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Прегледни рад

Citizen Science in Croatia and the Contribution of the National and University Library in Zagreb

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Abstract

Citizen science has been gaining ground in Croatia over the past decade, moving from first initiatives in environmental protection towards diverse applications in public health, cultural heritage, and the GLAM sector.

Particularly noteworthy are the contributions of libraries, both through the Zagreb Library Association's Working Group for Citizen Science in Libraries (GZUK) and the National and University Library in Zagreb (NSK). GZUK has fostered community participation through workshops, lectures, and collaborative projects that highlight libraries as bridges between science and society. The NSK, meanwhile, has emerged as a national leader, engaging in international projects such as CeOS_SE, and implementing innovative citizen science activities. These initiatives demonstrate how libraries can integrate education, digital tools, and citizen participation to advance both scientific knowledge and public engagement. By combining theoretical development, international collaboration, and practical training programs for librarians and researchers, the NSK plays a leading role in positioning libraries as hubs for citizen science in Croatia.

Keywords: citizen science, libraries, open science, National and University Library in Zagreb, Working Group for Citizen Science in Libraries

Introduction: Citizen Science in Croatia

Citizen science is one of the pillars of open science and, as a concept, it does not have a firmly established definition. Its definition depends on the discipline and the geographical area, which is why definitions in Europe and the United States differ¹, as well as among different authors and their respective disciplines in Croatia. The *Citizen Science Handbook* of the Institute for Youth Development and Innovation (hereinafter IRIM) defines the concept as scientific research carried out by members of the wider public, usually non-professional volunteers.² Frančula states that citizen science involves the collaboration of citizens and professional scientists in the

¹ Dolores Mumelaš, „Građanska znanost i knjižnice kao njezini provoditelji”, *Vjesnik bibliotekara Hrvatske* 66, 1 (2023): 105–138, <https://doi.org/10.30754/vbh.66.1.1052>.

² Nicola Schoenenberger, Paolo Zenzerović i Ana Tolić, *Priručnik za građansku znanost* (Zagreb: Institut za razvoj i inovativnost mladih, 2020), preuzeto 22. 8. 2025, <https://izradi.croatianmakers.hr/wp-content/uploads/2020/09/Prirucnik-za-gradjansku-znanost-cijela-knjiga-i-korice.pdf>.

collection and analysis of data, emphasizing its wide applicability across all fields of science.³ The most recent definition of citizen science in Croatia is provided by Ivanjko, Zlodi, and Horvat in their book *Citizen Science*. They describe citizen science as a practice of public participation aimed at generating new knowledge through the involvement of citizens in different stages of the research process.⁴ Due to the rapid spread of citizen science across the world, over the past decade it has increasingly become a topic of writing among Croatian authors as well, though not without its challenges.⁵ The very translation of these terms into Croatian has introduced additional confusion due to the different ways of rendering the concept. As a result, terms such as "crowdwork," "crowdsourcing," "mass collaboration," "participatory science," and "community science" have been used.

A major step in promoting the concept of citizen science in Croatia is the appointment of the European Citizen Science Ambassadors. At the end of 2023, the European Citizen Science Association (ECSA) established a network of 28 citizen science ambassadors within the framework of the European Citizen Science (ECS) project, with the aim of raising awareness of citizen science and strengthening its role across Europe. The ECS Ambassador for Croatia is Associate Professor Tea Vukušić Rukavina from the School of Medicine, University of Zagreb. Her role is to promote citizen science in Croatia as well as to connect all interested stakeholders.⁶

Citizen science first made its way into Croatia through associations, most often in the field of environmental protection, and several notable projects will be mentioned here. Among the first citizen science projects in Croatia were those of the non-profit organization IRIM through the *Croatian Makers* movement. IRIM has launched several highly successful citizen science projects, among which the following stand out: *The STEM Revolution Continues: Libraries, Digital Citizen*, and *Digital Libraries for Local Development – DL4LD*.⁷ Through the initiative *Citizen Science: Measuring and Observing the Sea*, IRIM equipped and trained nearly 200 institutions to measure sea temperature along the Adriatic coast and to document the state of the marine environment.⁸

The Blue World Institute is a non-profit and independent organization dedicated to the research and protection of the marine environment and organisms, as well as educating the public about important species, the marine ecosystem, and their conservation.⁹ As a partner in the LIFE DELFI project, which aims to reduce the negative impacts of dolphin–fisheries interactions, the Institute developed the application Partnerstvo za more (later renamed Marine Ranger). The app enables interested citizens to report sightings of dolphins and other marine mammals, as well as unusual events that threaten the marine environment. In this way, valuable data are collected to improve the management and protection of the marine ecosystem, while simultaneously encouraging the wider public to actively participate and raise awareness of the importance of marine conservation.

³ Nedjeljko Frančula, „Sudjelovanje javnosti u znanstvenim istraživanjima“, *Geodetski list* 70 (93), 1 (2016): 95–96, preuzeto 22. 8. 2025, <https://hrcak.srce.hr/285700>.

⁴ Tomislav Ivanjko, Goran Zlodi i Zoran Horvat, *Građanskaznanost* (Zagreb: FF-press, 2024), <https://doi.org/10.17234/9789533791333>.

⁵ Nedjeljko Frančula, „Znanost o sudjelovanju građana u znanstvenim istraživanjima“, *Geodetski list* 75 (98), 2 (2021): 221–222, preuzeto 22. 8. 2025, <https://hrcak.srce.hr/285242>.

⁶ Medicinski fakultet Sveučilišta u Zagrebu, „Profesorica Tea Vukušić Rukavina nova je ambasadorica platforme European Citizen Science“, (2023), preuzeto 25. 8. 2025, <https://mef.unizg.hr/profesorica-tea-vukusic-rukavina-nova-je-ambasadorica-paltforme-european-citizen-science-2/>.

⁷ Institut za razvoj i inovativnost mladih, „Digitalna pismenost“, *Croatian Makers*, preuzeto 23. 8. 2025, <https://croatianmakers.hr/hr/digitalna-pismenost/>.

⁸ Institut za razvoj i inovativnost mladih, „Građanska znanost: mjerenja i promatranja mora“, preuzeto 23. 8. 2025, <https://seas.croatianmakers.hr/>.

⁹ Institut Plavi svijet, „O nama“, preuzeto 23. 8. 2025, <https://www.plavi-svijet.org/o-nama/>.

The BIOM Association is dedicated to the protection and study of wild birds and other habitats, with one of its main goals being to foster a relationship between people and nature. In its work, it relies heavily on volunteer engagement. For several years, it has been implementing volunteer bird-counting projects, which allow for the collection of larger amounts of data in a shorter period of time with broader geographical coverage.¹⁰ They also launched the portal *Fauna.hr* for entering and reviewing observations of plant and animal life in Croatia. Participation is possible through a simple registration on the portal, and so far, remarkable results have been recorded.¹¹

As participants in the Aedes Invasive Mosquito COST Action project, which aims to establish effective risk management of the introduction and spread of exotic mosquito-borne viruses, the Andrija Štampar Teaching Institute of Public Health applied citizen science methods to monitor, research, and control invasive mosquito species in Croatia. Citizens were educated through informational leaflets and posters about the biology and control of tiger mosquitoes, as well as through educational activities in primary and secondary schools within the project *Pour out the Water so They Don't Bite Us*, which introduced students to these mosquitoes and ways in which they can help reduce the numbers and spread of the invasive tiger mosquito.¹²

In Croatia, citizen science is developing through diverse initiatives and organizations, ranging from environmental protection to public health, demonstrating both definitional challenges and a growing potential for engaging citizens in the co-creation of scientific knowledge.

Citizen Science in Croatia's GLAM Sector

Since the 2020s, citizen science has gradually begun to enter the Croatian GLAM sector. One of the better-known citizen science projects in Croatian cultural institutions is DigiSport, carried out in 2022 and 2023 by the Faculty of Humanities and Social Sciences, University of Zagreb, in cooperation with the Croatian Sports Museum. The project applies citizen science to describe and enrich the digitized segment of the Croatian Sports Museum's Photo Collection from the period 1970–1994. Active and retired sports journalists were invited to participate in gathering detailed metadata through a specially developed digital tool, thereby enabling open access to the collection and improving the preservation and research of cultural heritage.¹³

As part of the Written Heritage project, many historical Glagolitic manuscripts have been digitized, cataloged, and presented to the public through the portal of the Centre for Glagolitic Studies at the University of Zagreb – GlagoLab, which is intended for collaborative research and the promotion of Croatian Glagolitic script. The second part of the project, Civil Science in the Field of Glagolitics: From Crowdsourcing to Knowledge, aimed to involve citizens in the process of researching and interpreting Glagolitic texts from Zadar dating back to the 17th

¹⁰ Aleksandra Pikić, „Građanska znanost (Citizen Science): kako se narodne knjižnice mogu uključiti?“, u *Mreža narodnih knjižnica – suradnja u razvoju digitalnih usluga i predstavljanju javnosti: zbornik radova*, ur. Dunja Marija Gabrijel, Frida Bišćan i Amelia Kovačević (Zagreb: Nacionalna i sveučilišna knjižnica, 2022), 477–491.

¹¹ Udruga BIOM, „Svaka ptica se broji – i broji ih se više nego ikad!“, (2025), preuzeto 25. 8. 2025, <https://www.biom.hr/2025/08/05/svaka-ptica-se-broji-i-broji-ih-se-vise-nego-ikad/>.

¹² Ivana Vručina, Enrih Merdić i Nataša Bušić, „Građanska znanost (Citizen science) – aktivnost zajednice u svrhu praćenja i kontrole invazivnih vrsta komaraca u Hrvatskoj“, u *Znanstveno-stručno-edukativni seminar s međunarodnim sudjelovanjem DDD I ZUPP 2024 – uključenost zajednice – zbornik radova: novine u u djelatnosti dezinfekcije, dezinsekcije, deratizacije i zaštite uskladištenih poljoprivrednih proizvoda*, ur. Javorka Korunić (Zagreb: Korunić, 2024), 35–41.

¹³ Goran Zlodi et al., „Mogućnosti primjene građanske znanosti u društvenim i humanističkim istraživanjima na primjeru istraživanja i opisa segmenta Zbirke fotografija Hrvatskog športskog muzeja“, u *Dvanaesti festival hrvatskih digitalizacijskih projekata: programska knjižica*, ur. Renata Petrušić, Iva Adžaga Ašperger i Matilda Justinić (Zagreb: Nacionalna i sveučilišna knjižnica, 2023), 48–49, preuzeto 25. 8. 2025, https://dfest.nsk.hr/wp-content/uploads/2023/04/D-fest2023_programska.pdf.

and 18th centuries¹⁴, public were thus invited to take part in the initiative *Let's Explore Heritage Together*¹⁵. This was followed by the initiatives Reading History Written in Glagolitic! and Let's Read Glagolitic Texts Together!¹⁶

The Polytechnic of Križevci invited former students to participate in the research, documentation, and promotion of the rich historical collection of agricultural education, thereby linking open access and citizen science with cultural heritage, highlighting its importance and protection.¹⁷ The citizen science project entitled *Revitalization of the Cultural Heritage of the College of Agriculture in Križevci* resulted in a public presentation and a new approach to the preservation and interpretation of the school's and the institution's cultural tradition, which spans more than 160 years.¹⁸

Another example of citizen science in Croatia is ICARUS's *Topotheque* platform, developed within the *Community as opportunity* (co:op) project as a tool for creating online archives of local history. The platform enables citizens to actively participate in preserving and promoting historical heritage by sharing their photographs, documents, and stories. In cooperation with cultural institutions, such as the Prelog Public Library, more than 420 Topotheques have been launched as part of a wider European network.¹⁹

Croatian libraries are also interested in implementing citizen science projects. According to research conducted in Croatian libraries, librarians show willingness to actively participate in citizen science projects, to use libraries as platforms for their implementation, and they emphasize the importance of cooperation and education in fostering scientific literacy and social inclusion.²⁰ In promoting the concept of citizen science in Croatia, the most prominent roles are played by the Working Group for Citizen Science in Libraries of the Zagreb Library Association and the National and University Library in Zagreb.

Working Group for Citizen Science in Libraries

The Working Group for Citizen Science in Libraries of the Zagreb Library Association (hereinafter GZUK) was established in March 2024 with the aim of connecting libraries, the scientific community, and citizens through citizen science. Through education, specialized workshops, and lectures, GZUK empowers libraries and actively promotes the involvement of the wider public in scientific research, demonstrating how libraries can become important bridges between science and the community. The Working Group brings together librarians from public, academic, and research libraries in the Zagreb area who actively work on expanding knowledge and practices in citizen science.

¹⁴ Marijana Tomić, Laura Grzunov and Martina Dragija Ivanović, "Crowdsourcing transcription of historical manuscripts: Citizen science as a force of revealing historical evidence from Croatian Glagolitic manuscripts", *Education for Information* 37, 4 (2021): 443–464, accessed 25 August 2025, <https://journals.sagepub.com/doi/full/10.3233/EFI-211555>.

¹⁵ Glagolab – portal i digitalni laboratorij za suradnička istraživanja i promoviranje hrvatskoga glagoljaštva, „Istražujmo baštinu zajedno”, preuzeto 25. 8. 2025, <https://glagolab.unizd.hr/?cnt=info&id=15117>.

¹⁶ Glagolab – portal i digitalni laboratorij za suradnička istraživanja i promoviranje hrvatskoga glagoljaštva, preuzeto 25. 8. 2025, <https://glagolab.unizd.hr/>.

¹⁷ Marina Vidović Krušić, „Revitalizacija kulturne baštine Visokoga gospodarskog učilišta u Križevcima – projekt građanske znanosti u knjižnici”, u *Volonteri u knjižnicama: zbornik radova / Stručni skup s međunarodnim sudjelovanjem Suradnja, izgradnja, nadogradnja*, ur. Silvija Perić i Robert Fritz (Virovitica: Gradska knjižnica i čitaonica Virovitica, 2023), 54–62, preuzeto 25. 8. 2025, <https://digitalna.nsk.hr/?pr=iiif.v.a&id=668788>.

¹⁸ Marina Vidović Krušić, „Povijesna zbirka poljoprivrednog školstva Knjižnice Veleučilišta u Križevcima u službi promocije kulturne baštine”, *Kalibar* 11, 2 (2024): 38–43, preuzeto 25. 8. 2025, <https://www.dkkz.hr/wp-content/uploads/2024/12/10.-Marina-Vidovic-Krusic.pdf>.

¹⁹ Maja Lesinger, „Platforma Topoteka u kontekstu građanske znanosti – primjer Topoteke Prelog”, *@rhivi* 16 (2024): 12–13, preuzeto 25. 8. 2025, <https://hrcak.srce.hr/329532>.

²⁰ Dolores Mumelaš and Antonija Filipeti, "Exploring the Perspectives of Croatian Libraries on Citizen Science", *LIBER Quarterly: The Journal of the Association of European Research Libraries* 35, 1 (2025): 1–32, accessed 25 August 2025, <https://liberquarterly.eu/article/view/19014>.



Photo 1. Working group for citizen science in libraries official website

Through free workshops – *Upgrade!*, *Integrate!* and *Connect!* – tailored to the needs of libraries, GZUK educates librarians about the basics of citizen science, project design, community engagement, and collaboration with scientists and organizations.²¹ GZUK also organizes lectures aimed at scientists to introduce them to the benefits of public participation in research and to encourage collaboration with libraries.

In 2024 and 2025, GZUK supported numerous projects, including the national initiative GinkoBiFlav, where citizens collected ginkgo leaves for scientific analysis, and the project *Every Bird Counts*, which promotes systematic birdwatching within the community for biodiversity research. The group also takes pride in its own projects, such as *Through the Streets of Medieval Rulers*, *In the Footsteps of Croatian Writers* and *Spiders under the Magnifying Glass*.²² A total of 161 individuals from more than 26 institutions and organizations participated in the projects, resulting in the collection of over 270 valuable data records. In addition to fostering a relationship between the community and scientists and popularizing science, such projects confirm the active role of libraries as places of scientific and community engagement.

Through its innovative approach that combines digital tools and personal connections, GZUK strengthens the role of libraries as inclusive spaces for learning, research, and social integration. By means of the podcast ZKDruškanje and numerous scientific and professional publications, the Working Group disseminates knowledge about citizen science and its importance for the development of public scientific literacy. The group also plans to expand its activities, develop new projects, and foster partnerships with scientific institutions and community organizations. GZUK actively adapts to post-digital trends that merge physical and digital participation, striving to keep libraries at the forefront of public engagement in science and to provide a space for

²¹ Radna grupa za građansku znanost u knjižnicama, „Radionice”, preuzeto 22. 8. 2025, <https://gzukzkd.wordpress.com/radionice/>.

²² Radna grupa za građansku znanost u knjižnicama, „GZUK aktivnosti”, preuzeto 22. 8. 2025, <https://gzukzkd.wordpress.com/gzuk-aktivnosti/>.

creativity and the development of science within the community.²³ GZUK demonstrates how libraries can serve as vital bridges between science and society, fostering collaboration, innovation, and active citizen participation in research and cultural heritage.

The Beginnings of Citizen Science at the National and University Library in Zagreb (NSK)

National and University Library in Zagreb (hereinafter NSK) first came into contact with citizen science in 2018 through a project of the IRIM entitled *STEM Revolution Continues: Libraries*. As part of the project, IRIM donated micro:bits to libraries, which could then be borrowed just like any other library material. Within this project, NSK took on the role of educator and became a competence center for supporting librarians in the use of advanced technologies.²⁴ IRIM and the NSK have signed a cooperation agreement aimed at encouraging the use of new technologies in libraries across the Republic of Croatia, providing training for librarians and users to acquire digital skills, and ensuring the free lending of new tools/devices including micro:bits, 3D printers, and other equipment that foster learning and creativity.²⁵ In this way, NSK became acquainted with the concepts of citizen science, particularly crowdsourcing, which is considered the first level of citizen science.

CeOS_SE project

A major opportunity for the NSK to further engage with citizen science was provided through its partnership in an international Erasmus+ project coordinated by LIBER – the Association of European Research Libraries. The project, entitled *Citizen-Enhanced Open Science in Southeastern Europe Higher Education Knowledge Hubs* (hereinafter CeOS_SE), ran from early 2022 until the end of 2024. Project partners included: LIBER (Netherlands), the University Library of Southern Denmark (Denmark), the University of Torino (Italy), the University of Patras (Greece), the University of Cyprus (Cyprus), the University Library "Svetozar Marković" (Serbia), the National and University Library in Zagreb (Croatia), and the University of Library Studies and Information Technologies (Bulgaria). The CeOS_SE project sought to raise awareness of open science and citizen science practices in Southeastern European countries, particularly in those with lower levels of engagement in those concepts, or with limited knowledge of and involvement in major initiatives related to the European Open Science Cloud (EOSC).²⁶ Within the project, research libraries were identified as a key factor in linking society and science. One of the main objectives was to strengthen the role of academic and public libraries in supporting open and citizen science.²⁷ In response to the limited availability of information on citizen-enhanced open science practices in Southeastern Europe and beyond, the CeOS_SE project aimed to strengthen the role of research libraries as knowledge hubs or offices for both open and citizen science.²⁸ For the purposes of the project, the staff of the National and University Library in Zagreb (NSK) enhanced both their own knowledge and that of

²³ Sanja Jurković, "Zagreb Library Association's Working Group for Citizen Science in Libraries", *Libraries in the Digital Age 2025: Libraries and Information Institutions in the digital age* (poster, 2025).

²⁴ IRIM, "Doniramo micro:bitove u knjižnice!", preuzeto 15. 7. 2025, <https://croatianmakers.hr/hr/microbitovi-u-knjiznicama/>.

²⁵ "STEM revolucija se nastavlja – micro:bitovi i 3D printer i u NSK", *Večernji list*, preuzeto 15. 7. 2025, <https://www.vecernji.hr/techsci/stem-revolucija-se-nastavlja-micro-bitovi-i-3d-printer-i-u-nsk-1239458>.

²⁶ CeOS_SE, "The CeOS_SE Project", accessed 15 July 2025, <https://ceosse-project.eu/>.

²⁷ Nataša Dakić, Aleksandra Trtovac i Dragana Janković, "Uloga univerzitetskih biblioteka u implementaciji i širenju koncepta građanske nauke", *Bibliotekar: časopis za teoriju i praksu bibliotekarstva* 65, 1 (2023): 39–52, <http://doi.fil.bg.ac.rs/pdf/journals/bibliotekar/2023-07/bibliotekar-2023-65-1-3.pdf>.

²⁸ Thomas Kaarsted et al., "How European research libraries can support citizen-enhanced open science", *Open Information Science* 7, 1 (2023): 1–21, <https://www.degruyterbrill.com/document/doi/10.1515/opis-2022-0146/html>.

the wider library community regarding citizen science. One of NSK's tasks was to investigate collaboration between academic and public libraries in the joint organization of citizen science activities. This research resulted in the publication of two works: the article *Citizen Science in Europe—Challenges in Conducting Citizen Science Activities in Cooperation between University and Public Libraries* and the study *Upscaling Collaboration between Academic and Public Libraries for CeOS in Southeastern Europe*. The project activities included the organization and implementation of two citizen science activities: *Bees, Life, People* and *Self-Help and Well-Being in the Academic Online Environment*.

Bees, Life, people

As part of the CeOS_SE project and its second project package, the NSK organized the event *Bees, Life, People* on 2 May 2022, in cooperation with the Ivanić-Grad Public Library and within the framework of the national Festival of Science, whose central theme that year was *Life*. The Croatian Web Archive (hereinafter HAW), a department of NSK, also participated in the organization, while the Ivanić-Grad Public Library engaged citizen scientists, namely students of the Ivan Švcar Secondary School. The choice of bees as the focal theme reflected their essential role in sustaining life on Earth. The program began with a lecture at NSK that introduced participants to the concepts of open science and citizen science. This was followed by a workshop designed to familiarise students with the criteria for selecting online content for inclusion in HAW.

The activity then continued online, where students acted as citizen scientists by searching for and submitting relevant URLs on the topic of bees using a Google form prepared by NSK. To ensure diversity of results, each participant was assigned a different keyword. All submitted links were subsequently reviewed and supplemented by NSK librarians, archived, and published on the HAW portal on 2 June 2022. The activity was closely aligned with the European Year of Youth, as it directly involved young participants, while also supporting the United Nations 2030 Agenda for Sustainable Development, particularly Goal 4 (Quality Education) and Goal 15 (Life on Land).²⁹ Its main outcome was a thematic digital collection entitled *Bees, Life, People*, consisting of 145 URLs with a total size of 239 GB.³⁰

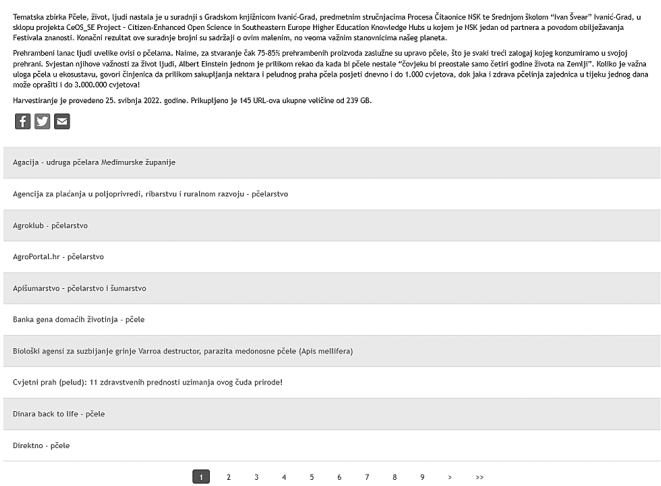


Photo 2. Thematic collection "Bees, life, people"

²⁹ Dolores Mumelaš, Alisa Martek and Dorja Mučnjak, "Upscaling collaboration between academic and public libraries for CeOS in SE Europe", Zenodo (2022), accessed 16 July 2025, <https://zenodo.org/records/7414551>.
³⁰ Croatian Web Archive, „Pčele, život, ljudi“, preuzeto 16. 7. 2025, <https://haw.nsk.hr/tematske-zbirke/42/p%C4%8Dele,-%C5%BEivot,-ljudi/>.

Through their involvement, the students not only enhanced their knowledge and digital skills but also became active contributors to the creation of a lasting scientific resource. They experienced first-hand how citizen science projects can combine education, digital literacy, and community engagement while also raising awareness of the importance of biodiversity and the role of bees as key organisms in sustaining life.³¹ This project was based on crowdsourcing and provided NSK with its first experience of involving the wider public in research conducted by information professionals. In addition, the project enabled collaboration with numerous external partners as well as departments within NSK.

Self-Help and Well-Being in the Academic Online Environment

As part of the fourth work package of the CeOS_SE project, the NSK organized the citizen science activity *Self-Help and Well-Being in the Academic Online Environment*. The initiative took place in 2022 in collaboration with professor Iva Žurić Jakovina, a researcher specializing in the field of self-help. The participants were students of the Faculty of Humanities and Social Sciences at the University of Zagreb, enrolled in the course Digital Library 2 taught by professor Tomislav Ivanjko.



Photo 3. *Self-Help and Well-Being in the Academic Online Environment* citizen science activity

The purpose of the activity was to search Hrčak – the Portal of Croatian Scientific and Professional Journals – and to collect data on scholarly and professional journals addressing the topics of self-help, well-being, and bibliotherapy that are also available in open access. Following an introductory lecture on self-help and a training session on database searching, the students compiled the dataset. The activity approached the theme of self-help from a psychological perspective, with a particular focus on adolescents, while also underscoring the role of books

³¹ Dolores Mumelaš, „Mladi u ulozi građana znanstvenika i kvizaša”, *Kalibar* 10, 1/2 (2023): 30–36, preuzeto 15. 7. 2025, <https://www.dkkz.hr/wp-content/uploads/2023/09/Kalibar-2023-1-30-36.pdf>.

and open access journals in advancing this field.³² The collected data were later processed and presented at the OAI13 conference in the form of a poster, which received the award for Best Poster.³³ Encouraged by the positive reception at the conference, the organizers subsequently prepared a scientific paper entitled *Bibliotherapy, Self-Help and Subjective Well-Being in Open Access in Croatia*, which was published in both Croatian and English in the journal *Socijalna psihijatrija*. The analysis revealed that the topic of self-help was less prevalent in the literature compared to bibliotherapy and subjective well-being, indicating both a need for greater scholarly attention and a potential area of growing interest. Bibliotherapy, in contrast, emerged as a well-established theme, particularly in professional publications, with a notable rise in interest after 2018. Subjective well-being also showed a marked increase in attention after 2015, which became especially pronounced in 2021 and 2022, following the COVID-19 pandemic. Considering the volume of publications, it is evident that this topic holds particular importance for the research community, highlighting the need to further investigate the factors influencing individual well-being. Keywords in the abstracts further demonstrate thematic overlap across all three areas, pointing to common emphases on emotional and psychological dimensions, socio-cultural contexts, and links to health-related issues.³⁴ The scientific outcomes of this activity demonstrate the potential of citizen science to serve as a valuable component of scholarly research.

Dendroteka

In 2023, the National and University Library in Zagreb (NSK), in cooperation with Croatian dendrology experts, led by Associate Professor Igor Poljak and students from Zagreb's 8th and 12th Gymnasiums, implemented the citizen science initiative *Dendroteka*, which focused on identifying tree species depicted on historical postcards of Zagreb.³⁵ This citizen science activity was part of the Festival of Science, whose main theme was *Nature and Society*.

The Graphic Collection of the NSK preserves a number of valuable historical postcards which have been digitized and made publicly available through the NSK Digital Collections Portal (digitalna.nsk.hr). On postcards depicting Croatian towns, especially Zagreb, various tree species can be observed alongside cultural and historical landmarks. This observation inspired the idea of focusing on trees, specifically on identifying the species represented. It was also noted that some of these species still exist today, while new ones have since appeared.³⁶ The activity unfolded in three stages. First, in the days leading up to the national Festival of Science, students visited the locations shown on the historical postcards and recreated them through new photographs. While on-site, they used a mobile application to identify tree species and record the data. The second stage took place on 25 April 2023 at the Faculty of Forestry in Zagreb, where students, dendrology experts, and NSK staff met. Library staff provided a short introduction to citizen science, while experts presented their research and methods for recognizing tree species. Students, working in groups with experts, compared and classified trees from both the old postcards and their recreated photographs. Preliminary results indicated which species had been most common in the past, which are most widespread today, and which have remained preserved.

³² Dolores Mumelaš, „Građanska znanost u NSK“, *Bez uveza* 2, 5 (2022), preuzeto 15. 7. 2025, <https://sites.google.com/view/bez-uveza/arhiva-brojeva/god-2-br-5-2022/gra%C4%91anska-znanost-u-nsk>.

³³ OAI14, „OAI13 Posters“, accessed 15 July 2025, <https://oai.events/oai13/posters/>.

³⁴ Iva Žurić Jakovina and Dolores Mumelaš, „Bibliotherapy, Self-Help and Subjective Well-Being in Open Access in Croatia“, *Socijalna psihijatrija* 52 (2024): 47–82, accessed 15 July 2025, <https://hrcak.srce.hr/file/462831>.

³⁵ Antonija Filipeti and Dolores Mumelaš, „Research on the competencies of librarians needed for organizing and conducting citizen science activities“, *Information Development, Online First* (2025): 1–23, accessed 15 July 2025, <https://journals.sagepub.com/doi/epub/10.1177/02666669251333396>.

³⁶ Festival znanosti, „Dendroteka“, preuzeto 15. 7. 2025, <https://www.festivalznanosti.hr/2022/zagreb/?eventId=3115>.



Photo 4. Dendroteka portal

The third outcome was the creation of the Dendroteka portal, which presents an interactive map of Zagreb.³⁷ By following the mapped locations, users can compare “before and after” postcard images, with tree species clearly identified and described. In this way, the project provided a dynamic way to visualize the transformation of urban greenery over time, while also raising awareness of the importance of biodiversity and the role of trees in the urban environment. The portal is open, and each tree is linked to an encyclopedic entry in the online Croatian Encyclopedia, allowing visitors to learn more about the different tree species.

HAWathon project

In 2023, on the occasion of the anniversary of Croatian author Ivan Goran Kovačić’s birth, the Ivan Goran Kovačić Public Library in Karlovac, in cooperation with the NSK, organized the first *HAWathon* – a crowdsourcing competition for high school students focused on collecting online content.³⁸ The activity was inspired by the earlier citizen science initiative *Bees, Life, People*, which also focused on collecting links for the creation of a thematic collection in the HAW. Several high school classes participated, and a competitive element was introduced: in each class, winner was announced – the student who collected the largest number of accurate online resources about the author within the given time. Encouraged by this positive experience, NSK decided to scale up the activity and develop it further as a formal project.

The crowdsourcing project *HAWathon* received support from the Ministry of Culture and Media and was carried out during 2024 in cooperation between the Special Collections Department and the User Services Department of the NSK. It was implemented in partnership with public libraries, school libraries, and secondary schools across Croatia. Each *HAWathon* was tailored to the needs of the host library, meaning that the themes of individual projects were adapted and agreed upon according to the specific context of each library. Most often, the topics focused on historical figures significant to the local communities in which the libraries are located.³⁹ A total of 11 *HAWathons* were held, involving 186 students. After each *HAWathon*, a participatory

³⁷ Dendroteka, preuzeto 20. 7. 2025, <https://virtualna.nsk.hr/dendroteka/>.

³⁸ City library „Ivan Goran Kovačić“ Karlovac, „Održano prvo HAWaton – natjecanje u Hrvatskoj“, preuzeto 20. 7. 2025, <https://gkka.hr/hawaton-natjecanje-gimnazijalaca-u-prikupljanju-mreznog-sadržaja/>.

³⁹ Dolores Mumelaš, Ingeborg Rudomino i Anamarija Ljubek, „Evaluacija sudionika projekata rada mnoštva i istraživanje sudionika projekta Hawaton“, *Vjesnik Bibliotekara Hrvatske* 68, 1 (2025): 189–210, preuzeto 20. 7. 2025, <https://hrcak.srce.hr/file/477776>.

evaluation was conducted, and the results showed that the participants were highly satisfied with both the organization and the implementation of the activity. The project fostered collaboration between different types of libraries, strengthened NSK's cooperation with secondary schools, and encouraged students to develop digital and information literacy skills as well as critical thinking. At the same time, it proved highly beneficial for librarians responsible for the Croatian HAW, as crowdsourcing significantly reduced the workload of collecting online content. In fact, within just 15 minutes, around 20 students managed to gather the same amount of material that librarians would normally collect over approximately five working days.

Musical Intelligence in the Service of National Heritage

In 2024, once again as part of the Festival of Science, this time with the central theme *Intelligence*, the NSK organized the citizen science activity *Musical Intelligence in the Service of National Heritage*. The initiative was prepared in cooperation between the User Services Department and the Music Collection. The activity focused on the preservation and promotion of national musical heritage, while encouraging the development of musical intelligence among students of primary and secondary music schools, who in this activity took on the role of citizen scientists.⁴⁰ The activity involved 68 participants. Its aim was the analysis of sound recordings from the legacy of Croatian composer Silvio Foretić. The students listened to the recordings and analyzed various elements of the musical works. In doing so, they contributed to identifying the musical genre and performing ensemble, which proved highly valuable for determining the titles of individual works in the audio recordings. The activity was led by Tatjana Mihalić, the Head of the Music and Audio Materials Collection, Phd in information sciences, senior librarian, and musicologist.⁴¹



Photo 5. *Musical Intelligence in the Service of National Heritage* project

All collected data were analyzed, and the results were published in a scientific article. Based on the findings, an analysis of the performing ensembles, types of musical and non-musical sounds, languages, and other musical characteristics made it possible to compare and identify 90% of the audio recordings in the sample, while 10% (two recordings) could not be identified. It is worth

⁴⁰ National and University Library in Zagreb, „Glazbena inteligencija u funkciji nacionalne baštine: provedena aktivnost građanske znanosti“, preuzeto 19. 8. 2025, <https://nsk.hr/vijesti/glazbena-inteligencija-u-funkciji-nacionalne-bastine-provedena-aktivnost-gradanske-znanosti/>.

⁴¹ Tanja Mihalić, Klara Kosić and Dolores Mumelaš, „Glazbena inteligencija u funkciji nacionalne baštine“, *Bez uveza* 4, 2 (2024), preuzeto 19. 8. 2025, <https://sites.google.com/view/bez-uveza/arhiva-brojeva/god-4-br-2-2024/glazbena-inteligencija-u-funkciji-nacionalne-ba%C5%A1tine>.

noting that this was the first citizen science project in Croatia to place musical materials at the center of its research focus.⁴² Interactive tools (such as Slido) were used in the project to support students in understanding their tasks and to encourage their active participation. All participants received certificates of appreciation for their involvement. The project showed how citizen science approaches can be applied in the field of music heritage, engaging students as collaborators and at the same time contributing to the preservation and interpretation of national cultural heritage.

Education on citizen science

In addition to the citizen science activities already mentioned, the NSK has been making continuous efforts to enhance the knowledge of librarians from all types of libraries in the field of citizen science. One of the most significant initiatives in this regard is the webinar series *Citizen Science in Libraries*, organized by the Training Centre for Continuing Education of Librarians in Croatia (hereinafter CSSU). The series began in February 2023, and by August 2025 a total of 11 webinars had been delivered, educating more than 700 librarians. The primary aim of the webinar is to clarify the role of citizen science as an essential component of open science, to present prominent international and Croatian examples of citizen science initiatives, and to provide participants with a better understanding of the skills needed to design and implement such activities. Through participation, librarians not only gain practical knowledge and skills for organizing citizen science projects and developing new services for their users, but they also strengthen broader competencies, including creative and systematic thinking, innovation, and a sense of personal and civic responsibility.⁴³ In 2025, the CSSU launched the workshop *Citizen Science in My Public Library*, dedicated to public librarians. By August 2025, the workshop had been held in three Croatian cities: Rijeka, Gospić, and Dubrovnik. The aim of the workshop is to prepare public library staff for potential challenges, to highlight the advantages that citizen science activities can bring to their institutions and communities, and to encourage them to design and implement their own initiatives.⁴⁴ In addition to the certified courses already mentioned, the National and University Library in Zagreb (NSK) presents its own experiences in citizen science at both national and international library conferences through presentations, poster sessions, workshops, and panel discussions. At the same time, NSK contributes to the theoretical development of citizen science in the library field, with its staff publishing numerous scholarly studies on the topic. Beyond educating librarians, NSK also provides training for researchers. To this end, it has organized three specialized webinars for members of the Penkala Association, the Ruđer Bošković Institute, and the University of Rijeka. Since 2025, the Library's official website has also featured dedicated subsections⁴⁵ for both researchers and librarians, highlighting citizen science and all related services provided by the institution.

Conclusion

Citizen science in Croatia has evolved from its first steps in environmental protection to a wide range of initiatives in public health, cultural heritage, and the GLAM sector, demonstrating both the diversity of its applications and the challenges of its definition. Institutions such as

⁴² Tanja Mihalić i Dolores Mumelaš, „Baštinska glazbena građa u kontekstu građanske znanosti i kao izvor za znanstvena istraživanja“, *Vjesnik bibliotekara Hrvatske* 68, 1 (2025): 25–50, preuzeto 19. 8. 2025, <https://hrcak.srce.hr/file/477769>.

⁴³ Mumelaš and Filipeti, "Exploring the perspectives of Croatian librarians on citizen science": 1–32.

⁴⁴ National and University Library in Zagreb, Training Centre for Continuing Education of Librarians in Croatia, „II. 23. Građanska znanost u mojoj narodnoj knjižnici (tečaj)“, accessed 19 August 2025, <https://cssu.nsk.hr/tecajevi/ii-23-gradanska-znanost-u-mojoj-narodnoj-knjiznici-tecaj/>.

⁴⁵ National and University Library in Zagreb, „Znanstvenici i istraživači“, accessed 19 August 2025, <https://nsk.hr/znanstvenici-i-istrazivaci/>.

the Blue World Institute, BIOM, IRIM, and the Andrija Štampar Teaching Institute have shown how citizens can contribute to scientific knowledge and biodiversity protection, while projects in libraries and cultural institutions, led by GZUK and the NSK, highlight the potential of libraries as hubs that connect science, heritage, and society. NSK has emerged as a leading institution in advancing citizen science in Croatia, actively shaping theory and practice through international projects, innovative activities, and the education of both librarians and researchers. By combining education, digital tools, and community engagement, Croatian citizen science initiatives not only generate valuable data but also foster scientific literacy, social inclusion, and stronger ties between researchers and the public, positioning libraries and cultural organizations as key drivers of open science and civic participation.

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Грађанска наука у Хрватској и допринос Националне и свеучилишне књижнице у Загребу

Апстракт

Грађанска наука у Хрватској последње деценије све више добија на значају, крећући се од првих иницијатива у области заштите животне средине ка разноврсним применама у јавној хигијени, културном наслеђу и сектору галерије, библиотеке, архиви, музеји (GLAM).

Посебно се истиче допринос библиотека, како кроз Радну групу за грађанску науку у библиотекама Удружења књижничара града Загреба (ГЗУК), тако и кроз Националну и свеучилишну књижницу у Загребу (НСК). ГЗУК је подстицао учешће заједнице путем радионица, предавања и заједничких пројеката који истичу библиотеке као мост између науке и друштва. НСК се, с друге стране, профилисала као национални лидер, учествујући у међународним пројектима као што је CeOS_SE и реализујући иновативне активности грађанске науке. Ове иницијативе показују како библиотеке могу објединити образовање, дигиталне алате и учешће грађана ради унапређења научног знања и јавне ангажованости. Комбинујући теоријски развој, међународну сарадњу и практичне програме обуке за библиотекарe и истраживаче, НСК има водећу улогу у позиционирању библиотека као центара грађанске науке у Хрватској.

Кључне речи: грађанска наука, библиотеке, отворена наука, Национална и свеучилишна књижница у Загребу, Радна група за грађанску науку у библиотекама