbury, N. D. (2001). Impacts of Land Use and Cultural Change in a Fragile Environment: Indigenous Acculturation and Deforestation in Kavanayen, Gran Sabana, Venezuela. Interciencia 26: 327-336.

- Klepi, Z. (2014). Prepreke za razvoj obrta u FBiH. Ekonomski fakultet Sveučilišta u Mostaru. http://www.nbrudruzenje.org/download/publikacije/publikacija_Analiza_prepreka_za_razvoj_obrta_u_FBiH.pdf.

- Klinger, M. (1963). Prilog flori gljiva okoline Sarajeva, GZMBiH, P. N., str. 31-40, Sarajevo

- Kosović, N. and Dunjić, Lj. (2000). Some indicators of the status and possibilities to improve the collection, purchase and processing of medicinal and aromatic plants in the region of Herzegovina - Neretva canton in the Federation of Bosnia and Herzegovina. In: Lorbach J (ed) FAO seminar proceedings on harvesting of non-wood forest products. Izmir Turkey, Joint FAO/ECE/ILO Committee on Forest Technology, Management and Training. http://www.fao.org/docrep/005/y4496e/Y4496E07.htm#ch4

- Krehić-Fočak, S. (2017). Medžmue-Ljekaruše: poseban oblik pisane kulturne baštine definicija i osobenosti u proučavanju zdravstvene kulture. Kulturno naslijeđe. Bosniaca, 19 (19): 48-53

- Kreševljaković, H. (1927). Sarajevska čaršija, njeni esnafi i obrt za Osmanlijske uprave. Narodna starina, Zagreb.

- Krželj, M. and Vitasović-Kosić, I. (2020). Etnobotanička primjena samoniklog bilja: hrana i lijek za ljude i životinje na području općine Šestanovac (Dalmatinska Zagora, Hrvatska). Krmiva: Časopis o hranidbi životinja, proizvodnji i tehnologiji krme, 62 (1): 3-13.

- Kujundžić, N., Škrobonja A. and Tomić, T. (2006). Plehanska ljekaruša "zbirka lijekova sa zbirkom ljekovitih trava i uputom za pravit meleme i murćefe". Acta med-hist Adriat, 4(1): 37-70.

- Kulenović, S. (1985). O nekim tradicionalnim zanatima u Bijeljini. GZM - etnologija NS 40: 244-252.

- Lakušić, R., Pavlović, D., Kutleša, L., Abadžić, S. (1979). Prirodni potencijali nekih ljekovitih, vitaminoznih i jestivih biljnih vrsta na planinama oko Prozora. Godišnjak Biološkog instituta Univerziteta u Sarajevu, Vol. XXXI, pp. 95-114.

- Lakušić, R., Pavlović, D. and Abadžić, S. (1980). Prirodni potencijali ljekovitih, vitaminoznih i jestivih biljnih vrsta na planinama jugoistočnih Dinarida. Glasnik GANU, Titograd, 3: 83-109.

- Lakušić, R. (2004). Ljekovite biljke Nacionalnog parka Sutjeska. Nacionalni park Sutjeska. Glas srpski grafika, Banja Luka.

- Ljubojević, S., Alajbegović, D., Beus, V., Milanović, S., Pinjuh, M., Rončević,

S. (1987). Analiza sirovinske baze I osnove organizacije I razvoja djelatnosti prikupljanja i prerade ljekovitog bilja, šumskih plodova, gljiva i puževa u šumama SR BiH, (projekat), ŠIPAD, Sarajevo.

- Ljubojević, S. (1992). Produkcija korisne biomase predstavnika farmakoflore u šumama bukve i šumama bukve i jele (sa smrčom) na krečnjčko-dolomitnim zemljištima Bosne i Hercegovine u zavisnosti od orografskih faktora i svjetlosti, (disertacija) Šumarski fakultet Univerziteta u Sarajevu.

- Lüpke, C. (2012). Documenting Environmental Protest: Taiwan's Gongliao Fourth Nuclear Power Plant and the Cultural Politics of Dialogic Artifice. In Li-chun Lin, S. & Tze-Lan D. Sang, eds. *Documenting Taiwan on Film: Issues and Methods in New Documentaries*. New York: Routledge Press, 274-292.

- Łuczaj Ł., Jug-Dujaković M., Dolina K., Jeričević M., Vitasović-Kosić I. (2019). The ethnobotany and biogeography of wild vegetables in the Adriatic islands. *Journal of ethnobiology and ethnomedicine*, 15(1): 1-17.

- Macanović, A. (2019). Evaluacija stanja ekosistemskih servisa i tradicionalnih znanja o biodiverzitetu Federacije Bosne i Hercegovine, Doktorska disertacija. Prirodno-matematički fakultet Univerziteta u Sarajevu, Sarajevo.

- Macanović, A. and Barudanović, S. (2021). Inventarizacija biljnih vrsta sa korisnim svojstvima na području Bosne i Hercegovine. Radovi Poljoprivredno-prehrambenog fakulteta Univerziteta u Sarajevu, God. LXVII, broj 72/1; 28-46.

- Maffi, L. (2005). Language and diversity. In Posey D, ed. *Cultural and Spiritual Values of Biodiversity*. London: Intermediate Technology Publications and UNEP.

- Maly, K. (1904). Plodovi i sjemenke iz predhistoričke sojenice u Donjoj Dolini. Glasnik Zemaljskog Muzeja u Sarajevu. Str. 487-492.

- Marčinković, J. (2011). Ljekaruša. Profil Multimedija, Zagreb, str. 1-512.

- Mazalić, Đ. (1932). Kako su stare sarajlije pravile obojeni papir. Večernja pošta od 8. II, Sarajevo.

- Mazalić, Đ. (1934). Slikarski materijal starih ikonopisaca koji su radili u Sarajevu i načini kako su ga upotrebljavali. GZM, sveska 2: 113-168.

- McCarter, J., and Gavin, M. C. (2011). Perceptions of the value of traditional ecological knowledge to formal school curricula: opportunities and challenges from Malekula Island, Vanuatu. *Journal of ethnobiology and ethnomedicine*, 7(1), 1-14.

- Medić, M. (1904a). Tri ljekaruše. GZM, knjiga 1:1-32.

- Medić, M. (1904b). Tri ljekaruše. GZM, knjiga 2:195-224.

- Mileusnić, Z. (1986/87). Narodna privreda tešanjskog kraja. GZM - etnologija NS 41/42: 25-67.

- Miličević Sečić, M. (2021). Konjičko drvorezbarstvo. Naše starine, 23: 223-235

- Molnár, Zs., Bartha, S. and Babai, D. (2008). Traditional ecological knowledge as a concept and data source for historical ecology, vegetation science and conservation biology: a Hungarian perspective. In: P. Szabó & R. Hédl (eds.) *Human Nature: Studies in Historical Ecology and Environmental History*. Pp. 14–27. Brno: Institute of Botany of the ASCR.

- Momirović, P. (1953). Dve drvene crkve u Bosanskoj Krajini. Naše starine 1: 167-176.

- Momirović, P. (1956). Drvene crkve Zapadne Bosne. Naše starine 3: 149-172.

- Muderizović, R. (1929). Popis sarajevskih zanatlija iz 1848. GZM, sveska 2:5-32.

- Mulić, S. (1985). Razvoj konjičkog drvorezbarstva i put u savremeno. GZM - etnologija NS 40: 1-28.
- Murtić, S., Čivić, H., Huseinbegović, N., Koleška, I., Muminović, Š., Ašimović, Z. (2014). Antioksidacijski kapacitet i sadržaj ukupnih fenola u ekstraktima lišća nekih vrsta ljekovitog bilja. Antioxidant capacity and total phenol content in the extract of leaves of some medicinal plants. Radovi Poljoprivredno-prehrambenog fakulteta, Univerziteta u Sarajevu God. LIX, broj 64/2
- Mustafa, B., Hajdari, A., Krasniqi, F., Hoxha, E., Ademi, H., Quave, C. L., and Pieroni, A. (2012). Medical ethnobotany of the Albanian Alps in Kosovo. *Journal of Ethnobiology and Ethnomedicine*, 8, 1-14.
- Nijar, G. S. (2013). Traditional knowledge systems, international law and national challenges: Marginalization or emancipation? *European Journal of International Law*, 24(4), 1205-1221. https://doi.org/10.1093/ejil/cht077.
- Nikić, A. (2004). Franciscans and Medicine in Herzegovina. Acta medico-historica Adriatica. 2004;2:155-170.
- Okić, R. (1991). Gljive, Samostalno izdanje autora, str. 1-148, Sarajevo.
- Paić-Vukić, T. (2003). Biljno i čudotvorno liječenje prema rukopisima sarajevskog kadije Mustafe Muhibbija. *Etnološka tribina* 26, Vol. 33, str. 9-21.
- Palavestra, V. (1970). Narodna ishrana u okolini Lištice. GZM - etnologija NS 24/25: 289-297.
- Pargan, M. (2016). Tradicija Bosne i Hercegovine - zanati. BMG Bosanska medijska grupa, Tuzla. Str.1-450.
- Pavković, N. (1958). Izrada belegija u Zoviku. GZM - etnologija NS 13: 131-136.
- Pećanac, D. (2010). *Sustainable Use of Medicinal and Aromatic Plants and Preservation of Traditional Knowledge in Bosnia and Herzegovina*. Balwois, May, *25-29*, 1-9.
- Pelagić, V. (1879). Narodni učitelj. Novi Sad, str. 1-800.
- Pichler, A. (1902). Flora hercegovačkih grobalja. GZM knjiga 1:123-127.
- Pintarić, K., Usčuplić, M. and Gavrilović, D. (1985). Uzgajanje i zaštita zasada košaračke vrbe, 1-55, "Zadrugar", Sarajevo.
- Popović, J. (1929a). Ljetni stanovi (katuni) na Zelengori. GZM, knjiga 1:173-186.
- Popović, J. (1929b). Ljetni stanovi (staje) na planini Vranici, Matorcu i Ščitu. GZM, knjiga 1:145-178.
- Popović, J. (1931). Ljetni stanovi na planini Vranici, Zec planini i planini Bitovnji. GZM, sveska 1:55-82.
- Popović, J. (1932). Ljetni stanovi na planini Bjelašnici. GZM, sveska 1:55-96.
- Popović, J. (1933a). Mahale (ljetni stanovi) na planini Visočici. GZM, sveska 1:143-164.
- Popović, J. (1933b). Ljetni stanovi (mahale)na planini Treskavici. GZM, sveska 1:181-206.
- Popović, J. (1935). Ljetni stanovi na planini Plasi, Muharnici i Čvrsnici. GZM, sveska 1:117-146.
- Popović, J. (1936). Ljetni stanovi na planini Vran, Čabulji i Čvrsnici. GZM, sveska 1:63-98.
- Popović, J. (1938). Ljetni stanovi na planini Raduši i Ljubuši. GZM, sveska 2:65-112.
- Popović, J. (1939). Ljetni stanovi na planini Hrbljini i Krug. GZM, sveska 2:61-92.
- Pourchez, L. (2011). *Savoirs des femmes : medecine traditionnelle et nature - Maurice, Reunion et Rodrigues*, Local and Indigenous Knowledge Systems

Series No. 1. Paris, UNESCO Publishing

- Prajndleberger, J. (1900). Prilozi narodnoj medicini iz Bosne. GZM knjiga 1:65-82.

- Protić, Đ. (1898a). Prilog poznavanju flore okoline Vareša u Bosni. GZM, knjiga 3: 657-706.

- Protić, Đ. (1898b). Prilog k poznavanju gljiva Bosne i Hercegovine-Vareš i okolina, GZMBiH X, knj. 1, str. 93-102, Sarajevo.

- Redžić, S. (1990a). O jestivim i otrovnim gljivama-Smrčak, Biološki list-5, Školska 1989/90 godina, God. izd. XXXVII, str. 148-150, Sarajevo.

- Redžić, S. (1990b). O jestivim i otrovnim gljivama-Rod *Amanita* Pers ex Fr.-Muhara, Biološki list-1, Školska 1990/91 godina, Septembar-oktobar, God. izd. XXXVIII, str. 9-13, Sarajevo.

- Redžić, S. (1990c). O jestivim i otrovnim gljivama-Rod *Amanita* Pers ex Fr.-Muhara (nastavak), Biološki list-2, Školska 1990/91 godina, God. izd. XXXVIII, Novembar- decembar, str. 38-40, Sarajevo.

- Redžić, S. (1991a). O jestivim i otrovnim gljivama-Rod *Boletus*-Vrganj, Biološki list-3, Školska 1990/91 godina, Januar-februar, God. izd. XXXVIII, str. 77-79, Sarajevo.

- Redžić, S. (1991b). O jestivim i otrovnim gljivama-Rod *Psalliota*-Pečurka, rudnjača, Biološki list-4, Školska 1990/91 godina, Mart-april, God. izd. XXXVIII, str. 105-107, Sarajevo.

- Redžić, S. (1991c). O jestivim i otrovnim gljivama-Rodovi *Lactarius*-Mliječnica i *Cantharellus*-lisičarka, Biološki list-5, Školska 1990/91 godina, Maj-juni, God. izd. XXXVIII, str. 139-142, Sarajevo.

- Redžić, S. (1991d). O jestivim i otrovnim gljivama, Biološki list-1, Školska 1991/92 godina, Septembar-oktobar, God. izd. XXXIX, str. 11-12, Sarajevo.

- Redžić, S. (1991e). O jestivim i otrovnim gljivama-Cjepača-Inocybe, Biološki list-2, Školska 1991/92 godina, God. izd. XXXIX, Novembar-decembar, str. 39-40, Sarajevo.

- Redžić, S., Lakušić, R., & Tokić, S. (1991). Ljekovite biljke u nekim ekosistemima doline rijeke Une. Bilten Društva Ekologa Bosne i Hercegovine, Serija B(6), 155-158.

- Redžić, S., Dalmatin, M., Hamidović, M., Kadić, J., Radević, M., Ševo, LJ. (2003). Biodiversity, geodiversity and protection of natural and cultural heritages. *National Environmental Action Plan of Bosnia and Herzegovina*, Federation of BIH and RS, Sarajevo

- Redžić, S. (2006). Wild Edible Plants and Their Traditional Use in the Human Nutrition in Bosnia-Herzegovina. *Ecology of Food and Nutrition*, 45, 189-232.

- Redžić, S. (2007). The ecological aspect of ethnobotany and ethnopharmacology of population in Bosnia and Herzegovina. *Collegium Antropologicum*, 31(3), 869-890.

- Redžić, S., Barudanović, S., & Radević, M. (eds.) (2008). Bosna i Hercegovina - zemlja raznolikosti. Pregled i stanje biološke i pejzažne raznolikosti Bosne i Hercegovine, Prvo izvješće Bosne i Hercegovine za Konvenciju o biološkoh raznolikosti. Federalno ministarstvo okoliša i turizma BiH, Sarajevo.

- Redžić, S., Bašić, H., Barudanović, S. (2009a). Ekološki sistemi i modeli. Univerzitet u Sarajevu, Prirodno-matematički fakultet. Sarajevo

- Redžić, S., Redžić, A., Bišćević, A. (2009b). Use of wild edible plants in human nutrition during war in Bosnia and Herzegovina (W. Balkan). Afr J Trad CAM. 6(Suppl. 4): 466

- Redžić, S. (2010a). Use of wild and semi-wild edible plants in nutrition and survival of people in 1430 days of siege of Sarajevo during the war in Bosnia and Herzegovina (1992-1995). *Collegium*

Antropologicum, 34: 551-570.

- Redžić, S. (2010b). Wild medicinal plants and their usage in traditional human therapy (Southern Bosnia and Herzegovina, W. Balkan). *Journal of Medicinal Plants Research*, 4(11), 1003–1027. https://doi.org/10.5897/JMPR09.254.

- Redžić, S., Barudanović, S., & Pilipović, S. (2010). Wild Mushrooms and Lichens used as Human Food for Survival in War Conditions; Podrinje - Zepa Region (Bosnia and Herzegovina, W. Balkan). *Human Ecology Forum*, 17(2), 175–187.

- Redžić, S. (2012). Biodiverzitet Bosne i Hercegovine - stanje, mogućnosti upotrebe i neophodnost održivog upravljanja. Drugi međunarodni kolokvijum „BIODIVERZITET-TEORIJSKI I PRAKTIČNI ASPEKTI“, Posebna izdanja CXLVIII, Odjeljenje prirodnih i matematičkih nauka; Zbornik radova 22, 47-70.

- Redžić, S. and Ferrier, J. (2014). The Use of Wild Plants for Human Nutrition During a War: Eastern Bosnia (Western Balkans). In *Ethnobotany and Biocultural Diversities in the Balkans*; Pieroni, A., Quave, C.L., Eds.; Springer: New York, NY, USA, pp. 149–182.

- Rexhepi, B., Bajrami, A. & Mustafa, B. (2018). Ethnobotanical Study of Wild Edible Plants in Pelagonia Region (Southwestern Macedonia), *International Journal of Advances in Science Engineering and Technology*, 6 (1): 61-65.

- Riter-Studnička, H. (1958). Biljne vrste u narodnom bojadisarstvu Bosne i Hercegovine. GZM - etnologija NS 13: 137-153.

- Rogić, R. (2014). Antioksidacijska svojstva nekih biljnih svojti s područja Blidinja (Bosna i Hercegovina). Diplomski rad, Sveučilište u Zagrebu Prirodoslovno-matematički fakultet Biološki odsjek. Zagreb

- Rončević, S. (1974). Prilog poznavanju flore viših gljiva na tresetištu kod Han Krama u Istočnoj Bosni, Magistarski rad, str. 1-111, Zagreb.

- Sadler, B. and Boothroyd, P. (eds.) (1994). *Traditional Ecological Knowledge and Modern Environmental Assessment*. Vancouver, Canadian Environmental Assessment Agency, International Association for Impact Assessments and University of British Columbia.

- Sali, S. and Filipo, P. (2020). *Protecting traditional knowledge: An analysis of the pacific regional framework for the protection of traditional knowledge and expressions of culture*. Victoria U. Wellington L. Rev., 51, 559.

- Samardžić, S., Đurić, G., Rudić-Grujić, V., Radovanović, G., Dizdarević, T., and Đorđević-Milošević, S. (2021). Food, nutrition and health in Bosnia and Herzegovina. In A.-I. Gostin, D. Bogueva, & V. Kakurinov (Eds.), *Nutritional and health aspects of food in Balkans* (Elsevier T, pp. 47-64). Academic press.

- Savić, J., Mačukanović-Jocić, M. and Jarić, S. (2019). Medicine Medical ethnobotany on the Javor Mountain (Bosnia and Herzegovina). *European Journal of Integrative Medicine*, 27 (February), 52-64. https://doi.org/10.1016/j.eujim.2019.02.007.

- Sesanti, S. (2016). Africanising the philosophy curriculum through teaching African culture modules: An African Renaissance act Sociology *South African Journal of Philosophy*.

- Shaw, R., Uly, N. and Baumwoll, J. (eds.) (2008). Indigenous Knowledge for Disaster Risk Reduction: good practices and lessons learned from experiences in the Asia-Pacific Region. Bangkok, UNISDR (UN International Strategy for Disaster Reduction), Kyoto University and the European Union

- Srinivas, K. R. (2008). Traditional Knowledge and Intellectual Property Rights: A Note on Issues, Some Solutions and Some Suggestions. *Asian Journal of WTO & International Health Law and Policy*, 3, 81.

- Stanić, R. (1967). Prilog proučavanju starih mostarskih zanata. GZM - etnologija NS 22: 145-160.
- Steiner, K. (1903). Bosanska narodna medicina. GZM, knjiga 3:563-579.
- Sucholas, J., Molnár, Z., Łuczaj, Ł., & Poschlod, P. (2022). Local traditional ecological knowledge about hay management practices in wetlands of the Biebrza Valley, Poland. *Journal of Ethnobiology and Ethnomedicine*, 18(1), 1-42.
- Swiderska, K. (2012). Protecting traditional knowledge: A holistic approach based on customary laws and bio-cultural heritage. *Conserving and Valuing Ecosystem Services and Biodiversity: Economic, Institutional and Social Challenges*, 331–342. https://doi. org/10. 4324/9 78184 9770859
- Šarić-Kundalić, B., Dobeš, C., Klatte-Asselmeyer V., Saukel, J. (2010a). Ethnobotanical study on medicinal use of wild and cultivated plants in middle, south and west Bosnia and Herzegovina. *Journal of Ethnopharmacology* 131, 33-55.
- Šarić-Kundalić, B., Fritz, E., Dobeš, Ch., Saukel, J. (2010b). Traditional medicine in the pristine village of Prokoško Lake on Vranica Mountain, Bosnia and Herzegovina. *Sci Pharm*. 2010; 78: 275-290.
- Šarić-Kundalić, B., Dobeš, Ch., Klatte-Asselmeyer, V., Saukel, J. (2011). Ethnobotanical survey of traditionally used plants in human therapy of east, north and north-east Bosnia and Herzegovina. *Journal of ethnopharmacology* 133(3): 1051-76.
- Šarić-Kundalić, B., Mazic, M., Djerzic, S., Kerleta-Tuzovic, V. (2016). Ethnobotanical study on medicinal use of wild and cultivated plants on Konjuh Mountain, North-East Bosnia and Herzegovina. Technics technologies education management, *Journal of Society for development of teaching and business processes in new net environment in B&H*, Volume 11, 208-221.
- Tadić, A, (1956). Prekomeran lov školjaka i njihova zaštita. Zavod za ribarstvo NRS. Ribarstvo Jugoslavije, 9: 27-29.
- Tahirović, A., Čopra-Janićijević, A., Bašić, N., Vidic, D., Klepo, L., Delić, D. (2012). Determination of Vitamin C in some *Bosnian Crataegus* L. species by spectrophotometric method. Works of Faculty of Forestry University of Sarajevo, 42(1): 43-55.
- Tang, Y.-Y., Lu, Q., Geng, X., Stein, E. A., Yang, Y., & Posner, M. I. (2010). Short-term meditation induces white matter changes in the anterior cingulate. *Proceedings of the National Academy of Sciences*, 107(35), 15649-15652. doi:10.1073/pnas.1011043107.
- Tanović, N. (2010). Atlas ljekovitog bilja i gljiva Bosne i Hercegovine. Univerzitet ''Džemal Bijedić'' Mostar. Str. 1-106.
- Toledo, V. (2002). "Ethnoecology: a conceptual framework for the study of indigenous knowledge of nature," in *Ethnobiology and Biocultural Diversity*, eds J. R. Stepp, F. S. Wyndham, R. K. Zarger, (Athens, GE: University of Georgia Press), 511-522.
- Trako, S. (1984). Jedan domaći farmakološki rukopis iz zbirke manuskripta Orijentalnog instituta u Sarajevu, Anali GHB, Knjiga XI-XII, str. 261-267.
- Tucakov, J. (1978). Liječenje čajevima ljekovitog bilja. Zagreb, August Cesarec.
- Turner, N. J., and Turner, K. (2008). Where our Women Used to Get the Food: Cumulative Effects and Loss of Ethnobotanical Knowledge and Practice; Case Study from Coastal British Columbia. *Botany* 86: 103-115.
- UNEP (2019). 6 National Report of BiH for the Convention on Biological Diversity. 1-270. Dostupno na: http://bih-chm-cbd.ba/wp-content/uploads/2020/11/Sixth-National-Report-BiH_ENG.pdf
- UNEP-WCMC (2021). Safeguarding Traditional Knowledge. How to bet-

ter recognize and include traditional knowledge in biodiversity conservation. Policy brief. Dostupno na: https:// cobracollective. org/wp-content/uploads/2021/07/TK-Policy-Brief_Final.pdf

- UNESCO (2000). B. and E.A. Berlin, M. Langton, R. Mathew, K. Ruddle, L. Séhuéto and commentary by D. Nakashima, Session on "Science and other systems of knowledge", in World Conference on Science. Science for the Twenty-First Century: A New Commitment, A.M. Cetto, ed. Paris: UNESCO, 2000, pp. 432-44.

- UNESCO/WIPO (1985). UNESCO-WIPO folklore-model-provisions.pdf. Dostupno na: https:// unesdoc. unesco. org/ark:/48223/pf0000220160

- United Nations (1992). Convention on Biological Diversity United Nations 1992. United Nations, 30. Dostupno na: http://www.cbd.int/doc/legal/cbd-en.pdf

- USAID/Sweden FARMA BiH (2010). Projekat unapređenja poljoprivrednih tržišta. Ljekovito i aromatično bilje u Bosni i Hercegovini - Analiza sektora, str 22.

- Usher, P. (2000). Traditional ecological knowledge in environmental assessment and management. *Arctic* 53: 83-94.

- Uščuplić, M. (1984). Gljive, Centar društvenih djelatnosti Univerziteta u Sarajevu, str. 1-148, Sarajevo.

- Uščuplić, M. (2004). Svijet gljiva. ANUBiH. Str. 1-244.

- Vladić-Krstić B. (1970). Tekstilna domaća radinost u okolini Lištice. GZM - etnologija NS 24/25: 271-288.

- Vladić-Krstić, B. (1976). Tekstilna radinost u okolini Dervente. GZM - etnologija NS 30/31: 175-236.

- Vladić-Krstić, B. (1977). Ćilimarstvo u Bosni i Hercegovini. GZM - etnologija NS 32: 225-296.

- Vladić-Krstić, B. (1978). Tekstilna radinost na Zmijanju. GZM - etnologija NS 33: 19-56.

- Vojniković, S., Balić, B., Višnjić, Ć. (2013). Održivo korištenje ljekovitog, jestivog i aromatskog šumskog bilja. Univerzitet u Sarajevu. Šumarski fakultet

- Vuletić-Vuksanović, V. (1896). Narodna kuća ili dom s pokućanstvom u Dalmaciji, u Hercegovini i u Bosni. Zbornik za narodni život i običaje. Jugoslovenska akademija znanosti i umjetnosti. Zagreb.

- Zeljković/Зељковић, С. (2020). (Zeljković С.) Достигнућа и будући правци сакупљања и плантажирања љековитих и ароматичних биљака. У: Пржуљ Н, Тркуља В (уредници) Од генетике и спољне средине до хране. Академија наука и умјетности Републике Српске, Бања Лука, Монографија XLI:661-703.

- Zovko, I. (1896a). Narodna jela i pića po Bosni i Hercegovini. Zbornik za narodni život i običaje Južnih Slavena. Knjiga 1. Jugoslovenska akademija znanosti i umjetnosti. Zagreb.

- Zovko, I. (1896b). Bolesti i lijekovi po Bosni i Hercegovini: narodno liječništvo. Zbornik za narodni život i običaje, Knjiga 1. Jugoslovenska akademija znanosti i umjetnosti. Zagreb.

- Zubić, J. (1930). Iz istorije šumske privrede u Bosni i Hercegovini. GZM, sveska 1:179-190.

- Институт за интелектуалну својину БиХ. (2022). *ВОДИЧ ЗА ЗАШТИТУ ЗАНАТСКИХ ПРОИЗВОДА У БОСНИ И ХЕРЦЕГОВИНИ*.

- **Web pages**

- https://en.unesco.org/about-us/legal-affairs/convention-concerning-protection-world-cultural-and-natural-heritage (pristup: 22.02.2022. god.)

- https://www.cbd.int/doc/c/ab-

b5/591f/2e46096d3f0330b08ce87a45/wg2020-03-03-en.pdf (pristup: 11.11.2022. god.)

- https://www.fws.gov/sites/default/files/documents/TEK-Fact-Sheet.pdf (pristup: 10.05.2022. god.)
- https://www.geneva-academy.ch/joomlatools-files/docman-files/UN%20Declaration%20on%20the%20rights%20of%20peasants.pdf (pristup: 11.01.2023. god.)
- https://www.researchgate.net/publication/311976536_EKOLOSKO_OBRAZOVANJE_I_STVARANJE_EKOLOSKE_SVIJESTI (pristup: 11.01.2023. god.)
- https://www.un.org/development/desa/indigenouspeoples/wp-ontent/uploads/sites/19/2018/11/UNDRIP_E_web.pdf (pristup: 20.02.2023. god.)
- https://www.wto.org/english/tratop_e/trips_e/intel1_e.htm (pristup: 10.05.2022. god.)
- https://www.slowfood.com/nazioni-condotte/bosnia-and-herzegowina/ (pristup: 11.01.2023. god.)
- https://www.mvp.gov.ba/dobro_dosli_u_bih/drzavno_uredjenje/administrativno_teritorijalno_uredjenje/?id=265 (pristup: 11.01.2023. god.)
- http://www.unfccc.ba/site/pages/karakteristike_klime.php (pristup: 11.01.2023. god.)
- https://www.fao.org/giahs/background/a-global-partnership/en/ (pristup: 11.01.2023. god.)
- https://food.ec.europa.eu/plants/plant-variety-property-rights_en (pristup: 11.01.2023. god.)
- https://fsa.gov.ba/hr/fao-projekt-u-bih-jacanje-administrativnog-sustava-za-upravljanje-i-podrsku-zastite-oznake-zemljopisnog-podrijetla/ (pristup: 11.01.2023. god.)
- https://www.bastabalkana.com/2012/03/narodna-tradicionalna-fitoterapija-i-medicina-i-priroda-na-dar/ (pristup: 22.02.2022. god.)
- http://unescobih.mcp.gov.ba/konkursi/?id=15125 (pristup: 11.01.2023. god.)
- https://montk.gov.ba/ (pristup: 22.02.2022. god.)
- https://www. mon.ks.gov.ba (pristup: 22.02.2022. god.)
- https://mozks-ksb.ba/ (pristup: 10.05.2022. god.)
- https://www.fao.org/3/i0510e/i0510e.pdf (pristup: 10.05.2022. god.)
- https://www.rpz-rs.org/ (pristup: 10.05.2022. god.)
- https://www.fao.org/plant-treaty/en/ (pristup: 11.01.2023. god.)
- https://www.monkshnk.gov.ba (pristup: 11.01.2023. god.)
- https://www.wipo.int/tk/en/tk/ (pristup: 11.01.2023. god.)
- https://www.wipo.int/patents/en/ (pristup: 11.01.2023. god.)
- https://www.cbd.int/abs/ (pristup: 12.01.2023. god.)
- Komisija za registraciju oznaka porijekla, oznaka geografskog porijekla i dodjelu oznaka garantovano tradicionalnog specijaliteta prehrambenih proizvoda u Bosni i Hercegovini („Službeni glasnik BiH“, broj 84/19) (Dostupno na: https://fsa.gov.ba/bs/politika-kvaliteta/ oblast/geografsko-porijeklo/; pristup: 10.01.2022. god.)
- Pravilnik o izgledu i načinu korištenja zaštićenog znaka oznake porijekla, oznake geografskog porijekla i oznake garantovano tradicionalnog specijaliteta prehrambenih proizvoda („Službeni glasnik BiH“, broj 82/19) (Dostupno na: https://fsa.gov.ba/bs/politika-kvaliteta/oblast/geograf-

sko-porijeklo/; pristup: 14.01.2022. god.)

- Pravilnik o sistemima kvaliteta za prehrambene proizvode („Službeni glasnik BiH“, broj 90/18) (Dostupno na: http://www.sluzbenilist.ba/page/akt/Bd5ragmx4gztz5k76kjn45hs=; pristup: 13.12.2022. god.)

- Zakon o hrani („Službeni glasnik BiH” broj 50/2004) (Dostupno na: http:// www.msb.gov.ba/dokumenti/7Zakon_o_hrani.pdf; pristup: 10.01.202. god.)

- Zakon o kulturnim dobrima („Službeni glasnik Republike Srpske“, broj 38/22) (Dostupno na: https://advokat-prnjavorac.com/Zakon-o-kulturnim-dobrima-Republike-Srpske.html/; pristup: 10.01.2022. god.)

- Zakon o obrtu u FBIH („Službene novine Federacije BiH“, broj 75/21) (Dostupno na: https://advokat-prnjavorac.com/Zakon-o-obrtu-i-srodnim-djelatnostima-u-FBiH.html; pristup: 21.01.2023. god.)

- Zakon o vinu, rakiji i drugim proizvodima od vina i grožđa („Službeni glasnik BiH”, broj 25/08) (Dostupno na: https:// propisi.ks.gov.ba /sites/propisi.ks.gov.ba /files/zakon _o_vinu_rakiji_ 25_8.pdf; pristup: 14.01.202. god.)

- Zakon o zanatsko-preduzetničkoj djelatnosti u RS („Službeni glasnik RS”, br. 117/2011, 121/2012, 67/2013, 44/2016 i 84/2019) (Dostupno na: https://www.paragraf.ba /propisi/republika-srpska/zakon-o-zanatsko-preduzetnickoj-djelatnosti.html; pristup: 22.02.2023. god.)

- Zakon o zaštiti geografskog porijekla („Službeni glasnik BiH” broj 53/2010) (Dostupno na: https://advokat-prnjavorac.com/zakoni/Zakon_o_zastiti_oznaka_geografskog_porijekla.pdf;pristup: 15.02. 2002. god.)

- Zakon o zaštiti i korištenju kulturno-istorijskog i prirodnog nasljeđa („Službeni list SRBiH“, broj 20/85) (Dostupno na: https://bastina.ba/zakon-o-zatiti-i-koritenju-kulturno-historijskog -i-prirodnog -naslijea/; pristup: 10.01.2022. god.)

- Zakon o zaštiti oznaka geografskog porijekla („Službeni glasnik Bosne i Hercegovine“, br. 53/10) (Dostupno na: https://advokat-prnjavorac.com/zakoni/ Zakon_o_ zastiti_oznaka_ geografskog_porijekla.pdf; pristup: 10.01.2022. god.)

- Zakon o žigu („Službeni glasnik BiH” broj 53/2010) (Dostupno na: https:// advokat-prnjavorac. com/ zakoni/ Zakon_o_zigu.pdf; pristup: 15.02.202. god.)com/2012/03/narodna-tradicionalna-fitoterapija-i-medicina-i-priroda-na-dar/ (pristup: 22.02.2022. god.)

ANNEX 1

Annex 1: Questionnaire on the state of traditional knowledge in Bosnia and Herzegovina (Adapted from Macanović, 2019 and Barudanović et Đurić, 2022)

Location :	QUESTIONNAIRE The state of traditional knowledge in Bosnia and Herzegovina	Date:

Personal information:

1. Birth year: _____

2. Gender *(circle):* a) Male b) Female

3. Work status *(circle):* a) Student:_____ b) Employed c) Unemployed d) Stay at home

4. Level of education: a) No education b) Elementary c) Highschool d) University degree or higher

5. Residence: _____

6. Yours or your parents' place of origin *(Enter the name of the native region or village):*
_____

Circle your response

1. Do you use natural resources?				a) Yes	b) No
2. Do you use medicinal plants for treatment?				a) Yes	b) No
3. Do you prepare homemade juices, jams and marmalades from natural resources?				a) Yes	b) No
4. Do you _____medicinal plants?	a) grow	b) buy	c) harvest	d) sell	e) none

5. What is your motive for collecting plant species?
_____
_____

6. How often do you harvest medicinal plants?
   1. Regularly when it is collection time
   2. When I need it
   3. Never
   4. I do not know how to harvest

7. When was the last time you prepared one of the traditional dishes?
   A. Never
   B. I do not know how to prepare them
   C. Regularly each year
   D. 5 years ago
   E. 30-40 years ago

8. When was the last time you used a traditional medicinal drink?
   A. Never
   B. 1 year ago
   C. 10 years ago
   D. Only when I am ill
   E. I use it regularly as a healthy way of eating

9. Circle the natural resources you use:
   1. Bees wax
   2. Resin
   3. Bee keeping
   4. Nectar
   5. Pollen
   6. Wood for heating
   7. Fatwood
   8. Shrubs for making brooms
   9. Hay
   10. None of the above

10. Do you perform any of the listed practices? *(circle multiple answers)*
   1. Crochet or embroidery
   2. Weave carpets
   3. Knit (sweaters, scarves, hats, etc.)
   4. Graft fruit trees
   5. Mow traditionally
   6. Prune fruit trees
   7. Make traditional sweet "halva"
   8. Make traditional biscuit "gurabije"
   9. Roast coffee beans in "shish" (coffee roaster)
   10. Prepare "šerbe" (sherbet)
   11. None of the above
   12. Not listed – *add* _____

11. When collecting, do you leave some plants for regeneration or do you collect everything?
_____
_____

12. How did you get information about collecting plants?
a) By folk tradition (from generation to generation)
b) Via media (TV, radio)
c) By reading books and specialized publications
e) By attending specialized courses in the field of harvesting

All information in this survey is anonymous and strictly protected

13. Circle the medicinal plants you know

1. Yarrow
2. Garlic
3. Oregano
4. Plantago
5. Common centaury
6. Saint John's Wort
7. Horse radish
8. Artemisia.
9. Eyebright
10. Hedgenettle
11. Bearberry
12. Mountain arnica
13. Comfrey
14. Cichorium
15. Hawthorn
16. None of the above

14. Circle the medicinal plants you recognize in nature

1. Inula sp.
2. Hedgenettle
3. Elderberry
4. Mint
5. Plantago
6. Common knotgrass
7. Calluna
8. Ramsons
9. Orchid sp.
10. Saint John's Wort
11. Chelidonium
12. Horsetails
13. Meadowsweets
14. Fennel
15. *Gentiana lutea*
16. None of the above

15. In which type of habitat do you find the most plant resources?

- Forest
- Meadow
- Pasture
- Steppe
- Ruderal
- Weed
- Halophile vegetation
- Freshwater and wetlands

16. By what natural resources is your area recognizable?

- Blueberry
- Blackberry
- Raspberry
- Immortelle
- Sage
- Tilia sp.
- Saint John's Wort
- Yarrow
- Nettle
- Calluna
- Chestnut
- Bearberry
- Horsetails
- Comfrey
- Cichorium
- Plantago
- Dandelion
- Elderberry
- Artemisia sp.
- Iceland moss
- I do not know
- Other _____
- _____
- _____
- _____
- _____

17. Name the 10 most economically important plants

Plant name	*Part of plant used*	*Used for treatment of*

18. Can you write a recipe for juice, balm, tea or food?

_____
_____
_____
_____

19. Are more effective legal restrictions on the exploitation of natural resources needed?	a) Yes	b) No	c) I do not know
20. Are you afraid that you will not have natural resources at your disposal in the future?	a) Yes	b) No	c) I do not know
21. Do you think that there are fewer of certain plants today than before?	a) Yes	b) No	c) I do not know

22. If there are changes and reduction of plant resources in nature, what do you consider to be the main causes?
a) excessive harvesting b) grazing c) climate change d) other _____

23. What, in your opinion, is the biggest local problem related to natural resources?

_____

24. Do you consider the collection of plant resources to be an economically promising business?	a) Yes	b) No
25. Do you want to know more about the traditional use of natural resources?	a) Yes	b) No

All information in this survey is anonymous and strictly protected

ANNEX 2

Annex 2. List of participants: individual research (questionnaire method) in Bosnia and Herzegovina with mapped localities

No. Respondent	No. Questionnaire	Age group	Gender	Work status	Level of education	Residence	Area	Area code	GPS coordinates
1	B204	-	Ženski	nezaposlen	srednje	Bjelašnica - Sinanovići	Centralna	C3	43°36'55.63"N 18°15'36.30"E
2	B207	III	Muški	penzioner	srednje	Bjelimići	Centralna	C4	43°31'12.78"N 18°16'58.22"E
3	B200	IV	Muški	-	visoko/više	Bjelimići	Centralna	C2	43°31'1.14"N 18°13'38.66"E
4	B201	IV	Muški	-	srednje	Bjelimići	Centralna	C1	43°32'24.13"N 18°13'49.96"E
5	B202	IV	Muški	nezaposlen	-	Bjelimići	Centralna	C1	43°32'24.13"N 18°13'49.96"E
6	B205	IV	Muški	nezaposlen	-	Bjelimići	Centralna	C1	43°32'24.13" N 18°13'49.96" E
7	B203	IV	Ženski	nezaposlen	visoko/više	Bjelimići - Odžaci	Centralna	C2	43°31'1.14"N 18°13'38.66"E
8	B206	IV	Muški	penzioner	-	Bjelimići - Odžaci	Centralna	C1	43°32'24.13"N 18°13'49.96"E
9	B223	II	Ženski	nezaposlen	srednje	Fojnica	Centralna	C33	43°57'49.79"N 17°53'47.90"E
10	B246	III	Muški	nezaposlen	srednje	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
11	B247	II	Ženski	penzioner	-	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
12	B248	III	Muški	zaposlen	srednje	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
13	B249	IV	Ženski	nezaposlen	osnovno	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
14	B250	IV	Ženski	nezaposlen	osnovno	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
15	B251	I	Muški	student	-	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
16	B252	IV	Ženski	nezaposlen	osnovno	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
17	B253	II	Muški	nezaposlen	srednje	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
18	B254	IV	Muški	penzioner	srednje	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
19	B255	IV	Muški	penzioner	srednje	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
20	B256	III	-	nezaposlen	srednje	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
21	B257	IV	Muški	penzioner	-	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
22	B258	II	Muški	zaposlen	srednje	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
23	B259	III	Muški	nezaposlen	srednje	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
24	B260	IV	Ženski	nezaposlen	osnovno	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
25	B261	III	Ženski	penzioner	osnovno	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
26	B262	IV	Ženski	nezaposlen	osnovno	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
27	B263	III	Muški	zaposlen	visoko/više	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
28	B264	III	Muški	nezaposlen	srednje	Jelaške - Olovo	Centralna	C35	44°16'50.13"N18°23'42.76"E
29	B440	II	Ženski	-	srednje	Konjic	Centralna	C9	43°47'57.58"N 17°52'31.66"E
30	B437	I	Muški	zaposlen	srednje	Konjic	Centralna	C8	43°29'52.69"N 18° 8'8.14"E
31	B208	-	-	student	srednje	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
32	B209	III	Muški	zaposlen	srednje	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
33	B435	II	Ženski	zaposlen	visoko/više	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
34	B436	II	Ženski	nezaposlen	visoko/više	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
35	B438	II	Ženski	nezaposlen	visoko/više	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
36	B444	-	Muški	-	-	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
37	B445	III	Muški	zaposlen	-	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
38	B446	III	Ženski	zaposlen	srednje	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
39	B447	III	Muški	zaposlen	srednje	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
40	B450	III	Muški	-	srednje	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
41	B452	III	-	-	-	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
42	B455	II	Muški	zaposlen	-	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
43	B456	III	Muški	zaposlen	osnovno	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
44	B457	III	Ženski	nezaposlen	osnovno	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
45	B459	-	-	-	-	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
46	B460	III	Muški	zaposlen	srednje	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
47	B462	II	Muški	zaposlen	srednje	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
48	B463	III	Muški	zaposlen	srednje	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
49	B464	-	Muški	zaposlen	-	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
50	B465	II	Muški	zaposlen	visoko/više	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
51	B466	II	Muški	zaposlen	visoko/više	Konjic	Centralna	C5	43°39'23.65"N 17°57'42.04"E
52	B449	II	-	zaposlen	srednje	Konjic	Centralna	C18	43°42'56.52"N17°48'55.70"E
53	B461	III	Muški	zaposlen	srednje	Konjic	Centralna	C17	43°40'45.90"N17°57'48.07"E
54	B458	-	Muški	zaposlen	-	Konjic	Centralna	C16	43°50'11.01"N17°50'28.20"E
55	B454	III	Muški	zaposlen	srednje	Konjic	Centralna	C15	43°49'12.77"N17°50'9.38"E
56	B453	III	Muški	zaposlen	srednje	Konjic	Centralna	C14	43°36'34.15"N18° 0'56.67"E
57	B451	III	Muški	zaposlen	osnovno	Konjic	Centralna	C13	43°45'30.66"N 17°57'7.09"E

58	B443	III	Ženski	nezaposlen	osnovno	Konjic	Centralna	C12	43°46'46.22"N 17°39'12.10"E
59	B442	II	Muški	zaposlen	srednje	Konjic	Centralna	C11	43°48'25.71"N 17°48'4.60"E
60	B441	III	Muški	nezaposlen	srednje	Konjic	Centralna	C10	43°47'59.18"N 17°48'58.63"E
61	B434	II	Muški	-	srednje	Konjic - Grabovci	Centralna	C7	43°42'52.68"N 17°54'44.43"E
62	B210	II	Muški	student	osnovno	Konjic - Orahovica	Centralna	C6	43°39'48.41"N 17°54'48.94"E
63	B439	III	Ženski	zaposlen	srednje	Konjic - Orahovica	Centralna	C6	43°39'48.41"N 17°54'48.94"E
64	B226	III	Muški	nezaposlen	srednje	Kreševo	Centralna	C19	43°51'9.48"N 18° 2'10.29"E
65	B227	IV	Muški	-	srednje	Kreševo	Centralna	C19	43°51'9.48"N 18° 2'10.29"E
66	B228	II	Ženski	nezaposlen	srednje	Kreševo	Centralna	C19	43°51'9.48"N 18° 2'10.29"E
67	B229	III	Ženski	nezaposlen	srednje	Kreševo	Centralna	C19	43°51'9.48"N 18° 2'10.29"E
68	B232	IV	Ženski	zaposlen	osnovno	Kreševo	Centralna	C19	43°51'9.48"N 18° 2'10.29"E
69	B233	III	Ženski	zaposlen	srednje	Kreševo	Centralna	C19	43°51'9.48"N 18° 2'10.29"E
70	B234	IV	Muški	zaposlen	srednje	Kreševo	Centralna	C19	43°51'9.48"N 18° 2'10.29"E
71	B235	IV	Ženski	zaposlen	srednje	Kreševo	Centralna	C19	43°51'9.48"N 18° 2'10.29"E
72	B236	IV	Ženski	zaposlen	srednje	Olovo	Centralna	C22	44° 7'15.36"N 18°34'58.22"E
73	B237	IV	Muški	penzioner	-	Olovo	Centralna	C22	44° 7'15.36"N 18°34'58.22"E
74	B238	IV	-	zaposlen	osnovno	Olovo	Centralna	C22	44° 7'15.36"N 18°34'58.22"E
75	B239	III	-	nezaposlen	-	Olovo	Centralna	C22	44° 7'15.36"N 18°34'58.22"E
76	B448	II	Muški	zaposlen	-	Prozor - Rama	Centralna	C34	43°49'14.76"N17°32'19.35"E
77	B231	IV	Ženski	nezaposlen	osnovno	Travnik	Centralna	C21	44°13'25.94"N 17°38'37.72"E
78	B230	III	Ženski	zaposlen	srednje	Travnik	Centralna	C20	44°13'25.94"N 17°38'37.72"E
79	B399	III	Muški	zaposlen	-	Vozuća	Centralna	C28	44°22'30.01"N18°21'51.06"E
80	B392	II	Ženski	zaposlen	visoko/više	Zavidovići	Centralna	C27	44°26'28.16"N 18° 8'36.93"E
81	B393	II	Ženski	zaposlen	visoko/više	Zavidovići	Centralna	C27	44°26'28.16"N 18° 8'36.93"E
82	B394	IV	Muški	zaposlen	srednje	Zavidovići	Centralna	C27	44°26'28.16"N 18° 8'36.93"E
83	B395	II	Muški	zaposlen	visoko/više	Zavidovići	Centralna	C27	44°26'28.16"N 18° 8'36.93"E
84	B396	III	Muški	zaposlen	-	Zavidovići	Centralna	C27	44°26'28.16"N 18° 8'36.93"E
85	B397	III	Muški	zaposlen	-	Zavidovići	Centralna	C27	44°26'28.16"N 18° 8'36.93"E
86	B400	II	Ženski	zaposlen	srednje	Zavidovići	Centralna	C27	44°26'28.16"N 18° 8'36.93"E
87	B402	III	Muški	zaposlen	srednje	Zavidovići	Centralna	C32	44°20'6.17"N 18°23'38.43"E
88	B398	III	Ženski	zaposlen	srednje	Zavidovići	Centralna	C29	44°26'9.09"N 18°14'35.39"E
89	B383	II	Ženski	nezaposlen	srednje	Zenica	Centralna	C24	44°11'38.62"N 17°55'33.13"E
90	B382	II	Muški	zaposlen	srednje	Zenica	Centralna	C23	44°19'27.39"N 17°50'44.53"E
91	B390	II	-	zaposlen	srednje	Zenica - Nemila Šerići	Centralna	C26	44°19'17.38"N17°54'18.47"E
92	B391	III	-	nezaposlen	osnovno	Zenica - Nemila Šerići	Centralna	C26	44°19'17.38"N17°54'18.47"E
93	B387	III	Muški	zaposlen	srednje	Zenica - Nemila Šerići	Centralna	C25	44°21'17.77"N 17°48'59.82"E
94	B388	II	Ženski	zaposlen	visoko/više	Zenica - Nemila Šerići	Centralna	C25	44°21'17.77"N 17°48'59.82"E
95	B389	IV	Muški	nezaposlen	srednje	Zenica - Nemila Šerići	Centralna	C25	44°21'17.77"N 17°48'59.82"E
96	B384	IV	Ženski	nezaposlen	osnovno	Zenica - Nemila Šerići	Centralna	C23	44°19'27.39"N 17°50'44.53"E
97	B385	III	Muški	nezaposlen	osnovno	Zenica - Nemila Šerići	Centralna	C23	44°19'27.39"N 17°50'44.53"E
98	B386	II	Muški	nezaposlen	osnovno	Zenica - Nemila Šerići	Centralna	C23	44°19'27.39"N 17°50'44.53"E
99	B401	III	Muški	zaposlen	srednje	Žepče	Centralna	C30	44°25'33.28"N 18° 2'11.63"E
100	B406	III	Ženski	nezaposlen	srednje	Žepče	Centralna	C30	44°25'33.28"N 18° 2'11.63"E
101	B408	III	Muški	zaposlen	-	Žepče - Željezno polje	Centralna	C31	44°23'34.40"N 17°56'22.93"E
102	B409	II	Muški	nezaposlen	visoko/više	Žepče - Željezno polje	Centralna	C31	44°23'34.40"N 17°56'22.93"E
103	B410	II	Muški	zaposlen	-	Žepče - Željezno polje	Centralna	C31	44°23'34.40"N 17°56'22.93"E
104	B403	III	Ženski	nezaposlen	srednje	Žepče- Željezno polje	Centralna	C31	44°23'34.40"N 17°56'22.93"E
105	B404	II	Ženski	nezaposlen	-	Žepče- Željezno polje	Centralna	C31	44°23'34.40"N 17°56'22.93"E
106	B405	II	Ženski	nezaposlen	-	Žepče- Željezno polje	Centralna	C31	44°23'34.40"N 17°56'22.93"E
107	B407	II	Ženski	nezaposlen	srednje	Žepče- Željezno polje	Centralna	C31	44°23'34.40"N 17°56'22.93"E
108	B412	III	-	zaposlen	-	Žepče- Željezno polje	Centralna	C31	44°23'34.40"N 17°56'22.93"E
109	B314	II	Muški	zaposlen	srednje	Brateljevići	Istočna	I16	44°13'20.10"N18°38'16.05"E
110	B316	-	Muški	zaposlen	-	Brateljevići	Istočna	I16	44°13'20.10"N18°38'16.05"E
111	B317	-	Muški	penzioner	-	Brateljevići	Istočna	I16	44°13'20.10"N18°38'16.05"E
112	B318	II	Muški	zaposlen	srednje	Brateljevići	Istočna	I16	44°13'20.10"N18°38'16.05"E
113	B313	IV	Muški	nezaposlen	osnovno	Goletići	Istočna	I15	44°16'24.67"N 18°37'39.29"E
114	B291	IV	Ženski	nezaposlen	srednje	Goradže	Istočna	I5	43°40'30.20"N19° 0'7.29"E
115	B294	II	Ženski	zaposlen	visoko/više	Goradže	Istočna	I4	43°39'53.34"N18°53'13.32"E
116	B278	IV	Ženski	nezaposlen	srednje	Goražde	Istočna	I2	43°39'50.24"N 18°58'29.80"E
117	B287	II	Muški	zaposlen	visoko/više	Goražde	Istočna	I2	43°39'50.24"N 18°58'29.80"E
118	B288	II	Ženski	zaposlen	visoko/više	Goražde	Istočna	I2	43°39'50.24"N 18°58'29.80"E
119	B289	III	Ženski	zaposlen	srednje	Goražde	Istočna	I2	43°39'50.24"N 18°58'29.80"E
120	B290	III	Ženski	zaposlen	srednje	Goražde	Istočna	I2	43°39'50.24"N 18°58'29.80"E

121	B292	III	Ženski	nezaposlen	srednje	Goražde	Istočna	I2	43°39'50.24"N 18°58'29.80"E
122	B293	III	Ženski	zaposlen	srednje	Goražde	Istočna	I2	43°39'50.24"N 18°58'29.80"E
123	B295	II	Ženski	zaposlen	visoko/više	Goražde	Istočna	I2	43°39'50.24"N 18°58'29.80"E
124	B296	II	Muški	zaposlen	srednje	Goražde	Istočna	I2	43°39'50.24"N 18°58'29.80"E
125	B319	III	Muški	nezaposlen	-	Kladanj	Istočna	I17	44°13'33.00"N18°45'18.28"E
126	B315	II	Muški	zaposlen	-	Kladanj	Istočna	I16	44°13'20.10"N18°38'16.05"E
127	B320	II	Ženski	zaposlen	srednje	Kladanj	Istočna	I11	44°13'33.00"N 18°45'18.28"E
128	B222	II	Ženski	nezaposlen	osnovno	Luka - Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
129	B225	II	Muški	nezaposlen	osnovno	Luka - Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
130	B240	III	Ženski	nezaposlen	srednje	Olovo - Gurdići	Istočna	I12	44° 6'52.02"N 18°41'55.77"E
131	B241	IV	-	penzioner	srednje	Olovo - Gurdići	Istočna	I12	44° 6'52.02"N 18°41'55.77"E
132	B242	IV	Muški	penzioner	srednje	Olovo - Gurdići	Istočna	I12	44° 6'52.02"N 18°41'55.77"E
133	B243	IV	Ženski	nezaposlen	-	Olovo - Gurdići	Istočna	I12	44° 6'52.02"N 18°41'55.77"E
134	B244	II	Ženski	nezaposlen	osnovno	Olovo - Gurdići	Istočna	I12	44° 6'52.02"N 18°41'55.77"E
135	B245	II	Muški	zaposlen	srednje	Olovo - Gurdići	Istočna	I12	44° 6'52.02"N 18°41'55.77"E
136	B211	IV	-	-	-	Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
137	B212	II	Muški	-	-	Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
138	B213	II	Muški	nezaposlen	srednje	Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
139	B214	II	Muški	zaposlen	visoko/više	Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
140	b215	II	Muški	nezaposlen	visoko/više	Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
141	B216	II	Ženski	student	visoko/više	Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
142	B217	II	Muški	nezaposlen	visoko/više	Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
143	B218	III	Ženski	nezaposlen	osnovno	Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
144	B220	II	Ženski	zaposlen	visoko/više	Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
145	B221	III	Muški	nezaposlen	osnovno	Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
146	B224	II	Ženski	nezaposlen	srednje	Srebrenica	Istočna	I1	44° 6'15.27"N 19°17'52.12"E
147	B321	III	Ženski	nezaposlen	srednje	Starić	Istočna	I17	44°13'33.00"N18°45'18.28"E
148	B322	-	Muški	nezaposlen	srednje	Starić	Istočna	I17	44°13'33.00"N18°45'18.28"E
149	B323	III	Ženski	zaposlen	srednje	Starić	Istočna	I17	44°13'33.00"N18°45'18.28"E
150	B324	I	Muški	zaposlen	srednje	Starić	Istočna	I17	44°13'33.00"N18°45'18.28"E
151	B325	III	Ženski	nezaposlen	-	Starić	Istočna	I17	44°13'33.00"N18°45'18.28"E
152	B326	I	Muški	student	srednje	Starić	Istočna	I17	44°13'33.00"N18°45'18.28"E
153	B327	III	Muški	zaposlen	srednje	Starić	Istočna	I17	44°13'33.00"N18°45'18.28"E
154	B311	III	Muški	zaposlen	srednje	Tuholj	Istočna	I14	44°16'0.08"N 18°38'7.28"E
155	B312	III	Ženski	-	srednje	Tuholj	Istočna	I14	44°16'0.08"N 18°38'7.28"E
156	B308	III	Muški	zaposlen	-	Tuholj	Istočna	I13	44°15'17.22"N 18°37'27.03"E
157	B309	IV	Muški	nezaposlen	srednje	Tuholj	Istočna	I13	44°15'17.22"N 18°37'27.03"E
158	B310	III	Muški	nezaposlen	-	Tuholj	Istočna	I13	44°15'17.22"N 18°37'27.03"E
159	B219	II	Ženski	zaposlen	visoko/više	Ustikolina	Istočna	I3	43°34'50.05"N 18°47'32.89"E
160	B277	II	Ženski	zaposlen	srednje	Ustikolina	Istočna	I3	43°34'50.05"N18°47'32.89"E
161	B279	III	Ženski	nezaposlen	-	Ustikolina	Istočna	I3	43°34'50.05"N18°47'32.89"E
162	B280	II	Ženski	zaposlen	visoko/više	Ustikolina	Istočna	I3	43°34'50.05"N18°47'32.89"E
163	B281	IV	Muški	zaposlen	srednje	Ustikolina	Istočna	I3	43°34'50.05"N18°47'32.89"E
164	B282	II	Muški	zaposlen	visoko/više	Ustikolina	Istočna	I3	43°34'50.05"N18°47'32.89"E
165	B283	III	Ženski	nezaposlen	srednje	Ustikolina	Istočna	I3	43°34'50.05"N18°47'32.89"E
166	B284	II	Ženski	zaposlen	visoko/više	Ustikolina	Istočna	I3	43°34'50.05"N18°47'32.89"E
167	B285	IV	Ženski	nezaposlen	osnovno	Ustikolina	Istočna	I3	43°34'50.05"N18°47'32.89"E
168	B286	III	Ženski	zaposlen	srednje	Ustikolina	Istočna	I3	43°34'50.05"N18°47'32.89"E
169	B346	-	Muški	nezaposlen	srednje	Višegrad	Istočna	I8	43°50'40.91"N19°15'12.79"E
170	B350	IV	Muški	nezaposlen	srednje	Višegrad	Istočna	I8	43°50'56.00"N19°16'41.34"E
171	B351	IV	Ženski	nezaposlen	osnovno	Višegrad	Istočna	I8	43°50'56.00"N19°16'41.34"E
172	B344	IV	Muški	nezaposlen	osnovno	Višegrad	Istočna	I7	43°51'21.38"N19°15'38.97"E
173	B345	IV	Ženski	nezaposlen	osnovno	Višegrad	Istočna	I7	43°51'21.38"N19°15'38.97"E
174	B347	III	Ženski	nezaposlen	srednje	Višegrad	Istočna	I7	43°51'21.38"N19°15'38.97"E
175	B348	III	Ženski	nezaposlen	srednje	Višegrad	Istočna	I7	43°51'21.38"N19°15'38.97"E
176	B349	III	Muški	nezaposlen	srednje	Višegrad	Istočna	I7	43°51'21.38"N19°15'38.97"E
177	B342	IV	Muški	nezaposlen	osnovno	Višegrad	Istočna	I6	43°43'25.74"N19°19'29.54"E
178	B343	IV	Ženski	nezaposlen	osnovno	Višegrad	Istočna	I6	43°43'25.74"N19°19'29.54"E
179	B411	III	Ženski	nezaposlen	srednje	Kladanj	Istočna	I10	44°13'16.04"N 18°41'27.39"E
180	B469	-	-	-	-	Bratač	Južna	J4	43°14'22.14"N 18°13'33.84"E
181	B330	IV	Ženski	nezaposlen	srednje	Buna	Južna	J1	43°14'53.72"N17°55'32.95"E
182	B333	III	Ženski	nezaposlen	srednje	Buna	Južna	J1	43°14'53.72"N17°55'32.95"E
183	B334	IV	Muški	zaposlen	visoko/više	Buna	Južna	J1	43°14'53.72"N17°55'32.95"E

184	B332	IV	Muški	nezaposlen	srednje	Ljuti Dolac	Južna	J2	43°18'13.76"N17°41'59.40"E
185	B468	-	-	-	-	Ortiješ	Južna	J3	43°15'52.00"N 17°50'23.44"E
186	B470	-	-	-	-	Ortiješ	Južna	J3	43°15'52.00"N 17°50'23.44"E
187	B265	II	Ženski	zaposlen	visoko/više	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
188	B266	II	Muški	zaposlen	visoko/više	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
189	B267	III	Ženski	nezaposlen	srednje	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
190	B268	IV	Ženski	nezaposlen	srednje	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
191	B269	II	Ženski	nezaposlen	srednje	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
192	B270	II	Ženski	zaposlen	visoko/više	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
193	B271	II	Muški	zaposlen	srednje	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
194	B272	II	Ženski	zaposlen	visoko/više	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
195	B273	III	Ženski	zaposlen	visoko/više	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
196	B274	II	Ženski	zaposlen	visoko/više	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
197	B275	II	Muški	zaposlen	srednje	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
198	B276	II	Muški	zaposlen	visoko/više	Odžak	Sjeverna	S2	45° 0'3.55"N18°19'34.95"E
199	B467	-	-	-	-	Banja Luka	Sjeverna	S1	44°47'46.85"N 17°12'18.96"E
200	B305	II	Muški	zaposlen	visoko/više	Bihać	Zapadna	Z18	44°48'17.00"N15°52'12.39"E
201	B306	II	Muški	zaposlen	visoko/više	Bihać	Zapadna	Z18	44°48'17.00"N15°52'12.39"E
202	B329	IV	Muški	zaposlen	-	Blidinje	Zapadna	Z23	43°32'18.28"N 17°25'56.16"E
203	B331	III	Muški	zaposlen	srednje	Blidinje	Zapadna	Z23	43°32'18.28"N 17°25'56.16"E
204	B339	II	Ženski	nezaposlen	srednje	Blidinje	Zapadna	Z22	43°36'6.30"N 17°28'50.11"E
205	B299	II	Ženski	zaposlen	srednje	Bosanski Petrovac	Zapadna	Z17	44°36'16.19"N16°37'51.03"E
206	B300	II	Muški	zaposlen	visoko/više	Bosanski Petrovac	Zapadna	Z17	44°36'16.19"N16°37'51.03"E
207	B301	II	Muški	zaposlen	visoko/više	Bosanski Petrovac	Zapadna	Z17	44°36'16.19"N16°37'51.03"E
208	B302	II	Ženski	zaposlen	srednje	Bosanski Petrovac	Zapadna	Z17	44°36'16.19"N16°37'51.03"E
209	B303	IV	Ženski	zaposlen	visoko/više	Bosanski Petrovac	Zapadna	Z17	44°36'16.19"N16°37'51.03"E
210	B304	II	Ženski	zaposlen	visoko/više	Bosanski Petrovac	Zapadna	Z17	44°36'16.19"N16°37'51.03"E
211	B307	II	Muški	zaposlen	visoko/više	Bosanski Petrovac	Zapadna	Z17	44°36'16.19"N16°37'51.03"E
212	B298	II	Ženski	zaposlen	visoko/više	Bosanski Petrovac	Zapadna	Z16	44°33'47.51"N16°21'20.36"E
213	B379	II	Muški	zaposlen	srednje	Bučevci	Zapadna	Z14	45° 5'41.07"N16° 4'35.66"E
214	B372	III	Muški	zaposlen	srednje	Bužim	Zapadna	Z1	45° 2'47.64"N16° 3'5.55"E
215	B374	III	Muški	zaposlen	srednje	Bužim	Zapadna	Z1	45° 2'47.64"N16° 3'5.55"E
216	B375	III	Muški	zaposlen	srednje	Bužim	Zapadna	Z1	45° 2'47.64"N16° 3'5.55"E
217	B378	III	Muški	zaposlen	srednje	Bužim	Zapadna	Z1	45° 2'47.64"N16° 3'5.55"E
218	B377	III	Muški	zaposlen	srednje	Bužim	Zapadna	Z1	44°47'46.85"N 17°12'18.96"E
219	B380	III	Ženski	nezaposlen	osnovno	Bužim - Zborište	Zapadna	Z12	45° 8'37.52"N16° 1'6.19"E
220	B424	III	Muški	zaposlen	srednje	Cazin	Zapadna	Z9	44°39'24.72" N 16° 4'2.76"E
221	B421	III	Muški	zaposlen	srednje	Cazin	Zapadna	Z8	45° 1'35.94" N15°48'48.88"E
222	B420	II	Muški	zaposlen	srednje	Cazin	Zapadna	Z7	45° 0'24.18" N15°57'23.64"E
223	B417	III	Ženski	zaposlen	osnovno	Cazin	Zapadna	Z6	44°56'34.31"N 16° 1'14.13"E
224	B414	II	Muški	zaposlen	visoko/više	Cazin	Zapadna	Z5	44°57'58.72" N15°54'25.39"E
225	B413	II	Muški	zaposlen	visoko/više	Cazin	Zapadna	Z4	44°58'6.54" N15°56'33.25"E
226	B415	III	Muški	zaposlen	visoko/više	Cazin	Zapadna	Z4	44°58'6.54" N15°56'33.25"E
227	B416	III	Muški	zaposlen	srednje	Cazin	Zapadna	Z4	44°58'6.54" N 15°56'33.25"E
228	B418	II	Muški	zaposlen	osnovno	Cazin	Zapadna	Z4	44°58'6.54" N 15°56'33.25"E
229	B419	II	Ženski	student	visoko/više	Cazin	Zapadna	Z4	44°58'6.54" N 15°56'33.25"E
230	B423	III	Ženski	zaposlen	srednje	Cazin	Zapadna	Z4	44°58'6.54" N 15°56'33.25"E
231	B422	III	Muški	zaposlen	srednje	Cazin	Zapadna	Z11	44°59'25.22"N 15°58'47.47"E
232	B381	II	Ženski	nezaposlen	visoko/više	Cazin - Donja Koprivna	Zapadna	Z11	44°59'25.22"N15°58'47.47"E
233	B352	II	Muški	-	srednje	Livno - Lusnić	Zapadna	Z20	43°54'7.05" N16°48'55.44"E
234	B353	III	Muški	zaposlen	visoko/više	Livno - Lusnić	Zapadna	Z20	43°54'7.05" N16°48'55.44"E
235	B354	IV	Muški	nezaposlen	srednje	Livno - Lusnić	Zapadna	Z20	43°54'7.05" N16°48'55.44"E
236	B355	III	Muški	zaposlen	visoko/više	Livno - Lusnić	Zapadna	Z20	43°54'7.05" N16°48'55.44"E
237	B356	IV	Muški	zaposlen	osnovno	Livno - Lusnić	Zapadna	Z20	43°54'7.05" N16°48'55.44"E
238	B357	IV	Muški	zaposlen	srednje	Livno - Lusnić	Zapadna	Z20	43°54'7.05" N16°48'55.44"E
239	B358	IV	Muški	nezaposlen	osnovno	Livno - Lusnić	Zapadna	Z20	43°54'7.05" N16°48'55.44"E
240	B359	III	Ženski	nezaposlen	srednje	Livno - Lusnić	Zapadna	Z20	43°54'7.05" N16°48'55.44"E
241	B360	IV	Muški	nezaposlen	-	Livno - Lusnić	Zapadna	Z20	43°54'7.05" N16°48'55.44"E
242	B361	III	Muški	-	-	Livno - Lusnić	Zapadna	Z20	43°54'7.05" N16°48'55.44"E
243	B429	IV	Muški	nezaposlen	srednje	Martin Brod	Zapadna	Z19	44°29'19.34" N16° 8'30.16"E

244	B430	IV	Ženski	zaposlen	srednje	Martin brod	Zapadna	Z19	44°29'19.34"N 16° 8'30.16"E
245	B431	IV	Muški	zaposlen	srednje	Orašac	Zapadna	Z13	44°29'38.68" 16°11'47.78"
246	B425	III	Muški	zaposlen	srednje	Orašac	Zapadna	Z10	44°37'35.63"N 16° 4'16.22"E
247	B426	II	Muški	nezaposlen	srednje	Orašac	Zapadna	Z10	44°37'35.63"N 16° 4'16.22"E
248	B427	II	Ženski	nezaposlen	srednje	Orašac	Zapadna	Z10	44°37'35.63"N 16° 4'16.22"E
249	B428	II	Muški	zaposlen	srednje	Orašac	Zapadna	Z10	44°37'35.63"N 16° 4'16.22"E
250	B432	III	Muški	zaposlen	srednje	Orašac	Zapadna	Z10	44°37'35.63"N 16° 4'16.22"E
251	B433	III	Muški	zaposlen	srednje	Orašac	Zapadna	Z10	44°37'35.63"N 16° 4'16.22"E
252	B376	III	Muški	zaposlen	srednje	Radoč	Zapadna	Z3	45° 4'4.46" N16° 6'9.79"E
253	B373	III	Muški	zaposlen	srednje	Radoč	Zapadna	Z2	45° 4'41.93" N16° 4'35.55"E
254	B328	III	Ženski	nezaposlen	srednje	Rakitno	Zapadna	Z23	43°32'18.28"N 17°25'56.16"E
255	B335	I	Muški	zaposlen	visoko/više	Rakitno	Zapadna	Z23	43°32'18.28"N 17°25'56.16"E
256	B336	III	Muški	zaposlen	srednje	Rakitno	Zapadna	Z23	43°32'18.28"N 17°25'56.16"E
257	B337	IV	Muški	nezaposlen	osnovno	Rakitno	Zapadna	Z23	43°32'18.28"N 17°25'56.16"E
258	B338	III	Ženski	nezaposlen	srednje	Rakitno	Zapadna	Z23	43°32'18.28"N17°25'56.16"E
259	B340	IV	Ženski	zaposlen	-	Rakitno	Zapadna	Z23	43°32'18.28"N17°25'56.16"E
260	B341	III	Muški	zaposlen	srednje	Rakitno	Zapadna	Z23	43°32'18.28"N17°25'56.16"E
261	B297	II	Muški	zaposlen	visoko/više	Sanski Most	Zapadna	Z15	44°45'22.36"N16°39'54.44"E
262	B362	III	Muški	zaposlen	visoko/više	Vržerale	Zapadna	Z21	43°43'22.73" N16°58'5.98"E
263	B363	III	Muški	zaposlen	visoko/više	Vržerale	Zapadna	Z21	43°43'22.73" N16°58'5.98"E
264	B364	III	Ženski	nezaposlen	srednje	Vržerale	Zapadna	Z21	43°43'22.73" N16°58'5.98"E
265	B365	IV	Ženski	nezaposlen	osnovno	Vržerale	Zapadna	Z21	43°43'22.73" N16°58'5.98"E
266	B366	III	Ženski	zaposlen	visoko/više	Vržerale	Zapadna	Z21	43°43'22.73" N16°58'5.98"E
267	B367	I	Ženski	zaposlen	visoko/više	Vržerale	Zapadna	Z21	43°43'22.73" N16°58'5.98"E
268	B368	II	Muški	zaposlen	visoko/više	Vržerale	Zapadna	Z21	43°43'22.73" N16°58'5.98"E
269	B369	IV	Ženski	nezaposlen	bez obrazovanja	Vržerale	Zapadna	Z21	43°43'22.73" N16°58'5.98"E
270	B370	III	Ženski	nezaposlen	osnovno	Vržerale	Zapadna	Z21	43°43'22.73" N16°58'5.98"E
271	B371	II	Ženski	nezaposlen	srednje	Vržerale	Zapadna	Z21	43°43'22.73 "N16°58'5.98"E

Dobne skupine

- ispitanik nije naveo podatak I: do 25 godina; II: 25-44 godina; III: 45-60 godina; IV: 61-75 godina

ANNEX 3

Appendix 3. List of group research locations (dialogue/workshop method) in Bosnia and Herzegovina with mapped benefits from nature and identified pressures

Br.	Code	Area	Locations	Coordinates	NCP1	NCP2	NCP3	NCP4	NCP5	NCP6	NCP7	NCP8	NCP9	NCP10	NCP11	NCP12	NCP13	NCP14	NCP15	NCP16	NCP17	NCP18	D_1	D_2	D_3	D_4	D_5	I_1	I_2	I_3	I_4	I_5
1	CD4	CENTRAL BIH	Bjelimići	43°31'1.14"N 18°13'38.66"E											x																	
2	CD5	CENTRAL BIH	Bjelimići	43°32'8.62" N 18°13'37.30"E																										x		x
3	CD5	CENTRAL BIH	Bjelimići	43°32'8.62"N 18°13'37.30"E													x													x		x
4	CD7	CENTRAL BIH	Bjelimići	43°32'29.03"N 18°13'53.13"E	x										x		x		x			x							x	x	x	x
5	CD8	CENTRAL BIH	Bjelimići	43°32'29.03"N 18°13'53.13"E		x									x							x										
6	CD8	CENTRAL BIH	Bjelimići	43°32'29.03"N 18°13'53.13"E																		x										
7	CD8	CENTRAL BIH	Bjelimići	43°32'29.03"N 18°13'53.13"E											x						x											
8	CD8	CENTRAL BIH	Bjelimići	43°32'29.03"N 18°13'53.13"E															x	x		x							x	x		x
9	CD8	CENTRAL BIH	Bjelimići	43°32'29.03"N 18°13'53.13"E	x										x					x												
10	CD8	CENTRAL BIH	Bjelimići	43°32'29.03"N 18°13'53.13"E	x										x					x												
11	CD8	CENTRAL BIH	Bjelimići	43°32'29.03"N 18°13'53.13"E																										x		x
12	CD9	CENTRAL BIH	Bjelimići	43°31'0.85"N 18°13'34.62"E																										x	x	
13	CD10	CENTRAL BIH	Bjelimići	43°37'8.81"N 18°10'33.39"E	x																									x	x	x	x
14	CD11	CENTRAL BIH	Bjelimići	43°31'6.14"N 18°13'33.22"E																				x				x			x	x
15	CD12	CENTRAL BIH	Bjelimići	43°29'48.18"N 18° 6'20.29"E	x										x	x		x				x	x					x	x	x		x
16	CD13	CENTRAL BIH	Bjelimići	43°29'52.69"N 18° 8'8.14"E	x										x			x	x													x
17	CD6	CENTRAL BIH	Trnovo - Sinanovići	43°36'55.63"N 18°15'36.30"E																		x										
18	CD1	CENTRAL BIH	Konjic - grad- drv.	43°39'21.56"N 17°57'12.37"E															x	x	x	x						x	x			x
19	CD1	CENTRAL BIH	Konjic - grad- drv.	43°39'21.56"N 17°57'12.37"E																x		x										
20	CD1	CENTRAL BIH	Konjic - grad- drv.	43°39'21.56"N 17°57'12.37"E																								x		x		x
21	CD1	CENTRAL BIH	Konjic - grad- drv.	43°39'21.56"N 17°57'12.37"E													x		x			x										
22	CD1	CENTRAL BIH	Konjic - grad- drv.	43°39'21.56"N 17°57'12.37"E															x	x	x											
23	CD1	CENTRAL BIH	Konjic - grad- drv.	43°39'21.56"N 17°57'12.37"E																								x		x		x
24	CD2	CENTRAL BIH	Konjic - Jasenik	43°50'11.01"N 17°50'28.20"E											x						x			x					x			
25	CD2	CENTRAL BIH	Konjic - Jasenik	43°50'11.01"N 17°50'28.20"E																										x		
26	CD2	CENTRAL BIH	Konjic - Jasenik	43°50'11.01"N 17°50'28.20"E																			x						x	x		
27	CD2	CENTRAL BIH	Konjic - Jasenik	43°50'11.01"N 17°50'28.20"E																			x						x			x
28	CD2	CENTRAL BIH	Konjic - Jasenik	43°50'11.01"N 17°50'28.20"E											x				x	x					x		x					
29	CD2	CENTRAL BIH	Konjic - Jasenik	43°50'11.01"N 17°50'28.20"E											x		x											x	x			
30	CD2	CENTRAL BIH	Konjic - Jasenik	43°50'11.01"N 17°50'28.20"E															x													
31	CD3	CENTRAL BIH	Konjic- Seonica	43°39'21.56" 17°57'12.37"E															x		x	x						x				x
32	CD3	CENTRAL BIH	Konjic- Seonica	43°39'21.56" 17°57'12.37"E	x																							x				x
33	CD3	CENTRAL BIH	Konjic- Seonica	43°39'21.56" 17°57'12.37"E													x					x				x						
34	JD1	SOUTHERN BIH	Trebinje	42°47'8.16"N 18°25'29.61"E											x																	
35	JD1	SOUTHERN BIH	Trebinje	42°47'8.16"N 18°25'29.61"E																	x											
36	JD1	SOUTHERN BIH	Trebinje	42°47'42.87"N 18°24'24.60"E											x				x	x	x	x						x				x
37	JD2	SOUTHERN BIH	Trebinje	43° 1'26.96"N 18° 9'50.81"E											x				x		x											
38	JD3	SOUTHERN BIH	Trebinje	42°59'57.67"N 18° 9'47.46"E											x				x	x	x											
39	JD4	SOUTHERN BIH	Trebinje	42°51'59.37"N 18° 7'59.26"E											x						x											
40	JD5	SOUTHERN BIH	Trebinje	42°42'30.99"N 18°18'16.75"E	x																											
41	JD6	SOUTHERN BIH	Trebinje	42°49'15.70"N 18°26'13.41"E															x		x											
42	JD6	SOUTHERN BIH	Trebinje	42°49'15.70"N 18°26'13.41"E																			x					x				
43	JD7	SOUTHERN BIH	Trebinje	42°42'50.49"N 18°20'53.87"E													x				x											
44	JD7	SOUTHERN BIH	Trebinje	42°42'50.49"N 18°20'53.87"E																				x			x		x			x
45	JD8	SOUTHERN BIH	Trebinje	42°42'7.60"N 18°21'12.41"E																									x			x
46	JD9	SOUTHERN BIH	Trebinje	42°36'20.15"N 18°30'38.77"E											x																	
47	JD10	SOUTHERN BIH	Trebinje	42°45'59.04"N 18°24'1.23"E		x									x						x			x	x							x
48	JD11	SOUTHERN BIH	Trebinje	42°45'54.27"N 18°25'30.21"E		x									x									x		x	x					
49	JD12	SOUTHERN BIH	Trebinje	42°47'11.13"N 18°23'53.13"E	x										x														x			x
50	JD13	SOUTHERN BIH	Trebinje	42°46'30.10"N 18°24'8.79"E											x											x		x	x		x	
51	JD14	SOUTHERN BIH	Trebinje	42°46'30.11"N 18°23'29.17"E																				x	x			x	x		x	x	x
52	JD15	SOUTHERN BIH	Trebinje	42°48'6.74"N 18°24'16.51"E											x						x	x	x	x					x			
53	JD16	SOUTHERN BIH	Trebinje	42°48'8.97"N 18°24'38.53"E											x						x	x	x	x	x		x	x	x	x		
54	JD17	SOUTHERN BIH	Trebinje	42°48'0.11"N 18°24'43.81"E											x						x	x	x	x								
55	JD18	SOUTHERN BIH	Trebinje	42°46'30.10" 18°24'8.79"E																										x		
56	JD19	SOUTHERN BIH	Trebinje	42°46'56.30"N 18°24'0.43"E																								x				x
57	JD20	SOUTHERN BIH	Trebinje	42°40'17.35"N 18°19'35.08"E											x						x		x	x								
58	JD21	SOUTHERN BIH	Trebinje	42°58'38.47"N 17°59'0.30"E																		x										
59	JD22	SOUTHERN BIH	Trebinje	42°57'54.54"N 18° 1'40.27"E											x																	
60	JD23	SOUTHERN BIH	Trebinje	43° 8'0.13"N 18° 9'27.56"E											x						x	x										
61	SD26	NORTHERN BIH	Srebrenik	44°41'11.07"N 18°29'27.22"E															x			x	x		x			x			x	x
62	SD26	NORTHERN BIH	Srebrenik	44°41'11.07"N 18°29'27.22"E		x									x		x		x	x	x	x	x	x		x		x		x		x
63	SD26	NORTHERN BIH	Srebrenik	44°41'11.07"N 18°29'27.22"E											x			x			x				x	x		x	x	x	x	
64	SD27	NORTHERN BIH	Ozren	44°39'35.61"N 18°12'48.97"E											x						x	x				x		x	x			x
65	SD28	NORTHERN BIH	Ozren	44°33'1.02"N 18°21'25.63"E												x		x	x	x		x						x				
66	SD1	NORTHERN BIH	Brčko	44°50'2.82"N 18°53'15.47"E											x				x		x											
67	SD2	NORTHERN BIH	Brčko	44°52'32.46"N 18°47'35.88"E																								x				
68	SD3	NORTHERN BIH	Brčko	44°44'8.98"N 18°40'33.54"E		x									x		x		x			x			x			x	x	x		
69	SD4	NORTHERN BIH	Brčko	44°49'40.86"N 18°46'1.05"E											x					x				x	x	x	x	x	x			
70	SD25	NORTHERN BIH	Brčko	44°53'8.89"N 18°47'39.47"E																x		x			x							
71	SD5	NORTHERN BIH	Brčko	44°51'40.62"N 18°46'45.95"E											x					x												
72	SD6	NORTHERN BIH	Brčko	44°49'42.18"N 18°48'3.37"E											x						x			x	x			x		x	x	
73	SD6	NORTHERN BIH	Brčko	44°49'42.18"N 18°48'3.37"E											x										x							
74	SD7	NORTHERN BIH	Brčko	44°44'39.53"N 18°37'43.88"E	x										x					x		x		x			x		x	x	x	
75	SD8	NORTHERN BIH	Brčko	44°46'13.65"N 18°38'22.68"E																							x		x			x
76	SD9	NORTHERN BIH	Brčko	44°47'31.91"N 18°33'57.29"E																		x										
77	SD10	NORTHERN BIH	Brčko	44°51'16.67"N 18°50'29.33"E																	x	x	x									
78	SD11	NORTHERN BIH	Brčko	44°50'54.48"N 18°57'11.05"E																	x	x	x									
79	SD12	NORTHERN BIH	Brčko	44°54'6.51"N 18°46'1.41"E																	x		x									
80	SD13	NORTHERN BIH	Brčko	44°51'53.95"N 18°48'59.10"E																	x	x	x									
81	SD14	NORTHERN BIH	Brčko	44°51'9.62"N 18°51'44.67"E											x									x					x	x		
82	SD15	NORTHERN BIH	Brčko	44°47'6.76"N 18°33'6.02"E																	x											
83	SD16	NORTHERN BIH	Brčko	44°50'46.03"N 18°39'41.37"E																					x							

84	SD17	NORTHERN BIH	Brčko	44°50'28.30"N	18°53'52.61"E
85	SD18	NORTHERN BIH	Brčko	44°54'33.21"N	18°44'18.36"E
86	SD19	NORTHERN BIH	Brčko	44°51'9.08"N	18°52'18.00"E
87	SD20	NORTHERN BIH	Brčko	44°45'18.88"N	18°37'13.51"E
88	SD21	NORTHERN BIH	Brčko	44°45'51.33"N	18°39'17.89"E
89	SD22	NORTHERN BIH	Brčko	44°45'51.33"N	18°39'17.89"E
90	SD23	NORTHERN BIH	Brčko	44°49'44.70"N	18°47'48.86"E
91	SD24	NORTHERN BIH	Brčko	44°50'26.32"N	18°56'12.36"E
92	ZD1	WESTERN BIH	Livno	43°39'21.86"N	17° 8'51.01"E
93	ZD2	WESTERN BIH	Livno	43°39'44.41"N	17° 2'56.58"E
94	ZD3	WESTERN BIH	Livno	44°10'48.97"N	16°21'56.00"E
95	ZD4	WESTERN BIH	Livno	43°57'39.54"N	17°15'15.07"E
96	ZD5	WESTERN BIH	Livno	44° 0'43.33"N	17°16'37.63"E
97	ZD6	WESTERN BIH	Livno	44°13'21.46"N	16°19'47.90"E
98	ZD7	WESTERN BIH	Livno	44° 9'19.81"N	16°21'53.42"E
99	ZD8	WESTERN BIH	Livno	43°41'2.67"N	17° 6'5.53"E
100	ZD9	WESTERN BIH	Livno	43°41'19.43"N	17° 7'41.97"E
101	ZD10	WESTERN BIH	Livno	43°46'32.27"N	16°47'18.40"E
102	ZD11	WESTERN BIH	Livno	43°40'31.34"N	17°14'50.55"E
103	ZD12	WESTERN BIH	Livno	43°43'24.90"N	17°21'37.63"E
104	ZD13	WESTERN BIH	Livno	43°43'34.59"N	17°11'50.76"E
105	ZD14	WESTERN BIH	Livno	43°39'25.95"N	17°10'1.25"E
106	ZD15	WESTERN BIH	Livno	43°36'32.84"N	17°28'57.50"E
107	ZD16	WESTERN BIH	Livno	43°36'40.76"N	17°21'56.97"E
108	ZD17	WESTERN BIH	Livno	43°37'49.73"N	17° 0'39.76"E
109	ZD18	WESTERN BIH	Livno	43°53'38.13"N	17° 3'20.62"E
110	ZD19	WESTERN BIH	Livno	43°46'45.99"N	16°47'49.47"E
111	ZD20	WESTERN BIH	Livno	43°54'31.17"N	16°43'27.24"E
112	ZD21	WESTERN BIH	Livno	43°46'53.57"N	17° 0'37.13"E
113	ZD22	WESTERN BIH	Livno	43°47'37.55"N	16°50'18.58"E
114	ZD23	WESTERN BIH	Livno	43°55'24.56"N	16°43'2.33"E
115	ZD24	WESTERN BIH	Livno	43°39'7.52"N	17° 6'23.90"E
116	ZD25	WESTERN BIH	Livno	43°38'2.16"N	17° 3'46.84"E
117	ZD26	WESTERN BIH	Livno	43°39'31.16"N	16°58'12.21"E
118	ZD27	WESTERN BIH	Livno	43°44'1.47"N	17° 1'24.29"E
119	ZD28	WESTERN BIH	Livno	43°47'13.16"N	17° 0'17.44"E
120	ZD29	WESTERN BIH	Livno	43°51'21.57"N	17° 4'2.72"E
121	ZD30	WESTERN BIH	Livno	43°49'55.10"N	17° 0'30.28"E
122	ZD31	WESTERN BIH	Livno	44° 9'56.69"N	16°36'5.44"E
123	ZD32	WESTERN BIH	Livno	44° 2'44.86"N	17°12'19.67"E
124	ZD33	WESTERN BIH	Livno	44° 4'25.86"N	16°34'36.52"E
125	ZD34	WESTERN BIH	Livno	43°48'15.74"N	16°58'58.29"E
126	ZD18	WESTERN BIH	Livno	43°53'38.13"N	17° 3'20.62"E
127	ZD35	WESTERN BIH	Livno	43°39'34.35"N	17°15'30.16"E
128	ZD35	WESTERN BIH	Livno	43°39'34.35"N	17°15'30.16"E
129	ZD35	WESTERN BIH	Livno	43°39'34.35"N	17°15'30.16"E
130	ZD35	WESTERN BIH	Livno	43°39'34.35"N	17°15'30.16"E
131	ZD36	WESTERN BIH	Livno	43°42'56.70"N	17° 6'34.67"E
132	ZD37	WESTERN BIH	Livno	43°41'1.23"N	17°18'30.47"E
133	ZD38	WESTERN BIH	Livno	43°51'15.51"N	16°50'46.25"E
134	ZD39	WESTERN BIH	Livno	43°56'54.43"N	17°19'55.27"E
135	ZD40	WESTERN BIH	Livno	44°17'46.54"N	16°17'46.52"E
136	ZD41	WESTERN BIH	Livno	43°52'22.22"N	16°41'55.76"
137	ZD42	WESTERN BIH	Livno	43°36'13.81"N	17°12'38.78"E
138	ZD43	WESTERN BIH	Livno	43°37'16.33"N	17°29'45.31"E
139	ZD44	WESTERN BIH	Drvar	44°12'54.15"N	16°39'58.84"E
140	ZD45	WESTERN BIH	Drvar	44°24'30.57"N	16°21'24.19"E
141	ZD46	WESTERN BIH	Drvar	44°22'50.27"N	16°23'14.54"E
142	ZD47	WESTERN BIH	Drvar	44°23'45.02"N	16°19'28.64"E
143	ZD48	WESTERN BIH	Drvar	44°23'29.36"N	16°22'28.09"E
144	ZD49	WESTERN BIH	Drvar	44°20'8.36"N	16°25'21.03"E
145	ZD50	WESTERN BIH	Drvar	44°32'4.53"N	16°25'7.97"E
146	ZD51	WESTERN BIH	Drvar	44°22'33.38"N	16°22'7.61"E
147	ZD52	WESTERN BIH	Drvar	44°18'4.75"N	16°31'0.99"E
148	ZD53	WESTERN BIH	Drvar	44°18'15.84"N	16°31'3.46"E
149	ZD54	WESTERN BIH	Drvar	44°24'52.96"N	16°18'28.93"E
150	ZD55	WESTERN BIH	Drvar	44°17'56.04"N	16°36'27.36"E
151	ZD56	WESTERN BIH	Drvar	44°25'43.92"N	16°20'4.46"E
152	ZD57	WESTERN BIH	Drvar	44°19'27.29"N	16°32'8.56"E
153	ZD58	WESTERN BIH	Drvar	44°22'12.28"N	16°23'12.74"E
154	ZD59	WESTERN BIH	Drvar	44°25'13.57"N	16°24'19.68"E
155	ZD60	WESTERN BIH	Drvar	44°21'39.13"N	16°22'2.81"E
156	ZD61	WESTERN BIH	Drvar	44°12'37.94"N	16°34'56.19"E
157	ZD62	WESTERN BIH	Drvar	44°24'15.02"N	16°18'53.01"E
158	ZD63	WESTERN BIH	Drvar	44°24'12.11"N	16°29'29.53"E
159	ZD64	WESTERN BIH	Drvar	44°27'22.5"N	16°26'59.0"E

In partnership with:

Supported by: