

## Versioning and contribution history

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v.01	01/05/2020	Second draft	Nusret Drešković	Snežana Radulović Dušanka Cvijanović

Project full title: Development of master curricula in ecological monitoring and aquatic bioassessment for Western Balkans HEIs

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The web address of the project: [www.ecobiaserasmus.com](http://www.ecobiaserasmus.com)

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Work package: WP-3 Quality assurance

Lead organization of WP3: University of Sarajevo, Bosnia and Herzegovina

Task3.2 Development and updating of ECOBIAS-NET internet platform

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Status: Draft

Responsible partner: UNSA

Dissemination level: External

## **Purpose and objectives**

This document presents the ECOBIAS Platform Plan for the Erasmus+ project "Development of master curricula in ecological monitoring and aquatic bioassessment for Western Balkans HEIs" (ECOBIAS). It is developed in the scope of the WP3 ECOBIAS -NET. The tasks of WP3 are the development of the ECOBIAS Platform applicable in the teaching process, to ensure the highest possible quality of the project activities, outputs and outcomes.

### **Phase 1**

Within this phase of the ECOBIAS Platform development the internal survey related to the key words for the Database was carried out. All the participants from the partners' institutions were asked to send the list of the keywords, which would describe best their research area in the domain of ecological monitoring and aquatic bioassessment. It was delivered by each coordinator at the Platform workshop before December 2020. and peer reviewed at the ECOBIAS 1st Workshop „Establishment of regional academic network in EMAB “held on 14 - 15.12.2020. at the International University Travnik in Travnik, Bosnia and Herzegovina (Agenda Item ECOBIAS Platform plan, chaired by Prof Nusret Drešković, University of Sarajevo).

The proposed lists of keywords (collected and delivered at the Workshop by Prof Dragan Škobić, SUM, BIH) per institutions was revised by the WP3 team in the next two months and sent back to the partners' institutions coordinators for the approval. The platform structure was agreed as follows: the keywords should lead to the specific expert group (node or entity one), where each expert within the group should have their own personal page (node or entity two), linked to the ResearchGate profile or personal web presentation. It should also be linked to the ECOBIAS courses' profiles (node three). When compiled, it should be sent P1 UNS for technical database and online Platform developer, with the following instructions:

- The database must compile already agreed 505 key words (first database entity or node)
- The database must compile around 120 academic teachers (second database entity or node)
- The database must compile all the ECOBIAS course related material (third database entity or node)
- The database must compile national (Western Balkans, primarily BIH and MNG) agencies and stakeholders, the same level as the second database entity.
- The database will include our future students as an independent user through the integrated ECOBIAS Moodle or MS Teams platform
- User registration will be optional.
- The registration must be free and simple.
- The ECOBIAS Platform Forum for the future ECOBIAS users (students) will be integrated within the Platform and available for the registered users.
- The database and Platform developer from UNS must obtain at least four admins, WP3 leader, Task 3.2 leader, P1 Coordinator and P1 Administrator
- Remote access to the specific topics will be available without registration.

- **The database peer-reviewed key word list / the first database entity**

Database keywords

1. Accumulation
2. Achillea millefolium
3. Acid rain
4. Adsorbents
5. Adsorption
6. Adsorption isotherm

7. Age structure
8. Aichi target
9. Algae
10. Alien plants
11. Alkalinity
12. Amphibians
13. Amphipoda
14. Analysis
15. Anatomy of plants
16. Animal histology
17. Animal physiology
18. Anthropogenic pressures
19. Anthropocentrism
20. Anthropogenic impact
21. Antibiotic resistance
22. Antimicrobial activity
23. Antioxidant activity
24. Antioxidant enzymes
25. Antioxidant enzymes in plants
26. AOE
27. Applied entomology

28. Aquatic ecology
29. Aquatic ecosystems
30. Aquatic forensic entomology
31. Aquatic macroinvertebrates
32. Aquatic macrophytes
33. Aquatic plants
34. Aquatic ecotoxicology
35. *Arabidopsis thaliana*
36. Area
37. Associations
38. Bacteria
39. Bacterial pathogen
40. Bee honey
41. Benthic macroinvertebrate identification
42. Benthic macroinvertebrate sampling
43. Bioassessment
44. Bioavailability
45. Biocentrism
46. Biochemical parameters in plants
47. Biocompatibility
48. Biodegradable

49. Biodiversity
50. Biodiversity conservation
51. Biodiversity protection
52. Bio elements
53. Biogeography
54. Bioindication
55. Bioindicators
56. Bioinvasions
57. Biological active materials
58. Biological characteristics
59. Biological control
60. Biological monitoring
61. Biomaterials
62. Biomonitoring
63. Biophysics
64. Biosphere
65. Biosystematics
66. Biotic indices
67. BOD
68. Botanical origin
69. Botany

70. Caddisflies
71. Cartography
72. Catchment areas
73. Cell biology
74. Cellular markers of toxicity
75. Chelating agents
76. Chemical engineering
77. Chemical processes
78. Chemistry
79. Chemotaxonomy
80. Chlorophyll a
81. Cladocera
82. Class of water
83. Classification
84. Climate
85. Climate changes
86. COD
87. Coliforms, Faecal
88. Coliforms, Total
89. Colloidal chemistry
90. Colloids



91. Communication
92. Community ecology
93. Concentration
94. Condition factor
95. Conductivity
96. Conservation
97. Conservation biology
98. Conservation ecology
99. Conservation genetics
100. Conservation status assessment
101. Copepoda
102. Corrosion
103. Crenal habitats
104. Cyanobacteria
105. Cyanobacterial bloom
106. CYP
107. Cyprinidae
108. Decarbonization
109. Decision making
110. Degraded forest ecosystems
111. Descriptive statistic

- 112. Diatom indices
- 113. Diatoms
- 114. Dispersal
- 115. Distribution
- 116. Diversity
- 117. Diversity indices
- 118. DNA analysis
- 119. Drinking water
- 120. *Drosophila melanogaster*
- 121. *Drosophila subobscura*
- 122. Ecological niche
- 123. Ecological potential
- 124. Ecological projects
- 125. Ecological quality
- 126. Ecological status
- 127. Ecological status of water
- 128. Ecological potential
- 129. Ecology
- 130. Ecological status
- 131. Ecomonitoring
- 132. Ecosystem

- 133. Ecosystem dynamics
- 134. Ecosystem quality assessment
- 135. Ecosystem services
- 136. Ectoparasites
- 137. Edcs
- 138. Edocrine disruptors
- 139. Electrical conductivity
- 140. Electrochemical methods
- 141. Electrochemistry
- 142. Electrolysis
- 143. Endangered
- 144. Endangered species
- 145. Endemic fish
- 146. Endemism
- 147. Energy flow
- 148. Environmental
- 149. Environmental assessment
- 150. Environmental engineering
- 151. Environmental factors
- 152. Environmental flow
- 153. Environmental impact assessment

- 154. Environmental microbiology
- 155. Environmental monitoring
- 156. Environmental permit
- 157. Environmental planning
- 158. Environmental policy
- 159. Environmental pollutions
- 160. Environmental protection
- 161. Environmental research
- 162. Environmental science
- 163. Environmental stress
- 164. Environmental waters
- 165. Ephemeroptera
- 166. Ephemeroptera
- 167. ESAV
- 168. ESBL
- 169. Ethnobotany
- 170. Eutrophication
- 171. Eutrophication in deep lakes
- 172. Eutrophication of wetlands
- 173. Evaluation
- 174. Evolution

- 175. Evolutionary biology
- 176. Ex situ
- 177. Exploratory analysis
- 178. Extinction risk
- 179. Extract
- 180. Faecal streptococci
- 181. Faecal coliform bacteria
- 182. Faecal streptococci
- 183. Feeding ecology
- 184. Field Work in Botany
- 185. Filtration
- 186. Fish
- 187. Fish community
- 188. Fish diversity
- 189. Fish genetics
- 190. Fish haematology
- 191. Fish histology
- 192. Fishpond
- 193. Floristics
- 194. Fly ash
- 195. Food analysis

- 196. Food microbiology
- 197. Forensic entomology
- 198. Freshwater
- 199. Freshwater benthic invertebrates
- 200. Freshwater biology
- 201. Freshwater Ecology
- 202. Freshwater ecosystem
- 203. Freshwater fish
- 204. Freshwater fish ecology
- 205. Freshwater fish monitoring
- 206. Freshwater fisheries
- 207. Freshwater management
- 208. Freshwater systems
- 209. Gene pool
- 210. General ecology
- 211. General entomology
- 212. Genetic analysis
- 213. Genetic diversity
- 214. Genetic marker
- 215. Genetics
- 216. Genotoxicology

- 217. Geoecology
- 218. Geometric morphometrics
- 219. Geomorphology
- 220. GIS
- 221. Gluten
- 222. Habitat degradation
- 223. Habitat restoration
- 224. Habitats
- 225. Hardness
- 226. Heavy metal saturated substrate
- 227. Heavy metals
- 228. Heavy metals in soil and water
- 229. *Helichrysum italicum*
- 230. Haematological parameters
- 231. Herbarium Techniques
- 232. Hydrology
- 233. Histology
- 234. Human ecology
- 235. Hydrobiology
- 236. Hydro morphology
- 237. Ichthyofauna

- 238. Ichthyology
- 239. Identification
- 240. In situ
- 241. Indicator
- 242. Influence of water deficit on gene expression
- 243. Insect-plant communication
- 244. Invasion
- 245. Invasion corridor
- 246. Invasive plants
- 247. Invasive species
- 248. Invertebrates
- 249. Karstic rivers
- 250. Karstic springs
- 251. Lakes
- 252. Lakes
- 253. L-ascorbic acid
- 254. Lasers
- 255. Length-weight relationship
- 256. Life-history traits
- 257. Low-cost sorbents
- 258. Macroinvertebrates



- 259. Macrophytes
- 260. Macrophytes in lakes
- 261. Macrophyte flora
- 262. Macrophyte vegetation
- 263. Macrozoobenthos
- 264. Mammals
- 265. Material science
- 266. Mechanistic toxicology
- 267. Mediterranean shrubs
- 268. Metal ions toxicity
- 269. Metal toxicity
- 270. Metallic materials
- 271. Metapopulation
- 272. Microbial ecology
- 273. Microbial indicators
- 274. Microbiology
- 275. Microbiota composition
- 276. Microbiota diversity
- 277. Microcystin
- 278. Micronutrients
- 279. Mini hydro plants

- 280. Molecular anthropology
- 281. Molecular biology
- 282. Molecular dynamics
- 283. Molecular genetics
- 284. Molecular systematics
- 285. Monitoring
- 286. Monitoring system
- 287. Morphology of plants
- 288. Morphometrics
- 289. Mosses
- 290. Mountain
- 291. Mountain flora
- 292. Mountain vegetation
- 293. Mtdna
- 294. Multiple stressors
- 295. Multivariate statistic
- 296. Nanomaterials
- 297. NATURA 2000
- 298. Natural products
- 299. Natural resources
- 300. Nature protection

- 301. Next-generation sequencing
- 302. NO<sub>2</sub> nitrogen (Nitrite)
- 303. NO<sub>3</sub> nitrogen (Nitrate)
- 304. NPOC
- 305. Oligotrophic habitats
- 306. Ordination
- 307. Organic chemistry
- 308. Organic matter
- 309. Organometal complexes
- 310. Oxidative stress
- 311. Pantle–Buck index
- 312. Parasitoids
- 313. Parasitology
- 314. Passive film
- 315. Passivity
- 316. Peat Bog Vegetation
- 317. Periphyton
- 318. Phenolic compounds
- 319. Phosphorus
- 320. Phosphorus in water
- 321. Photonic

- 322. Phycotoxin
- 323. Phylogeny
- 324. Phylogeny of insects
- 325. Phytogeography
- 326. Physical and chemical characteristics of water
- 327. Physical chemistry
- 328. Physico-chemical characteristics
- 329. Physicochemical factors
- 330. Physiological solution
- 331. Phyto benthos
- 332. Phytochemical profile
- 333. Phytocoenology
- 334. Phytogeography
- 335. Phyto indicator
- 336. Phytoplankton toxins
- 337. Phytoplankton
- 338. Phytoremediation
- 339. Plant communities
- 340. Plant conservation
- 341. Plant diversity
- 342. Plant ecology

- 343. Plant physiology
- 344. Plant succession
- 345. Plant Systematics and Phylogeny
- 346. Plant taxonomy
- 347. Plant tolerance to drought stress
- 348. Plecoptera
- 349. Pollution
- 350. Polymers
- 351. Population
- 352. Population augmentation
- 353. Population biology
- 354. Population dynamics
- 355. Population ecology
- 356. Population genetics
- 357. Population viability analysis
- 358. Presentation of results
- 359. Pressures
- 360. Protected areas
- 361. Proteins
- 362. Quantitative ecology
- 363. R in ecology

- 364. Reaction kinetics
- 365. Red list
- 366. Red mud
- 367. Remote Sensing
- 368. Reproductive biology
- 369. Reptiles
- 370. Research coverage
- 371. Research goals
- 372. Research hypotheses
- 373. Research methods
- 374. Research plan
- 375. Research preparation
- 376. Resistance genes
- 377. Resources
- 378. Restoration
- 379. Riparian area
- 380. Riparian corridor
- 381. Riparian ecosystem
- 382. Riparian zone
- 383. River
- 384. River basin

385. River continuum

386. Rivers

387. Rivers and Lakes

388. Rotifera

389. Rstudio

390. Ruderal flora and vegetation

391. Salmonidae

392. Salubrity

393. Sampling

394. Saprobic index

395. Saprobic indices

396. Saprobic system

397. Saprobic values

398. Saturea montana

399. Softening

400. Solar cells

401. Solar energy

402. Solutions

403. Sorption

404. Species

405. Spring

- 406. Springs
- 407. Stability
- 408. Statistical design in ecology
- 409. Statistical processing
- 410. Statistics in Botany
- 411. Stream
- 412. Streams
- 413. Submerged plants
- 414. Sulphate (SO<sub>4</sub>)
- 415. Sulphite-reducing clostridia
- 416. Sustainable development
- 417. Sustainable energy
- 418. Sustainable use
- 419. Swamp vegetation
- 420. System analysis
- 421. Systematics
- 422. Tall Herb Vegetation
- 423. Tannin
- 424. Tannins
- 425. Taxonomy
- 426. Technology



- 427. The Danube River
- 428. Thematic mapping
- 429. Thin films
- 430. Threatened fish
- 431. TOC
- 432. Total bacterial count
- 433. Total coliform bacteria
- 434. Total Dissolved Solids (TDS)
- 435. Toxicological chemistry
- 436. Traditional knowledges
- 437. Trichoptera
- 438. Trophic state indices
- 439. Trophic structure
- 440. Tufa
- 441. Turbidity
- 442. Univariate analysis
- 443. Vascular Plants
- 444. Vegetation
- 445. Vegetation degradation
- 446. Vegetation distribution
- 447. Vegetation dynamics

- 448. Vertical migration
- 449. Vertical stratification
- 450. Viability of fish populations
- 451. Wastewater
- 452. Water
- 453. Water analysis
- 454. Water deficit in plant
- 455. Water ecosystems
- 456. Water microbiology
- 457. Water pollution
- 458. Water protection technologies
- 459. Water Quality
- 460. Water Quality assessment
- 461. Water quality index
- 462. Water quality monitoring
- 463. Water technology
- 464. Waterborne bacterial infections
- 465. Weed flora and vegetation
- 466. Weeds
- 467. Wetland
- 468. WFD

- 469. WFD CISECOSTAT
- 470. Wild vs. Lab populations
- 471. WQI
- 472. Xenobiotics
- 473. Zonation
- 474. Zoobenthos
- 475. Zooecology
- 476. Zoology
- 477. Zooplankton

- 120 academic staff and teachers (second entity) proposed within the Project proposal.
- **National (Western Balkans) agencies and stakeholders (third database entity)** will be included. The first networking has been done within the ECOBIAS 1st Workshop „Establishment of regional academic network in EMAB“ 14-15.12.2020. (International University Travnik in Travnik, Bosnia and Herzegovina) presented by:
  1. Alma Imamović FMPS, Sarajevo, BiH
  2. Jelena Vičanović, Javna ustanova Vode Srpske, BiH
  3. Zorana Lukić - Udruženje za zaštitu prirode i biodiverziteta Via natuae, BiH
  4. Olgica Marušić - FPMOZ Mostar, BiH
  5. Srđan Marjanovic - RHMZ Srbije, Beograd, Serbia
  6. Amela Jusufovic - Udruzenje za zastitu prirode i biodiverziteta 'Via naturae', BiH
  7. Tanja Mihinjač - Ministarstvo gospodarstva i održivog razvoja, Zavod za zaštitu okoliša i prirode Zagreb, Croatia
  8. Nena Tomic - Zavod za hidrometeorologiju i seizmologiju Podgorica, Montenegro
  9. Mirjana Šibalić - Zavod za hidrometeorologiju i seizmologiju Podgorica, Montenegro

10. Željka Đurišić - ZHMS Podgorica, Montenegro
11. Kumrija Šestović- ZHMS Podgorica, Montenegro
12. Olivera Gavrilović, Vode Vojvodine, Serbia

Integrating the agencies to the ECOBIAS Platform will strengthen institutional cooperation and capacity building in education. According to the Ministry of Agriculture, Forestry and Water Management and 'The Strategy for Integral Water Management in the Republic of Srpska till 2024' (Bosnia and Herzegovina), development of standardised methodology for assessment of ecological status of lakes and rivers in line with EU Water Framework Directive (WFD) was selected as a priority. To obtain this, the Strategy recommends high monitoring frequency of biological quality elements and development of national and regional (Eastern Continental Intercalibration Region) ecological status classification systems. According to Federal Ministry of Agriculture, Water Management and Forestry (The Sava River Basin District Agency; The Adriatic Sea River Basin District), and Water Management Strategy of the Federation of Bosnia and Herzegovina, it is in the interest of the Federation of BiH to join the intercalibration network of the European Union as soon as possible. In line with Ministry of agriculture and rural development, and the Water Management Strategy of Montenegro, harmonisation of the national ecological monitoring and bioassessment of surface waters was highlighted as priority in water management in Montenegro. Also, the Strategy listed only a few biological quality parameters regularly monitored by official environmental agencies. Therefore, the Platform should improve these national strategies in water management highly.

Subsequently, the Workshop was the first step to achieve that and integrate it within the database, based on the presentations:

*Regional institutional networking in freshwater ecomonitoring in Bosnia and Herzegovina*, given by Jasmina Kamberović, University of Tuzla and Biljana Lubarda, University of Banja Luka, Bosnia and Herzegovina

*Regional institutional networking in freshwater ecomonitoring in Croatia*, given by Zoran Marčić, University of Zagreb, Croatia

*Regional institutional networking in freshwater ecomonitoring in Montenegro* given by Dr.sc. Anđela Jakšić-Stojanović, University of Donja Gorica Montenegro

*Stakeholders in freshwater ecomonitoring in Montenegro* given by Mirjana Šibalić - Zavod za hidrometeorologiju i seizmologiju Podgorica, Montenegro.

*Stakeholders and policy makers networking for promoting the best practice in freshwater management* given by Slavko Smiljanić, University of East Sarajevo, Bosnia and Herzegovina

*Calibration exercise in freshwater biomonitoring* given by Ivana Buj, University of Zagreb, Croatia

*Stakeholders in freshwater biomonitoring in Serbia - Regional institutional networking in freshwater ecomonitoring in Serbia* given by Olivera Gavrilović, Vojvodina vode, Novi Sad, Serbia

- **Intergrated ECOBIAS Moodle or MS Teams platform for students and partners**

The ECOBIAS Platform should stimulate educational institutions to offer broader educational opportunities. This process entails a situation in which the lecturer and students are physically separated, communicating via technical devices for voice and video transfer, usually in combination with face-to-face communication. This approach can also be used in lifelong learning and distance learning, can be an additional chance for learning new skills, or be used for in-house training. It allows accomplishing plans and projects together:

- Task lists allow to stay on top of work projects or plans. Assign tasks, set due dates, and cross off completed tasks is going keep everyone on the same page.
- File sharing in chats makes it easier to coordinate on work assignments or personal projects.
- Cloud storage makes it easy to access shared documents and files on the go.
- Dashboard view neatly organizes all shared content—photos, files, tasks and links.

Additionally, screenshare, whiteboard, or breakout in virtual rooms will help to get most for the ECOBIAS teaching and meetings.

- **User registration will be optional.**  
It would help to keep the Forum sustainable.
- **The registration must be free and simple.**  
It would help the users to get on the Forum easily.
- **The ECOBIAS Platform Forum for the future ECOBIAS users (students) will be integrated within the Platform and available for the registered users.**

The database and Platform developer from UNS must obtain at least four admins, WP3 leader, Task 3.2 leader, P1 Coordinator and P1 Administrator (Prof Nusret Drešković UNSA, Maja Novković UNS, Prof Snežana Radulović UNS, Prof Dušanka Cvijanović UNS), who will be able to:

1. Change of setting up the front (home) page
2. Adding courses
3. Adding users
  - i. Step 1: Authentication
  - ii. Step 2: Enrolment
4. File management
5. Important default site settings
6. Admin tips and tricks

- **Remote access to the specific topics will be available without registration.**  
This should be available only for registered users.

## WP3 Phase 2 Report UNS

### TECHINICAL SPECIFICATION (software development)

The ECOBIAS platform will be an online website that has an integrated database. It will be composed of few different segments (Database tables, Forum, Moodle and Remote Access) with the main focus on the database segment. The database will contain keywords (items) and people on the project as two separated connected entities. The first entity (item) will have the following fields: ID, Name and the array of ID numbers of the people that are connected to it. The second entity (people) will have basic information about each individual: ID, name, e-mail, the university that they are working at and a research gate profile link.

The main goal of the table database is to retrieve and display people based on the user selected item. Furthermore, users can easily find all database entities (people and items) via search and filter built-in functions. The interface will have a clear and user-friendly design that will be accessible and responsive.

The platform forum will be composed of a registration component and a simple forum user interface. Posting on the forum will be strictly for the people that have an account (via registration). The registration will be free and open to all users. The Moodle page will be created via the open-source learning platform – Moodle. It will offer users various documentation regarding the ECOBIAS project.

The design will be fairly simple. Colour scheme will be composed of neutral or logo related colours with the main focus being on visibility and cleanliness.

The relational database management system that this platform will use will be PostgreSQL. The rest of the back-end is solved in Spring Boot (Java) technology. The front-end part will mostly be composed of React (Javascript library) components.

Link to the website (the link to the platform can be found in the navigation bar):

<http://ecobiaserasmus.com>

Direct link to the platform:

<http://ecobiaserasmusplatform.com>

Link to the code:

<https://gitfront.io/r/user-9228663/5e7e365ecb2ebd073bcdfb06e552c1ef0bba3938/EcobiasProjectPlatform/>

or make an account on GitHub and check with the project developer to provide the direct invite to the GitHub repository, since it is set to private because of security concerns.

*Development of master curricula in ecological monitoring and aquatic bioassessment for Western Balkans HEIs) and Footer (The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.*