

REFERENCES

- [1] Acosta-Alba, I., S. Lopéz-Ridaura, H.M.G. van der Werf, P. Leterme, and M.S. Corson. 2012. "Exploring Sustainable Farming Scenarios at a Regional Scale: An Application to Dairy Farms in Brittany." *Journal of Cleaner Production* 28: 160-168.
- [2] Aryupong, C., 2012. Water Resources Management Plan by Community Involvement Process in Chiang Mai. Department of Civil Engineering, Faculty of Engineering, Chiang Mai University.
- [3] Azar, C., J. Holmberg, and K. Lindgren. 1996. "Socio-Ecological Indicators for Sustainability." *Ecological Economics* 18: 89-112.
- [4] The Bank of Thailand. 2014. Annual Report Economic Indices. [Online]. Available: <http://www.bot.or.th/Thai/Statistics/EconomicAndFinancial/EconomicIndices/Pages/StatEconomicIndices.aspx>. [May 12, 2014].
- [5] Bassel, H. 2000. Assessing Viability and Sustainability in INRM: A System-Base Approach for Deriving Comprehensive Indicator Sets. *Paper Presented in the Conference on Integrated Natural Resource Management in the CGIAR. Approaches & Lessons*. 21-25 August 2000. Penang Malaysia.
- [6] Chaiwinit, W. 2009. Economically and Environmentally Optimal Highland Crop Production Plans at Farm Level, Mae Suk Watershed, Mae Chaem District, Chiang Mai Province. Graduate School, Chiang Mai University.
- [7] Conservation Area Office 16. 2007. Information: Fang watershed. Department of National Parks, Wildlife and Plant Conservation.
- [8] Chiang Mai Agricultural Office. 2011. *Statistics of Crops*. [Online]. Available: http://chiangmai.doae.go.th/Stat_Plan.html. [January 1, 2012].
- [9] Chiang Mai Agricultural Office. 2013. *Agricultural Area in Fang, Chai Phrakan and Mae Ai district*. [Online]. Available: http://chiangmai.doae.go.th/Stat_Planhtm. [March 15, 2013].
- [10] Chiang Mai Agricultural Research and Development Center (Fang). 2012. Annual Report: Fang Horticultural Experiment Station. 256 p.

- [11] Chiang Mai Community Development Office. 2013. Annual Report: Quality of Life in Chiang Mai Rural Area, p 81.
- [12] Chiang Mai Employment Office. 2013. *Statistics of Migrant Workers*. [Online]. Available: <http://cmemployment.org/default2.asp>. [July 1, 2013].
- [13] Chiang Mai Meteorological Center, 2013. *Statistic of Rain and Temperature at Ang Khang Station*.
- [14] Choprayoon, C. 2005. Community's Participation in Water Resources Management for Agricultural in the Fang River Basin, Chiang Mai Province. Graduate School, Chiang Mai University.
- [15] Conway, G.R. 1994. "Sustainability in Agricultural Development: Trade-Offs Between Productivity, Stability, and Equitability." *Journal for Farming Systems Research-Extensions* 4 (2): 1-14.
- [16] DEQP. 1994. Department of Environmental Quality Promotion. *Northern Basin and Upstream Regeneration by Population Organization: Kok River*. Ministry of Natural Resource and Environment: p 59-60.
- [17] Dyer. J. S. 1972. Interaction goal programming. *Manage. Sci.* 19(1): 62-70.
- [18] Ekasingh, B., M. Ekasingh, and P. Promburom. 2001. Indicators of Sustainable Agriculture and Natural Resources on Highland: Socio-Economic Perspective. Multiple Cropping Center, Chiang Mai University.
- [19] Ekasingh, B., M. Ekasing, J. Kitchaicharoen, K. Thong-ngam, C. Sangchyoswat P. Punsompong, T. Kaewmuangmun, K. Kerdmun and W. Chaivinit. 2011. Agricultural Land Allocation Using Interactive Multiple Goal Programming. The Report summit the Thailand Research Fund.
- [20] Ekasingh, M., T. Koawmuangmoon and C. Sumhem. 2006. Analytical Hierarchy Process for Decision Support System. In 2006 Workshop of the Multiple Cropping Center, 22-23 September 2006, Green Lake Resort, Chiang Mai. (in Thai)
- [21] Ekasingh, M., B. Ekasingh, K. Ngamsomsuke and K. Thong-Ngam. 2007. Application of Analytical Hierarchy Process by Farmers to Select Pesticide Free Vegetable. 2007 Workshop of the Multiple Cropping Center, Imperial Mae Ping Sports Club, Chiang Mai. (in Thai)

- [22] Gómez-Limón, J.A., and L. Riesgo. 2008. Alternative Approaches on Constructing a Composite Indicator to Measure Agriculture Sustainability. Paper prepared for presentation at the 107th EAAE Seminar "Modelling of Agricultural and Rural Development Policies." January 29th -February 1st, 2008. Sevilla, Spain.
- [23] Heal Information Systems Development Office (HISO). 2005. *The Situation Air Pollution in Thailand*. [Online]. Available: http://www.hiso.or.th/hiso/analystReport/picture/5_lesson4.doc. [January 1, 2012].
- [24] Hijmans, R.J. and M.K. Van Ittersum. 1996. "Aggregation of spatial units in linear programming models to explore and use options". *Netherlands Journal of Agricultural Science* 44:14-162.
- [25] Hung, M. L., W.F Yang., H.W. Ma and Y.M Yang. 2006. "A Novel Multi-objective Programming Approach Dealing with Qualitative and Quantitative Objectives for Environmental Management". *Ecological Economics* 56(4): 584–593.
- [26] Ismail W.K.W. and L. Abdullah. 2012. "A New Environmental Performance Index using Analytic Hierarchy Process: A Case of ASEAN Countries". *Environmental Skeptics and Critics*. 1(3):39-47.
- [27] Janssen, S., and M.K.van Ittersum. 2007. "Assessing Farm Innovations and Responses to Policies: A Review of Bio-Economic Farm Models." *Agricultural Systems* 94 (3): 622-636.
- [28] Jongkaewwattana, S. 1995. *Systems Simulation and Modeling*. Multiple Cropping Center, Faculty of Agricultural, Chiang Mai University, Thailand, p 199.
- [29] Jomreanma, K., S. Sutiarrrom, S. Srichantha, S. Srikacha, B. Manutmunkong, V. Plodnakronburee, and V. Vongnikong. 2005. *The Following of Behavior and Effects of Insecticides and Enemies Mite of Orange Orchard in Fang and Mae Ai District, Chiang Mai Province*. Entomology and Zoology, Department of Plant Protection Research and Development, Department of Agriculture. Ministry of Agriculture.

- [30] Julio, B.V., J.B. Maria and G. Carlos. 2005. "Multicriteria and Multiperiod Programming for Scenario Analysis in Guadalquivir River Irrigated Farming". In the Future of Rural Europe in the Global Agri-Food System Meeting. 24-27 August, 2005. Copenhagen, Denmark.
- [31] Jumnon A. 2002. *Sociology*. Kasetsart University Published, Bangkok, Thailand.
- [32] Kammerbauer. J., B. Cordoba, R. Escola'n, S. Flores, V. Ramirez, J. Zeledo'n. 2001. "Identification of Development Indicators in Tropical Mountainous Regions and Some Implications for Natural Resource Policy Aesigns: An Integrated Community Case Study". *Ecological Economics*.36: 45–60.
- [33] Karami E. 2006. "Appropriateness of Farmer's Adoption of Irrigation Methods: The Application of the AHP Model". *Agricultural Systems*. 87: 101–119.
- [34] Kara, Y and A.C. Köne. 2012. *The Analytic Hierarchy Process (AHP) Approach for Assessment of Regional Environmental Sustainability*. Department of Economics, Muğla University, Muğla, Turkey.
- [35] Klemperer, W.D. 1996. *Forest Resource Economics and Finance*. New York: McGraw-Hill International.
- [36] Lee. Song M. 1971. *Goal Programming for Decision Analysis*. Averbach Pubi., Inc., Philadelphia, p 363.
- [37] Lefroy, Rod D.B., Hans-Dieter Bechstedt and Mohammad Rais. (2000). "Indicators for Sustainable Land Management Based on Farmer Surveys in Vietnam, Indonesia, and Thailand". *Agriculture, Ecosystems and Environment*. 81: 137–146.
- [38] Laborte A.G., R.P. Roetter and C.T. Hoanh. 1999. *SysNet Tools: The Multiple Goal Linear Programming (MGLP) Model and MapLink*. Manila: International Rice Research Institute.

- [39] López-Ridaura, S., H. van Keulen, M.K.van Ittersum, and P.A. Leffelaar. 2005a. “Multi-Scale Sustainability Evaluation of Natural Resource Management Systems: Quantifying Indicators for Different Scales of Analysis and Their Trade-Offs Using Linear Programming.” *International Journal of Sustainable Development & World Ecology*. 12:81–97.
- [40] López-Ridaura, S., H.van Keulen, M.K. van Ittersum, and P.A. Leffelaar. 2005b. “Multiscale Methodological Framework to Deliver Criteria and Indicators for Sustainability Evaluation of Peasant Natural Resource Management Systems.” *Environment, Development and Sustainability* 7:51–69.
- [41] Lu, C.H., M.K.van Ittersum, and R. Rabbinge. 2004. “A Scenario Exploration of Strategic Land Use Options for the Loess Plateau in Northern China.” *Agricultural Systems* 79:145–170.
- [42] McConnell, D.J. and J.L. Dillon. 1997. *Farm Management for Asia: A Systems Approach*. Department of Agricultural and Resource Economics, University of New England Armidale, New South Wales, Australia, p 355.
- [43] Masera, O., M. Astier, and S. Lopez-Ridaura. 1999. *Sustainability and Natural Resource Management: The MESMIS Evaluation Framework*. Mexico City: Group Interdisciplinario de Tecnologia Rural Aproplacia and Instituto de Ecologia.
- [44] Marten. G.G. 1998. “Productivity, Stability, Sustainability, Equitability and Autonomy as Properties for Agroecosystem Assessment.” *Agricultural Systems* 26: 291-316.
- [45] Moldan, B., S. Janousková, and T. Hák. 2012. “How to Understand and Measure Environmental Sustainability: Indicators and Targets.” *Ecological Indicators* 17:4-13.
- [46] Mueller, S. 1997. *Evaluating the Sustainability of Agriculture: the Case of the Reventado River Watershed in Costa Rica*. Dissertation, Kiel University, Germany.

- [47] NREMD. 2011. Natural Resource and Environmental Management Division. *The Problem Management of Chemicals Use in Orange Farms*. [Online]. Available: <http://www.onep.go.th/Naturalresources/soil/som/som.htm>. [December 13, 2011].
- [48] Nidumolu, U. B., H. van Keulen, M. Lubbers, and A. Mapfumo. 2007. “Combining Interactive Multiple Goal Linear Programming with an Inter-Stakeholder Communication Matrix to Generate Land Use Options.” *Environmental Modelling & Software* 22: 73-83.
- [49] Nikkami, D., M. Shabani, and H. Ahmadi. 2009. “Land Use Scenarios and Optimization in a Watershed.” *Journal of Applied Sciences* 9(2): 287-295.
- [50] Office of Agricultural Economic. 2013. *Land use*. [Online]. Available: http://www.oae.go.th/more_news.php?cid=262. [Junly 25, 2013]
- [51] Onpraphai, T., M. Ekasingh, B Ekasingh, C. Sheangchyoswat, V. Veerachitt, T. Kaewnuangmun, P. Pantiya and A. Ratniyom. 2009. Analytical System of Alternative Agricultural Occupation Based on Resources Information in Watershed. Multiple Cropping Center, Chiang Mai University. Report submit the Thailand Research Fund.
- [52] Onpraphai, T., S. Tealtatum, R. Na lunphun, J. Kunmano and V. Verunrat. 2011. Spatial database systems. In: Onpraphai, T. and C. Santasup (Eds.) *Optimal Land Use and Water Resources Management for Orange (Sainumphung)*. The Thailand Research Fund (TRF), pp. 13-60.
- [53] Pannell, D. J. and Glenn, N. “A. 2000. A Framework for the Economic Evaluation and Selection of Sustainability Indicators in Agriculture”. *Ecological Economics*. Vol. 33, issue 1, Page 135–149.
- [54] PCD. 2004. Pollution Control Department, Ministry of Natural Resource and Environmental. *Thailand Pollution Report of the year 2004*. [Online]. Available: http://www.pcd.go.th/public/publications/en_print_report.task=report2547. [December 13, 2011].

- [55] Perez-Grovas, G.V., 2000. Evaluación de la Sustentabilidad del Sistema de Manejo de café Orgánico en la Unión de Ejidos Majomut, Región de los Altos de Chiapas. In: Maserá, O., López-Ridaura, S., (Eds.), *Sustentabilidad y Sistemas Campesinos. Cinco Experiencias de Evaluación en el México Rural*. MundiPrensa-GIRA-UNAM, México, p. 45–81.
- [56] Phratnuwat, P., N. Taveechai and P. Hammering. 1999. *Nanasara of Orange Publication*. Jae Film Process Co.,Ltd, p 181.
- [57] Praneetvatakul, S., Janekarnkij, P., PotchanasinC., K. Prayoonwong (2001). Assessing the Sustainability of Agriculture: A Case of Mae Chaem Catchment, Northern Thailand, *Environment International* 27 (2001), p 1-7.
- [58] Praneetvatakul, S., Sirijinda, A. 2001. *Sustainable Agricultural Systems Planning on Highland Area of Northern Thailand*. Applied Economic, Faculty of Economic, Kasetsart University.
- [59] Praneetvatakul S. and A. Sirijinda. 2003. Sustainable Agricultural Systems Planning on Highland Area of Northern Thailand. The report summated to the Thailand Research Fund, Ministry of Science and Technology.
- [60] Praneetvatakul S. and A. Sirijinda. 2005. Village and Regional Models for Sustainability of Highland Agricultural Systems in Northern Thailand. The report summated to the Thailand Research Fund, Ministry of Science and Technology.
- [61] Roetter, R.P., M.van den Berg, A. Laborte, H. Hengsdijk, J.Wolf, M. van Ittersum, H.van Keulen, E.O. Agustin, T.T. Son, N.X. Lai, and W. Guanghuo. 2007. “Combining Farm and Regional Level Modeling for Integrated Resource Management in East and South-East Asia.” *Environmental Modelling & Software* 22:149-157.
- [62] Saaty T.L. 2008. *Decision Making with the Analytic Hierarchy Process*. Int. J. Services Sciences, Vol. 1, No. 1.
- [63] Saaty, T.L. 2010. *Principia Mathematica Decernendi: Mathematical Principles of Decision Making*. Pittsburgh, Pennsylvania: RWS Publications. ISBN 978-1-888603-10-1.

- [64] Sadeghi, S.H.R., Kh. Jalili, and D. Nikkami. 2009. "Land Use Optimization in Watershed Scale." *Land Use Policy* 26:186–193.
- [65] Santasup, C. and V. Verunrat. 2011. Condition of Soil Fertility and Trend Change of Soil Properties in Orange Crop. In: Onpraphai, T. and C. Santasup (Eds.) *Optimal Soil and Water Management for Orange (Sainumphung)*. The Thailand Research Fund (TRF), pp. 61-89.
- [66] Senthilkumar, K., M.T.M.H. Lubbers, N.Ridder, P.S.Bindraban, T.M.Thiyagarajan and K.E.Giller. 2011. "Policies to Support Economic and Environmental Goals at Farm and Regional Scales: Outcomes for Rice Farmers in Southern India Depend on Their Resource Endowment". *Agricultural Systems* 104(1): 82-93.
- [67] Tharaj S. 2012. The Appropriate Management of Soil and Water Resources for Orange Orchard (Sai Nam Phung). [Online]. Available: <http://web.agri.cmu.ac.th/somsainamphung/Annals.asp>. [April 13, 2013].
- [68] Thailand Rice Foundation. 2010. Rice awareness. [Online]. Available: http://www.thairice.org/html/aboutrice/about_rice3.htm. [July 1, 2013].
- [69] USAID Forest Service General Technical Report PNW-53.
- [70] Ubonrat K., M. Phummin, S. Vijetranun and P. Pithukpriwan. 2002. *Citrus production and propagate pure disease of citrus*. Department of Agricultural, Ministry for Agricultural and Cooperatives.
- [71] Willson, K. and George E.B. Morren. 1990. *Systems Approaches for Improvement in Agriculture and Resource Management*. Macmillan Publishing Company, New York, Collier Macmillan Publishers, London, p 361.
- [72] Wironsri, W. 1988. Economic Analysis of the Sustainability of High Land Agricultural Systems: A Case Study of Pha Nok Kok Village, Mae Rim District, Chiang Mai Province. Graduate School, Chiang Mai University.
- [73] Xu, W. and J.A.Mage. 2001. "A Review of Concepts and Criteria for Assessing Agroecosystem Health Including a Preliminary Case Study of Southern Ontario." *Agriculture, Ecosystem & Environment* 83: 215-233.
- [74] Zander, P. and H.Kachele. 1999. "Modelling Multiple Objectives of Land Use for Sustainable Development". *Agricultural Systems*. 59:311-325.

- [75] Zhu X. and P. D. Allan. 2001. "Java AHP: a Web-Based Decision Analysis Tool for Natural Resource and Environmental Management". *Environmental Modeling & Software*. 16: 251–262.

LIST OF PUBLICATIONS

- 1) Panitpim Sittisak “Economic Worthiness of Citrus by Production Resource Management” The 3rd Khon Kean University International and National Conference on Sustainable Rural Development 2013 under the “Local Community; The Foundation of Development of the ASEAN Economic Community”. 9-10 May 2013 At Centara Hotel & Convention Center Khon Hean, Thailand.
- 2) Panitpim Sittisak and Benchaphun Ekasingh, “Sustainable Indicators of Citrus-based Farming Systems at Farm Levels in Chiang Mai Province, Thailand,” International Graduate Research Conference 2013 the Graduate School, Chiang Mai University, December 20, 2013, Page HS 59-66.
- 3) Panitpim Sittisak and Benchaphun Ekasingh, “Optimal Resource Management with Multiple Goals of Citrus-based Farming Systems at Farm and Watershed Levels, Chiang Mai Province,” The 9th National Conference on Agricultural Systems, 21-23 May 2014. Khon Kaen Agricultural Journal, Val.42 Supplement 2, 2014, Page 15-24.
- 4) Panitpim Sittisak and Benchaphun Ekasingh, “Trade-offs in Optimal Resource Management in the Fang Watershed, Chiang Mai Province, Thailand” 1st International Conference on Asian Highland Natural Resources Management (AsiaHiLand) and 2nd IDRC-SEARCA Upland Fellowship and Conference The Empress Hotel, Chiang Mai, Thailand January 7th to 9th, 2015.