

Land and Environmental Management

Editor Hazairin Zubair



Land and Environmental Management

Editor

Hazairin Zubair

Publisher



Land and Environmental Management

Editor

Hazairin Zubair

Layouter & Cover Design

Muhammad Ihlasul Amal

ISBN 978-979-530-371-8

Published, I 2022

Publisher

Unhas Press

Membership

IKAPI No.: 002/SSL/01 & APPTI No.: 005.026.1.03.2018

Publisher Address

UPT Unhas Press Office, Unhas Tamalanrea Campus

Perintis Kemerdekaan KM 10 Street, Makassar, South Sulawesi

Phone/WA: +62 8229 9555 591 — Email: unhaspress@gmail.com

Website: unhaspress.unhas.ac.id

Copyright ©Hazairin Zubair. *All rights reserved.*

Reproduction part or whole content in this book is prohibited without written permission from the author or publisher.

Contents

Preface	v
Contents.....	vii
Chapter 1 Identification and Inventory of Land Resources....	1
Isolation and Screening Bacterial Exopolysaccharide (EPS) from Potato Rhizosphere in Highland and The Potential as a Producer Indole Acetic Acid (IAA)	3
Pore Characteristics at Different Depths of Cultivated and a Fallow Land in Vertisol from Jenepono South Sulawesi....	17
Production of Exopolysaccharide (Eps) Isolated from Bacterial Potato Rhizosfer on Several Sources of Carbon	33
Distribution of Cu Metal on the Soil around the Landfills of Antang, Makassar City.....	45
Distribution of <i>Escherichia Coli</i> as Soil Pollutant around Antang Landfills.....	59
Distribution of Manganese Heavy Metal (Mn) in Soil Around of Antang Landfill, Makassar City, Indonesia	71

Chapter II | Impact of Land Use on the Environment91

Analysis of cobalt (Co) in the soil of Antang Landfill, Makassar City, South Sulawesi Province, Indonesia by use of ICP-OES.....	93
Contamination and characteristic of Ni and Cr metal on top soil from Antang landfill, Makassar City, South Sulawesi Province, Indonesia	115
Behaviour of Mercury Around the Landfill of Tamangapa Antang, Makassar City, Indonesia	133
The Potential and Contamination of Metals Pb and Zn on the Soil around Tamangapa Antang Landfill.....	151
Coliform Distribution Around The Antang Landfill Soil Makassar City, South Sulawesi	169
Effect of Biochar and Water Level on Increasing Availability and Water Use Efficiency for Maize in Vertisol from Jeneponto South Sulawesi.....	181

Chapter III | Land, Watershed and Environment

Management.....199

Land Rehabilitation and Farm Management System of Upland: A Case Study of The Manting Sub Watershed, East Java, Indonesia	201
A Spatial Decision Support System for Agricultural Land Management in Maros Region, Indonesia.....	227
Sediment Control in the Bili-bili Reservoir: An Application of Modeling to Determine Management Options for the Jeneberang River Basin.....	245

Application of Conservation Techniques in the Potato Planting Area in Jeneberang Watershed	275
Study of Land-Use Changes in the Tanralili Sub Watershed in Supporting the Watershed Sustainability Model.....	285

Besides increasing farmers' income, one of the positive externalities of paddy fields is reducing the surface flow rate. Terracing will reduce the length and slope of the slopes to reduce surface runoff and erosion.

4. Conclusion

The period 2010 to 2020 saw a decline in industrial forest plantations, dry land, mixed bush farming, and savanna by 126.81 ha, 339.33 ha, and 103.67 ha, respectively. In this period, there was also an increase in secondary dryland forest, rice fields, shrubs, water bodies, and open land by 58.45 ha, 285.67 ha, 109.64 ha, 92.88 ha, and 23.18 ha, respectively. To achieved the Tanralili Sub-watershed sustainability, watershed management can be carried out by a). Increasing forest area (secondary forest and industrial plantation forest) and reducing the area of dryland agriculture by combining forestry and agricultural activities on existing dryland agricultural land cover (agroforestry); b). it was managing the area of water bodies in the Tanralili sub-watershed through reforestation activities or river normalization to increase assimilative water capacity; c). Increase the area of rice fields in specific locations. Increasing rice fields' area can increase farmers' income, reduce the amount of runoff or erosion, and control landslides if done by terracing on slope land.

References

- [1] E. F. Lambin et al., "The causes of land-use and land-cover change: Moving beyond the myths," *Glob. Environ. Chang.*, vol. 11, no. 4, pp. 261–269, 2001.
- [2] R. Erdogan, "Stakeholder Involvement in Sustainable Watershed Management," *Adv. Landsc. Archit.*, 2013.

- [3] B. Bishaw, "Deforestation and Land Degredation in the Ethiopian Highlands: A Strategy for Physical Recovery," *Northeast Afr. Stud.*, vol. 8, no. 1, pp. 7–25, 2001.
- [4] Q. Wu et al., "Monitoring and predicting land use change in Beijing using remote sensing and GIS," *Landsc. Urban Plan.*, vol. 78, no. 4, pp. 322–333, 2006.
- [5] N. Ramankutty and J. A. Foley, "Estimating historical changes in global land cover: Croplands from 1700 to 1992," *Global Biogeochem. Cycles*, vol. 13, no. 4, pp. 997–1027, 1999.
- [6] A. O. Haris, H. Zubair, and S. A. Syaiful, "Land suitability evaluation of crops that form agroforestry in tanralili district maros regency," *IOP Conf. Ser. Earth Environ. Sci.*, vol. 637, no. 1, 2021.
- [7] R. K. Jaiswal, N. C. Ghosh, A. K. Lohani, and T. Thomas, "Fuzzy AHP Based Multi Criteria Decision Support for Watershed Prioritization," *Water Resour. Manag.*, vol. 29, no. 12, pp. 4205–4227, 2015.
- [8] C. Losiri, M. Nagai, S. Ninsawat, and R. P. Shrestha, "Modeling urban expansion in Bangkok Metropolitan region using demographic-economic data through cellular Automata-Markov Chain and Multi-Layer Perceptron-Markov Chain models," *Sustain.*, vol. 8, no. 7, 2016.
- [9] V. N. Mishra and P. K. Rai, "A remote sensing aided multi-layer perceptron-Markov chain analysis for land use and land cover change prediction in Patna district (Bihar), India," *Arab. J. Geosci.*, vol. 9, no. 4, 2016.
- [10] C. A. Ku, "Incorporating spatial regression model into cellular automata for simulating land use change," *Appl. Geogr.*, vol. 69, pp. 1–9, 2016.
- [11] H. W. Zheng, G. Q. Shen, H. Wang, and J. Hong, "Simulating land use change in urban renewal areas: A case study in Hong Kong," *Habitat Int.*, vol. 46, pp. 23–34, 2015.
- [12] C. K. Yeh and S. C. Liaw, "Application of landscape metrics and a Markov chain model to assess land cover changes within a

- forested watershed, Taiwan,” *Hydrol. Process.*, vol. 29, no. 24, pp. 5031–5043, 2015.
- [13] A. Mukhopadhyay, P. Mondal, J. Barik, S. M. Chowdhury, T. Ghosh, and S. Hazra, “Changes in mangrove species assemblages and future prediction of the Bangladesh Sundarbans using Markov chain model and cellular automata,” *Environ. Sci. Process. Impacts*, vol. 17, no. 6, pp. 1111–1117, 2015.
 - [14] Y. Huang, P. Nian, and W. Zhang, “The prediction of interregional land use differences in Beijing: a Markov model,” *Environ. Earth Sci.*, vol. 73, no. 8, pp. 4077–4090, 2015.
 - [15] Hasnawir, T. Kubota, L. Sanchez-Castillo, and A. S. Soma, “The influence of land use and rainfall on shallow landslides in tanralili sub-watershed, Indonesia,” *J. Fac. Agric. Kyushu Univ.*, vol. 62, no. 1, pp. 171–176, 2017.
 - [16] R. W. Saaty, “The analytic hierarchy process-what it is and how it is used,” *Math. Model.*, vol. 9, no. 3–5, pp. 161–176, 1987.
 - [17] G. Camorani, A. Castellarin, and A. Brath, “Effects of land-use changes on the hydrologic response of reclamation systems,” *Phys. Chem. Earth*, vol. 30, no. 8–10, pp. 561–574, 2005.
 - [18] P. Pamukcu, N. Erdem, Y. Serengil, and T. O. Randhir, “Ecohydrologic modelling of water resources and land use for watershed conservation,” *Ecol. Inform.*, vol. 36, pp. 31–41, 2016.
 - [19] D. Rukmana, “Pertanian Berkelanjutan : Mengapa , Apa Dan Pelajaran Penting Dari,” pp. 1–9, 2012.
 - [20] B. Arts and J. de Koning, “Community Forest Management: An Assessment and Explanation of its Performance Through QCA,” *World Dev.*, vol. 96, no. April, pp. 315–325, 2017.
 - [21] M. Achmad, S. Samsuar, and H. Mubarak, “Predicting the impact of land-use change on soil erosion rate in Ussu sub-catchment area and sedimentation yield in Malili River,” *IOP Conf. Ser. Earth Environ. Sci.*, vol. 486, no. 1, 2020.



Hazairin Zubair graduated with a bachelor's degree in Agricultural Engineering at the Faculty of Agricultural Sciences, Hasanuddin University in 1980. The author continued to pursue his education at the Bogor Agricultural Institute and received a Master of Science degree in Soil and Water Conservation in 1987 and a Doctorate degree in Natural Resources and Environmental Management. in 1992. The author is a lecturer at the Soil Science Study Program, Faculty of Agriculture, Hasanuddin University since 1983 and was appointed as Professor in 2008 in the field of Soil and Water Conservation.

The author teaches various courses in undergraduate programs including Soil and Water Conservation, Fundamentals of Soil Science, Land System Analysis and Integrated Watershed Management, as well as in postgraduate programs including Systems Analysis in Agriculture, Environmental Management, Natural and Social Resource Analysis Region, Regional Planning Process and Method, Environmental Impact Analysis, Environmental Modeling, and Gender and Environment.

The author has done a lot of research on soil and land, watershed management, and the environment. The author joins several professional association, including the Indonesian Soil Science Association (HITI), the Indonesian Soil and Water Conservation Society (MKTi), the All-Indonesian Association of Environmental Experts (PERTALINDO).



Gedung UPT Unhas Press
Kampus Unhas Tamalanrea
Jln. Perintis Kemerdekaan Km. 10
Email: unhaspress@gmail.com
Makassar

