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PROMETHEE/GAIA

- [1] European Commission (EC). Communication from the commission to the council, the European parliament, the European economic and social committee and the committee of the regions, Thematic Strategy for Soil Protection COM(2006)231, Brussels, Belgium: European Union, 2006.
- [2] European Commission (EC). Communication from the commission to the council, the European parliament, the European economic and social committee and the committee of the regions, Towards a Thematic Strategy for Soil Protection COM(2002)179, Brussels, Belgium: European Union, 2002.
- [3] IAEA-TECDOC-1415, Soil sampling for environmental contaminants, International Atomic Energy Agency, Vienna, Austria, 2004.
- [4] The European environment – state and outlook 2010 – Soil (SOER 2010), EEA and JRC, Luxembourg: Publications Office of the European Union, 2010
- [5] The State of Soil in Europe – a contribution of the JRC to the European Environment Agency’s Environment State and Outlook Report – SOER 2010, Luxembourg: Publications Office of the European Union, 2012
- [6] UKEA; 2009. Human health toxicological assessment of contaminants in soil, Science Report SC050021/SR2. United Kingdom Environment Agency, Bristol, United Kingdom
- [7] UNSCEAR, 2000. Sources and Effects of Ionizing Radiation. United Nation Scientific Committee on the Effect of Atomic Radiation, United Nation, New York
- [8] United Nations Scientific Committee on the Effects of Atomic Radiation, (2010). Sources and Effects of Ionizing Radiation, UNSCEAR 2008 Report to the General Assembly with Scientific Annexes, Volume 1, New York, United Nations
- [9] Zakon o zaštiti životne sredine, („Službeni glasnik RS“ br. 135/04)
- [10] Zakon o poljoprivrednom zemljištu, („Službeni glasnik RS“ br. 62/06)
- [11] Izveštaj o stanju zemljišta u Republici Srbiji u periodu 2006-2008, Ministarstvo životne sredine i prostornog planiranja, Agencija za zaštitu životne sredine, Beograd, 2009.
- [12] Izveštaj o stanju zemljišta u Republici Srbiji za 2011. godinu, Ministarstvo energetike, razvoja i zaštite životne sredine, Beograd, 2012.
- [13] Izveštaj o stanju zemljišta u Republici Srbiji za 2012. godinu, Ministarstvo energetike, razvoja i zaštite životne sredine, Beograd, 2013.
- [14] Izveštaj o nivou izlaganja stanovništva jonizujućim zračenjima iz životne sredine u Republici Srbiji u 2010. Godini, Agencija za zaštitu od jonizujućih zračenja i nuklearnu sigurnost Srbije
- [15] Godišnji izveštaj o izlaganju stanovništva jonizujućim zračenjima u 2011. god., Agencija za zaštitu od jonizujućih zračenja i nuklearnu sigurnost Srbije
- [16] Uredba o programu sistemskog praćenja kvaliteta zemljišta, indikatorima za ocenu rizika od degradacije zemljišta i metodologiji za izradu remedijacionih programa, ("Sl. glasnik RS", br. 88/2010)
- [17] Pravilnik o dozvoljenim količinama opasnih i štetnih materija u zemljištu i vodi iz javnih vodovodnih javanjenih metoda njihovog ispitivanja, ("Sl. glasnik RS", br. 23/94)

- [18] Uredba o sadržini i na inu vo enja informacionog sistema zaštite životne sredine, metodologiji, strukturi, zajedni kim osnovama, kategorijama i nivoima sakupljanja podataka, kao i o sadržini informacija o kojima se redovno i obavezno obaveštava javnost, ("Sl. glasnik RS", br. 112/2009)

PROMETHEE/GAIA

- [19] Mostert, M., Ayoko, G., Kokot, S. Application of chemometrics to analysis of soil pollutants, *Trends in Analytical Chemistry*, 29 (2010) 430 – 445
- [20] Mostert, M., Ayoko, G., Kokot, S., 2012. Multi-criteria ranking and source identification of metals in public playgrounds in Queensland, Australia. *Geoderma*, 173-174, 173-183.
- [21] Munda, G., Nijkamp, P., Rietveld, P. (1995). Application of chemometrics to analysis of soil pollutants. *European Journal of Operational Research*, 82, 1, 79-97
- [22] Linkov, L., Satterstrom, F.K., Kiker, G., Seager, T.P., Bridges, T., Gardner, K.H., Rogers, S.H., Belluck, D.A., Meyer, A., Multicriteria Decision Analysis: A comprehensive Decision Approach for Management of Contaminated Sediments, *Risk Analysis* 26 (1), (2006a) 61-78.
- [23] Briggs, Th., Kunsch, P.L., Mareschal, B., Nuclear waste management: An application of the multicriteria PROMETHEE methods, *European Journal of Operational Research* 44 (1990) 1-10.
- [24] . Nikoli , N. Milošević , Z. Živković , I. Mihajlović , R. Kovačević , N. Petrović , Multi-criteria analysis of soil pollution by heavy metals in the vicinity of the Copper Smelting Plant in Bor (Serbia), *Journal of Serbian Chemical Society*, 76 (2011) 625–641
- [25] W. Al-Shiekh Khalila, A. Goonetilleke, S. Kokot, S. Carroll, Use of chemometrics methods and multicriteria decision-making for site selection for sustainable on-site sewage effluent disposal, *Analytica Chimica Acta*, 506 (2004) 41-56
- [26] Keller, H.R., Massart, D.L., Brans, J.P., Multicriteria decision making: A case study, *Chemometrics and Intelligent Laboratory Systems*, 11 (1991) pp. 175-189
- [27] Agarski, B., Budak, I., Kosec, B., Hodolic, J. (2012). An Approach to Multi-criteria Environmental Evaluation with Multiple Weight Assignment, *Environmental Modeling and Assessment*, 17, 255

M

- [28] Amaya Franco-Uría, Cristina López-Mateo, Enrique Roca, Maria Luisa Fernández-Marcos, Source identification of heavy metals in pastureland by multivariate analysis in NW Spain, *Journal of Hazardous Materials* 165 (2009) 1008–1015
- [29] Abubakr M. Idris, Combining multivariate analysis and geochemical approaches for assessing heavy metal level in sediments from Sudanese harbors along the Red Sea coast, *Microchemical Journal* 90 (2008) 159–163
- [30] C. Mico, L. Recatala, M. Peris, J. Sanchez, Assessing heavy metal sources in agricultural soils of an European Mediterranean area by multivariate analysis, *Chemosphere* 65 (2006) 863–872
- [31] Jinling Li, Ming He, Wei Han, Yifan Gu, Analysis and assessment on heavy metal sources in the coastal soils developed from alluvial deposits using multivariate statistical methods, *Journal of Hazardous Materials* 164 (2009) 976–981
- [32] Sollitto, D., Romic, M., Castrignanò, A., Romic, D., Bakic, H. Assessing heavy metal contamination in soils of the Zagreb region (Northwest Croatia) using multivariate geostatistics, *Catena* 80 (2010) 182–194
- [33] Limei Cai, Zhencheng Xu, Mingzhong Ren, Qingwei Guo, Xibang Hu, Guocheng Hu, Hongfu Wan, Pingan Peng, Source identification of eight hazardous heavy metals in agricultural soils of Huizhou, Guangdong Province, China, *Ecotoxicology and Environmental Safety* 78 (2012) 2–8

- [34] Hanesch, M., Scholger, R., Dekkers, M.J. The application of fuzzy C-means cluster analysis and non-linear mapping to a soil data set for the detection of polluted sites, *Phys. Chem. Earth (A)*, Vol. 26, No. 11-12, pp. 885-891, 2001
- [35] Facchinelli, A., Sacchi, E., Mallen, L. Multivariate statistical and GIS-based approach to identify heavy metal sources in soils, *Environmental Pollution*, Volume 114, Issue 3, October 2001, Pages 313–324
- :
- [36] Gunawardena, J., Egodawatta, P., Ayoko, G.A., Goonetilleke, A., 2012. Role of traffic in atmospheric accumulation of heavy metals and polycyclic aromatic hydrocarbons. *Atmospheric Environment*, 54, 502-510.
- [37] Ilic, I., Bogdanovic, D., Zivkovic, D., Milosevic, N., Todorovic, B., 2011. Optimization of heavy metals total emission, case study: Bor (Serbia). *Atmospheric Research*, 101, 1-2, 450-459.
- [38] Yisa, J. Heavy Metals Contamination of Road-Deposited Sediments, *American Journal of Applied Sciences* 7 (9): 1231-1236, 2010
- [39] Pekey, H., Heavy metal pollution assessment in sediments of the Izmit Bay, Turkey, *Environmental Monitoring and Assessment* (2006) 123: 219–231
- [40] Mariagrazia D’Emilio, Rosa Caggiano, Maria Macchiato, Maria Ragosta, Serena Sabia, Soil heavy metal contamination in an industrial area: analysis of the data collected during a decade, *Environ. Monit. Assess.* (2013) 185:5951–5964
- [41] Grzebisz, W., Cie la, L., Komisarek, J., Potarzycki, J. Geochemical Assessment of Heavy Metals Pollution of Urban Soils, *Polish J. Environ. Stud.* 11(5), 493, 2002.
- [42] Grigalavi ien , I., Rutkovien , V., Marozas, V. The Accumulation of Heavy Metals Pb, Cu and Cd at Roadside Forest Soil, *Polish J. Environ. Stud.* 14(1), 109, 2005.
- [43] Dube, A., Zbytniewski, R., Kowalkowski, T., Cukrowska, E., Buszewski, B. Adsorption and Migration of Heavy Metals in Soil, *Polish J. Environ. Stud.* 10 (1), 1, 2001.
- [44] Aydinalp, C., Marinova, S. Distribution and Forms of Heavy Metals in Some Agricultural Soils, *Polish J. Environ. Stud.* 12(5), 629, 2003.
- [45] Buszewski, B., Jastrz bska, A., Kowalkowski, T., Górna-Binkul A. Monitoring of Selected Heavy Metals Uptake by Plants and Soils in the Area of Toru , Poland, *Polish Journal of Environmental Studies* 9(6), 511, 2000.
- [46] Guo, Y.B, Feng, H., Chen, C., Jia, C.J., Xiong, F., Lu, Y. Heavy Metal Concentrations in Soil and Agricultural Products Near an Industrial District, *Polish Journal of Environmental Studies* 22(5), 1357, 2013.
- [47] Bekteshi, A., Bara, G. Uptake of Heavy Metals from *Plantago major* in the Region of Durres, Albania, *Polish Journal of Environmental Studies* 22(6), 1881, 2013.
- [48] M.A. Arshad, S. Martin, Identifying critical limits for soil quality indicators in agro-ecosystems, *Agriculture, Ecosystems and Environment*, 88 (2002) 153–160
- [49] G.Dugali , D. Krsti , M. Jeli , D. Nikezi , B. Milenkovi , M. Pucarevi , T. Zeremski-Škori , Heavy metals, organics and radioactivity in soil of western Serbia, *Journal of Hazardous Materials*, 177 (2010) 697–702
- [50] I. alovi , D. Jockovi , G. Dugali , G. Bekavac, B. Pupar, S. Šeremeši , M. Jockovi , Soil acidity and mobile aluminum status in pseudogley soils in the Cacak–Kraljevo Basin, *Journal of Serbian Chemical Society*, 77 (2012) 833–843
- [51] Mohanty, A.K., Sengupta, D., Das, S.K., Vijayan, V., Saha, S.K., Natural radioactivity in the newly discovered high background radiation area on the eastern coast of Orissa, India, *Radiation Measurements*, 38 (2004), 2, pp. 153 – 165

- [52] Boukhenfouf, W., Boucenna, A., The radioactivity measurements in soils and fertilizers using gamma spectrometry technique, *Journal of Environmental Radioactivity*, 102 (2011), 4, pp. 336 – 339
- [53] Zhu, Y.G. Shaw, G., Soil contamination with radionuclides and potential remediation, *Chemosphere*, 41 (2000), 1-2, pp. 121–128
- [54] Bikit, I., Slivka, J., Conkic, Lj., Krmar, M., Veskovic, M., Zikic-Todorovic, N., Varga, E., Curcic, S., Mrdja, D., Radioactivity of the soil in Vojvodina(northern province of Serbia and Montenegro), *Journal of Environmental Radioactivity*, 78 (2005), 1, pp. 11–19
- [55] Antovic, N.,Boskovic, D., Svrkota, N., Antovic, I., Radioactivity in soil from Mojkovac, Montenegro, and assessment of radiological and cancer risk, *Nuclear Technology & Radiation Protection*, 27(2012), 1, pp. 57–63
- [56] Kovacs, T., Szeiler, G., Fabian, F., Kardos, R., Gregoric,A., Vaupotic, J., Systematic survey of natural radioactivity of soil in Slovenia,*Journal of Environmental Radioactivity*, 122 (2013),pp. 70 – 78
- [57] Degerlier, M., Karahan, G., Ozger, G., Radioactivity concentrations and dose assessment for soil samples around Adana, Turkey, *Journal of Environmental Radioactivity*, 99 (2008), 7, pp. 1018 – 1025
- [58] Sahoo, S. K.,Fujimoto, K.,Celikovic, I., Ujic, P., Zunic, Z., Distribution of uranium, thorium, and isotopic composition of uranium in soil samples of south Serbia: evidence of depleted uranium, *Nuclear Technology & Radiation Protection*, 19(2004), 1, pp. 26 – 30
- [59] Papaefthymiou, H., Athanasopoulos, D., Papatheodorou, G., Iatrou, M., Geraga,M., Christodoulou, D., Kordella, S., Fakiris, E., Tsikouras, B., Uranium and other natural radionuclides in the sediments of a Mediterranean fjord-like embayment, Amvrakikos Gulf (IonianSea), Greece, *Journal of Environmental Radioactivity*, 122 (2013), pp. 43 – 54
- [60] Grdovi , S., Vitorovi , G., Mitrovi , B., Andri , V., Petrujki , B., Obradovi , M., Natural and anthropogenic radioactivity of feedstuffs, mosses and soil in the Belgrade environment, Serbia, *Archives of Biological Sciences*, 62 (2010), 2, pp. 301-307
- [61] Pantelic, G., Vuletic, V., Eremic – Savkovic, M., Javorina, LJ., Tanaskovic, I., Radioecological monitoring in Serbia, *Arhiv veterinarske medicine*, 2 (2009), 2, pp. 59-69
- [62] Dragovic, S., Mihailovic, N., Gajic, B., Heavy metals in soils: Distribution, relationship with soil characteristics and radionuclides and multivariate assessment of contamination sources, *Chemosphere*, 72 (2008), 3, pp. 491–495
- [63] Ele Abiama, P., Owono Ateba, P., Ben-Bolie, G.H., Ekobena, F.H.P., El Khoukhi, T., High background radiation investigated by gamma spectrometry of the soil in the southwestern region of Cameroon, *Journal of Environmental Radioactivity*, 101 (2010), 9, pp. 739-743
- [64] Ramola, R.C., Gusain, G.S., Manjari, B., Yogesh, P., Ganesh, P., Ramachandran, T.V., ²²⁶Ra, ²³²Th and ⁴⁰K contents in soil samples from Garhwal Himalaya,India, and its radiological implications. *Journal of Radiological Protection*28 (2008) pp. 379
- [65] De Miguel, E., Iribarren, I., Chacon, E., Ordonez, A., Charlesworth,S.,Risk-based evaluation of the exposure of children to trace elements in playgrounds in Madrid (Spain) *Chemosphere* 66 (2006) pp. 505-513.
- [66] GuitaoShi, ZhenlouChen, ShiyuanXu, JuZhang, LiWang, ChunjuanBi, JiyanTeng, Potentially toxic metal contamination of urbansoil sand roadside dust in Shanghai, China, *Environmental Pollution* 156 (2008) pp. 251-260
- [67] Herngrenna, L., Goonetilleke, A., Ayoko, G.,Analysis of heavy metals in road-deposited sediments, *Analytica Chimica Acta*, 571 (2006) pp. 270-278
- [68] Petrovi – Gegi , A., Vojinovi – Miloradov, M., Sabo – Cehmajster, K., Ileš, F. Absorption of essential and toxic elements in various fruit and vegetable sorts in the flooded area of the Tisa river, *Hem. Ind.* 61 (5a) (2007) 321 – 325

[69] Jakši , S., Vu kovi , S., Vasiljevi , S., Grahovac, N., Popovi , V., Šunjka, D., Dozet, G. Accumulation of heavy metals in *Medicago sativa* L. and *Trifolium pratense* L. at the contaminated fluvisol, *Hem. Ind.* 67 (1) (2013) 95–101

[70] Paunovi , A., Mandi , M., Stevovi , V., Mandi , L., Mogu nosti proizvodnje organskog ratarstva na teritoriji opštine a ak, *Tractors and Power Machines*, 10 (2005) 484-493

[71] Mitrovi , O., Gavrilovi -Damnjanovi , J., Blagojevi , M., Hemijske osobine zemljišta u proizvodnim zasadima maline, *Jugoslovensko vo arstvo* 38 (2004) 171-175

[72] Hadižc, V., Neši , Lj., Beli . M., Furman. T., Savin, L. Zemljišni potencijal Srbije, *Tractors and Power Machines*, 7:4 (2002) 43-51

3.3.

20), Visual Promethee (1.3). SPSS (

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1. **Papi , M.**, Vukovi , M.,Bikit, I., Mr a, D., Forkapi , S., Bikit, K., Nikoli , .: Multi-criteria analysis of soil radioactivity in a ak basin, Serbia, *Romanian Journal of Physics*, Vol 59, No 7-8,2014, pp. 846-861. ISSN: 1221-146X, IF: 0,745
2. **Papi , M.**, Vukovi , M.: Multivariate analysis of contamination of alluvial soils with heavy metals in a ak, Serbia, *Romanian Journal of Physics*, Vol xx, No x,2014, pp. xxx-xxx. ISSN: 1221-146X, IF: 0.745 (http://www.nipne.ro/rjp/accepted_papers.html)

(M-52)

1. **Papi , M.**, Vukovi , M.,Dugali , G., Radoji i , M., Mitrovi , O.: *Multi-criteria analysis of soil fertility on the territory of municipality of a ak*, Zemljište i Biljka, Vol 62, No 3,2013, pp. 113-125. ISSN: 0514-6658

(M-33)

1. **Papi , M.**, Vukovi , M.: *Analysis of fertility as an Aspect of Sustainable Development of Soil in a ak Basin*, Environmental Management and Material Flow Management – EMFM 2014, Proceedings, pp. xxx-xxx, ISSN: xxxx-xxxx, 31.10. – 2.11. 2014., Bor, Srbija

5.

M.Sc.

M23,

JCR
