PHILIPPINE AGRICULTURAL BIBLIOGRAPHY

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USER'S GUIDE

Consecutively numbered, the bibliographic entries are classified according to subject category.

SAMPLE ENTRIES

MONOGRAPH

1 **C10**

2 Enhancement of the forest genetics laboratory of the College of Forestry and 3 Natural Resources (CFNR) University of the Philippines Los Baños (UPLB) [Laguna, Philippines]. **Tolentino, E.L., Jr.** *Department of Science and Technology, Bicutan, Taguig City (Philippines). Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development.* 2016 *TR-1826.* 4 6 5

9 Laboratory mass rearing of the five lepidopteran pests of corn namely the…

10 FORESTS; LABORATORY EQUIPMENT; FORESTRY EQUIPMENT; UNIVERSITIES;

BOOK CHAPTER

1 **E14**

2 Bioethanol production from macroalgae and socio-ecological implications: Project 1: socio-ecological assessment and analysis for algal biomass production, development and promotion.

3 **Fernandez, P.R.,Jr, Geganzo, L.G.L., Subade, R.F., Napilan-Espectato. L.** Bioethanol production from macroalgae and socio-ecological implications. Fernandez, P.R.Demafelis, R.B.Geganzo, L.G.L.Subade, R.F.Napilan-Espectato, L.Santiago, D.E.O.Movillon, J.L.Hourani, K.Gatdula, K.M.Magadia, R.V.Jr.- College, Laguna (Philippines), *2016. TR-1732. p. 1-71 .* 11 12 6 5

9 IPB Var 6 is a white-flint open pollinated variety. It is a quality protein maize (QPM) that is high yielding and

10 ZEA MAYS; MAIZE; VARIETIES; SEED; PROTEINS; PROCESSED PRODUCTS; FOODS; TECHNOLOGY; TECHNOLOGY

SERIAL ARTICLE

1

D50 - LEGISLATION

2

Will patients benefit from the current Philippine Legislative Bill on medical cannabis? a cost-benefit analysis. **Dalmacion, G.V. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). Dept. of Clinical Epidemiology. Ramirez, P.J.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Economics. Regencia, Z.J.G., Baja, E.S. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). Inst. of Clinical Epidemiology. esbaja@up.edu.ph.** *Philippine Agricultural Scientist (Philippines). 0031-4454. v. 104 (3) p. 197-222. 2021.* *https://pas.cafs.uplb.edu.ph/download/will-patients-benefit-from-the-current-philippine-legislative-bill-on-medical-cannabis-a-cost-benefit-analysis/*

3 8 13

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Philippine Congress is pushing House Bill (HB) 6517 to decriminalize medical cannabis use in the Philippines. This study aims to evaluate the cost and benefit that will likely result from ...

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CANNABIS; DRUG PLANTS; PUBLIC HEALTH LEGISLATION; COST BENEFIT ANALYSIS; GOVERNMENT

BOOK CHAPTER

1

E14 - DEVELOPMENT ECONOMICS AND POLICIES

2

Bioethanol production from macroalgae and socio-ecological implications: Project 1: socio-ecological assessment and analysis for algal biomass production, development and promotion. **Fernandez, P.R.,Jr, Geganzo, L.G.L., Subade, R.F., Napilan-Espectato. L.** Bioethanol production from macroalgae and socio-ecological implications. Fernandez, P.R.Demafelis, R.B.Geganzo, L.G.L.Subade, R.F.Napilan-Espectato, L.Santiago, D.E.O.Movillon, J.L.Hourani, K.Gatdula, K.M.Magadia, R.V.Jr.- College, Laguna (Philippines), *TR-1732. 2016. p. 1-71 .*

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IPB Var 6 is a white-flint open pollinated variety. It is a quality protein maize (QPM) that is high yielding and

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ZEA MAYS; MAIZE; VARIETIES; SEED; PROTEINS; PROCESSED PRODUCTS; FOODS; TECHNOLOGY; TECHNOLOGY

1. Subject category
2. Title
3. Author (s)
4. Corporate author
5. TR No.
6. Date
7. Conference title, place, and date
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A - AGRICULTURE IN GENERAL

A01 - AGRICULTURE - GENERAL ASPECTS

Developing our high value crops: some insights from an insider. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 61-64. 2022.*
https://agriculture.com.ph/2022/02/09/developing-our-high-value-crops-some-insights-from-an-insider/

AGRICULTURE; ECONOMIC POLICIES; TRADE; ENTERPRISES; PROFITABILITY; FOOD SUPPLY; FARMERS; PHILIPPINES

A50 – AGRICULTURAL RESEARCH

Transdisciplinary approach in development studies. **Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. agnesrola08@yahoo.com.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 1 (1) p. 23-57. 2012.*
https://jpad.cpaf.uplb.edu.ph/articles/transdisciplinary-approach-in-development-studies/

This paper traces the origin, evolution, and the propositions made by the framers of the transdisciplinary (TD) concept. It reviews the body of work of the various applications of the TD approach in the human sciences as in the twinning of medical sciences and the social sciences; biodiversity; agriculture sciences and development; and agriculture, food, and nutrition. Another application of the TD approach is discussed in the context of innovation systems for development studies with focus on sustainable community development and food security. The experiences of the College of Public Affairs and Development (CPAf), University of the Philippines Los Baños (UPLB) in formulating and applying the TD approach to development problems are highlighted. Recommendations are given on the integration of TD in curricular programs of CPAf.

RESEARCH; INNOVATION; COMMUNITY DEVELOPMENT; RURAL COMMUNITIES; FOOD SECURITY; SUSTAINABILITY

C – EDUCATION, EXTENSION AND INFORMATION

C10 - EDUCATION

Assessment of the level of job satisfaction among faculty members in a Philippine University. **de Guzman, R.S.C., Depositario, D.P.T., Banzon, A.T. Philippines Univ. Los**

Baños, College, Laguna (Philippines). Dept. of Agribusiness Management and Entrepreneurship. *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 5 (2) p. 55-68. 2019.*
https://jemad.cem.uplb.edu.ph/articles/an-assessment-of-the-level-of-job-satisfaction-among-faculty-members-in-a-philippine-university/

An assessment of levels of satisfaction was conducted among 142 faculty members of a Philippine university. In general, the members of the faculty were satisfied with their jobs. These were due to the personal and professional growth and development, as well as the freedom and flexibility the job has provided them to achieve work-life balance. Though, administrative functions such as promotion, document processing, salary and benefits, and university facilities were evaluated to be relatively less satisfactory. Using regression analysis, it was determined that years of service, gender, number of course preparations, work fulfillment, safety, salary contentment, and career advancement significantly contribute to satisfaction. Further, utilizing factor analysis, six relevant factors related to job satisfaction were identified; workload, social and societal interactions, growth and development, compensation and benefits, administration, and classroom experience. Satisfaction was seen to have moderate and weak positive relationship with organizational citizenship and intent to continue work, respectively. It is recommended that the university should continue creating an environment conducive for personal and professional growth and development through its plans and programs. The insights the research provided call for more efficient document processing through automation and computerization, thorough review and revision of promotion policies and procedures, and improvements in infrastructure.

PHILIPPINES; WORK SATISFACTION; HUMAN RESOURCES; EDUCATION; UNIVERSITIES

Challenges of the new normal: students' attitude, readiness and adaptability to blended learning modality. **Abbacan-Tuguic, L.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 134-150. 2020.*

In Mid the second semester of the academic year 2019-2020, the Kalinga State University commenced applying a blended/Flexible learning approach that combines synchronous and asynchronous learning modalities. This study explores students' attitudes, readiness for learning to determine their adaptability to a blended learning environment using different technological platforms and investigating problems and challenges students face in their learning. Drawing upon 508 questionnaires using the Google form, with closed and open-ended questions along with virtual interview with 25 interviewees. The researcher analyses the survey data quantitatively and open-ended questions and virtual results qualitatively and then merges the two sets of results to assess in what the results about students

attitudes and readiness to blended learning converge and diverge employing the convergent parallel-side by the side mixed method approach. Mixing the two databases by merging the results during interpretations the findings revealed Technological Lapses, which covers the educational devices unavailability unreliable internet connectivity hinders the success and productive implementation of blended readiness to implement blended learning. But there is a negative correlation between the students' attitude and students' readiness towards blended learning environment. Conversely results from open-ended question responses and the virtual-interview confirmed or validated the results from the closed-ended questions.

UNIVERSITIES; STUDENTS; BEHAVIOUR; ADAPTABILITY; COMPUTER APPLICATIONS

Coping mechanisms of teacher education students in online class. **Leyaley, R.V.G.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 1 (1) p. 105-116. 2020.*

It has been a while now when online classes in the country were the options for schools to deliver lessons that will not affect teachers and students of the COVID 19 pandemic. The Kalinga State University used the online classroom as the mode of teaching and learning. This study focused on the Teacher Education students' experiences on this new way of learning. This study then focused on the Teacher Education students' experiences on this new new way of learning. It sought answers to problems they encountered, their coping mechanisms and their suggestions for learning delivery models. The results revealed that the students encountered problems along with technological issues, learning environments, and lesson delivery. As the coping mechanisms, the students coped up by using adaptive, cognitive and behavioral mechanisms; and most of the respondents suggested using printed modules as mode of teaching and learning.

EDUCATION; TEACHERS; TEACHING; STUDENTS; MENTAL ABILITY; COMPUTER APPLICATIONS; COMPUTER SOFTWARE; UNIVERSITIES

Farmer Field School as an effective approach in increasing farmers' knowledge, skills, and practices, and in enhancing diffusion of innovations: evidences from selected rice farmers in Masalasa, Victoria, Tarlac, Philippines. **Ilar, G.Y. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). glenn.ilar@gmail.com.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (2) p. 107-142. 2015.*
https://jpad.cpaf.uplb.edu.ph/articles/farmer-field-school-as-an-effective-approach-in-increasing-farmers-knowledge-skills-and-practices-and-in-enhancing-diffusion-of-innovations-evidences-from-selected-rice-farmers-in-masalas/

The study assessed the effectiveness of the Farmer Field School (FFS) approach in increasing the knowledge, skills, and practices of selected rice farmers in Barangay [village] Masalasa, Victoria, Tarlac in the Philippines as well as the diffusion of innovations among them. Empirical evidences were obtained from the 24 farmers who attended the FFS on PalayCheck System and 24 non-participating farmers serving as the control group. The FFS provided farmers with new knowledge and skills on the whole PalayCheck System as demonstrated by the FFS graduates having more knowledge on the PalayCheck component-technologies as compared with non-FFS farmers. All the FFS farmers shared their knowledge to their families, relatives, friends, and other farmers. Farmer- to-farmer diffusion was observed as the FFS farmers shared what they have learned to the non-FFS farmers, who in turn, shared this knowledge with other farmers. Thus, more farmers were reached because of the multiplier effect of farmer-to-farmer diffusion. While the extent of knowledge diffusion, such as the number of farmers and the management practices shared by the participants, were not determined, this case study suggests that FFS can be a good avenue for building the human and social capital of farmers. However, social and technical gains can only be sustained if the appropriate local and national level-institutions, and the necessary supporting mechanisms and policies for continuous capacity development are developed and in place.

ORYZA SATIVA; RICE; FARMERS; EDUCATIONAL INSTITUTIONS; DIFFUSION OF INFORMATION; TRAINING CENTRES; TRAINING PROGRAMMES; TECHNOLOGY; TECHNOLOGY TRANSFER; PHILIPPINES

Improving the training guide on village forestry management planning. **Anon.** *Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. 2020. p. 59-62.*

COMMUNAL FORESTS; FORESTRY; VILLAGES; FOREST MANAGEMENT; TRAINING PROGRAMMES; LOCAL GOVERNMENT; LAO PEOPLE'S DEMOCRATIC REPUBLIC

Knowledge, attitude, and practices about chemical laboratory safety of the faculty, staff and students of Kalinga State University [Philippines]. **Manuel, M.S., Bona, C.A.C., Aggabao, B.C.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 117-124. 2020.*

This study investigates the perception of the students, faculty, and staff of Kalinga State University [Philippines] about chemical safety in the laboratories, including the familiarization of chemical hazards and warning symbols. Thirty-two questions were used to assess knowledge, attitudes, and practices among 114 respondents, primarily female, classified as ten faculty members, a university official, and 113 students. Descriptive

statistics convey that both students, faculty, and staff demonstrated poorly on familiarity and understanding a chemical hazards and warning symbols. Students displayed a poor attitude towards chemical safety and practices, there is a need for reinforcement and conduct of safety ethics and risk management in the university's chemical laboratory, especially students and subject-in charge with the laboratory. It is imperative to develop a crash course or lecturer-seminar on Chemical Hazard identification, hazardous waste, and risk management with safety rules and procedures to equipped students and faculty, and staff with knowledge, the right attitude, and practices in all laboratories. It is also recommended that all university students need to undergo training on testing facilities, chemical safety devices, and other normal protocols encountered in the laboratory.

HIGHER EDUCATION; LABORATORIES; TEACHERS; STUDENTS; HEALTH PROTECTION; UNIVERSITIES; PHILIPPINES

Mother tongue based language education in Philippines and Cambodia: a comparative study. **Lang-ay, P.L.D., Sannadan, J.G.M.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 72-94. 2020.*

The implementation of Mother Tongue-Based Multilingual Education addresses numerous educational issues in the Philippines and Cambodia by recognizing a child's mother tongue, culture, and context as the foundation of learning. The study used literature juxtaposition and qualitative meta-analysis to conduct a rigorous secondary qualitative analysis of primary qualitative findings. This is to provide a more comprehensive description of the implementation of MTB-MLE in both countries and its perceived effects on the indigenous communities. The study determined that most mother tongue-based education in both countries occur in the non-formal sector, particularly at the preschool or adult literacy classes. Most programs are run by non-government actors, such as local and international NGOs and other civil society actors. It further concludes that this learning initiative helped the marginalized minorities by supporting the utilization of their mother tongue and helping them make sense of the words and the world they are in. This learning initiative would encourage students to achieve more and would allow them to relate their everyday reality to reality nationally, internationally, and globally.

EDUCATION; ETHNIC GROUPS; INDIGENOUS KNOWLEDGE; CULTURAL VALUES; CAMBODIA; PHILIPPINES

Neoliberal restructuring in Philippine Education; toward perfomativity. **Lang-ay, P.L.D., Sannadan, J.G.M.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 58-71. 2020.*

This research article focuses on the manifestation of neoliberalism in Philippine Education and its effect on performativity. Qualitative meta-analysis is used to conduct a rigorous secondary qualitative analysis of primary qualitative findings. Its purpose is to provide a more comprehensive description of a phenomenon and an assessment of neoliberalism's influenced on the performativity of Philippine Education. The study determined the neoliberalism is manifested in the K to 12 Program and the Quality Management Mechanisms in Philippine Higher Education. The study further concludes that 'performativity' is apparent in teachers' day-to-day activities and teachers' social relations. Teachers are required to choose and judge their actions. These actions, in turn, are judged by others based on their contribution to organizational performance. The stricter qualification standards measured through a minimum set of criteria evaluated by accrediting agencies are also set for Philippine Higher Education Inst

HIGHER EDUCATION; TEACHERS; EDUCATIONAL POLICIES; EDUCATION; CURRICULUM; PHILIPPINES

Performance of Civil Engineering Graduates on the licensure examination relating to their academics performance. **Garming, R.R., Ganagan, G.O., Malaga, J.P.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 44-57. 2020.*

Along with the Kalinga State University aim of targeting Center of Excellence in its priority, programs, the institution is yet to address to surpass the national passing rate and address the declining Board Exam performance in its Bachelor of Science in Civil Engineering. This study investigates the performance of Civil Engineering Graduates in the board exam relating to their Academic Performance. The study utilized the Quantitative-descriptive method among 92 first time examinees from November 2016 to November 2018. Descriptive statistics on Board Examination showed their potential in Subject 1 and Subject 2. Subject 3, as the professional subject, yielded the lowest. Their Academic performance reflected their potential in Subject 1 while professional subjects 2 and 3 scaled the lowest. A correlation exists at a 29.6% correlation between board exam and academic performance presented by the Grade point average of 23 related subjects. Subjects College Algebra, Analytic and Solid Mensuration, and Transportation engineering were identified as predictors for subject 1; Hydraulics and Geotechnical Engineering for Subject 2 and: Structural Theory 1 and Reinforced Concrete 2 for subject 3. The regression model validated these predictor variables except for College Algebra. Results were used to rationalize admission and retention policies of the program and the board exam intervention program.

HIGHER EDUCATION; UNIVERSITIES; CURRICULUM; STUDENTS; PHILIPPINES

Performance of graduates in licensure examination for agriculturists in Bicol Region, Philippines. **Dimayuga, C.L., Dr. Emilio B. Espinosa, Sr. Memorial State College of Agriculture and Technology, Mandaon, Masbate (Philippines). cynthia_dimayuga@yahoo.com.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (1) p. 111-129. 2015.*
https://jpad.cpaf.uplb.edu.ph/articles/performance-of-graduates-in-licensure-examination-for-agriculturists-in-bicol-region-philippines/

The study assessed the performance of graduates in Licensure Examination for Agriculturists (LEA) in the different state universities and colleges in Bicol Region, Philippines in 2008 and 2009. Central Bicol State University of Agriculture ranked 1st, Camarines Norte State College ranked 2nd, Catanduanes State College ranked 3rd, Bicol University College of Agriculture and Forestry ranked 4th, Dr. Emilio B. Espinosa, Sr. Memorial State College of Agriculture and Technology ranked 5th, and Sorsogon State College ranked 6th . Academic variables such as fourth year high school average grade (FYHSG), college general weighted average (CGWA), and the type of preparation tool were found to have significant relationships with the LEA rating. The socio-demographic variables identified (age, gender, type of high school attended, location of high school attended, course and major field, level of accreditation of agriculture programs) had no significant relationship with the LEA rating. First time LEA test takers with FYHSG of 86 and above, CGWA of 1.97 and above, and good preparation such as enrollment in a formal LEA review class backed up with self-review, tended to pass the LEA. An agriculture graduate should have a good academic performance during his/her high school and college education and must have good preparation tools to successfully hurdle the LEA rating. First time the LEA test takers with FYHSG of 86 and above CGWA of 1.97 and above, and good preparation such as enrollment in a formal LEA review class backed up with self-review, tendered to pass the LEA. An agriculture should have a good academic performance during his/her high school and college education and must have good preparation tools to successfully hurdle the LEA.

STUDENTS; EVALUATION; HIGHER EDUCATION; PHILIPPINES

Perspective of environmental education in Taiwan: current status of implementation. **Chang-Mao Lee, Ching-Hwa Lee. Da-Yeh Univ., Changhua (Taiwan). Dept. of Environmental Engineering. chl@mail.dyu.edu.tw., Popuri, S.R. The Univ. of the West Indies, Cave Hill Campus (Barbados). Dept. of Biological and Chemical Science.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 83-95. 2020.*

Environmental education is becoming an essential subject as the environment changes rapidly with human activities. To protect the environment, several countries implemented

environmental education acts. Taiwan is the sixth country in the world that implemented an act for environmental protection and sustainability. This study reports the 20-year journey of development and the pioneer status of environmental education act into practice. The Ministry of Education of Taiwan and Environmental Protection Agency jointly proposed the environmental education programme in 1992 to create awareness on the environment protection and develop knowledge, attitudes, skills and values necessary for improving the environment. The Environmental Protection Agency is responsible for accrediting qualified environmental education institutions to handle environmental education personnel training, curriculum plan and management, provide professional service of environmental education with rich ecology, etc. During 2011 to 2019, 200 students in 17 cities were issued environmental education certificates and became qualified environmental education personnel. The number of environmental education personnel in Taiwan has increased every year after the implementation of the Environmental Education Law. This study also provides suggestions of integrating environmental education into the school curriculum and the establishment of corporate social responsibility towards environmental education.

ENVIRONMENT; EDUCATION; ENVIRONMENTAL POLICIES; ENVIRONMENTAL PROTECTION; TAIWAN

Towards sustainable communities and human security: challenges of the College of Public Affairs and Development University of the Philippines Los Baños [Laguna, Philippines]. **Rola, A.C. agnesrola08@yahoo.com., Dizon, J.T., Quimbo, M.A.T. anaquimbo@yahoo.com., Carada, W.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. wcarada@yahoo.com.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 1 (1) p. 153-168. 2012.*
https://jpad.cpaf.uplb.edu.ph/articles/towards-sustainable-communities-and-human-security-challenges-of-the-college-of-public-affairs-and-development-university-of-the-philippines-los-banos/

The College of Public Affairs (CPAf) in the University of the Philippines Los Baños (UPLB) evolved as a unit of the University with the mandate to raise the bar of applied social science scholarship by developing transdisciplinary methods in the resolution of public issues such as food security, land reform and land use, governance, population, and education. The creation of CPAf in 1998 was prompted 'by the need to attune academic programs in the pursuit of UP's mission to promote nationalism and development in the face of profound changes occurring in the global environment.' In 2011, it was renamed as the College of Public Affairs and Development. This paper highlights the integrative framework that summarizes CPAf's plans, innovations, and strategies in helping build sustainable communities and attain human security. These targeted impacts anchored on programs and services that operationalize the major functions of CPAf as an academic unit.

Built into these functions are the theoretical foundations for communities of practice on institutional development, policy reform and development, and local governance and development. In the final section, future challenges are presented. These center on the growing appreciation of students in agriculture in the Philippines and in Southeast Asia of Public Affairs as a discipline and the articulation of the rigor and relevance of trandisciplinary research in an otherwise disciplinary community.

UNIVERSITIES; STUDENTS; EDUCATION; EXTENSION ACTIVITIES; TRAINING PROGRAMMES

Tracer study of Bachelor of Science in Entrepreneurship graduates of Kalinga State University [Philippines]. **Dawaton, G.C.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 151-174. 2020.*

The study aimed to know the employability of the Bachelor of Science in Entrepreneurship graduates of Kalinga State University from 2015-2019. A descriptive and quantitative method was used as a design of the tracer study. The survey questionnaire, which is the primary tool to get the graduates' responses, was patterned from the Commission on Higher Education and the tracer study conducted by Gines (2014) at Philippine Normal University. Results revealed that a strong revealed that a strong passion for business is the primary reason why the respondents took up Bachelor of Science in Entrepreneurship. However, only a few of the graduates established their businesses due to a lack of capital. Most of their established enterprises are in trading and retailing. It is noteworthy that most of the graduates are employed in private entities operating locally, even as rank and file employees instead of being unemployed. As for those currently unemployed, their reasons were family concerns, and they pursued further studies. As to graduates' assessment or the University services, learning environment, and facilities, they were generally very satisfied. However, upgrading of facilities should always be done to be at par with international and national entrepreneurship education standards. Moreover, the skills training provided on communication, human relations, leadership, problem-solving, and entrepreneurial skill are very adequate that the graduates find it helpful in their current employment. Lastly, most graduates seek the university's continuing assistance in their business venture in terms of providing them business seminars and skills training.

EDUCATION; CURRICULUM; ENTERPRISES; UNIVERSITIES; OCCUPATIONS; PHILIPPINES

Tracer study of BSAF graduates of the Kalinga State University-Rizal Campus from 2012-2018. **Bayed, E.C., Putic, R.T., Publico, C.P., Amoga, C.L., Banguilan, R.A.C.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 23-29. 2022.*

This study aimed to assess the factors associated with the job placement of the graduates of the Bachelor of Science in Agroforestry (BSAF) Program from 2012 to 2018 specially to (1)determine the nature and current employment status of the BSAF graduates; and (2) identify the competencies/skills developed by Kalinga State University - Rizal Campus considered by the respondents useful in meeting the demands of their present work. It was conducted at Rizal, Kalinga from June-December 2019, with BSAF graduates from 2012-2018 at the respondents of the study. There were a total of 90 graduates, and 61 or 67.78% only were traces. Survey questionnaires were floated to the graduates, and frequency, percentage were traced. Survey questionnaires were floated to the graduates, and frequency, percentage, and ranking were used to treat the data gathered. Results revealed that out of 61 traced graduates, there were 43 or 70.49% who were employed and 18 or 29.51% were not yet employed; the majority were engaged in Professional/Technical/Supervisory works with 29 or 67.44%, and; the majority were contractual employees with 23 or 53.49%. Furthermore, more than 3/4 or 75.93% of the respondents regarded Communication Skills as the main competency that helps them a lot in finding a job. The employment status of BSAF graduates is high. However, enhancing linkage with the different agencies in the immediate vicinity and nearby towns is highly recommended. This may improve graduates' chances of finding employment and at least maintain the graduates' high employability level.

HIGHER EDUCATION; UNIVERSITIES; CURRICULUM; UN; EMPLOYMENT; PHILIPPINES

Visual quality analysis of educational institutions and their surroundings: a case study of Ataturk University, Erzurum, Turkey. **Sezen, I. eakpinar@atauni.edu.tr., Kulekci, E.A., Karadag, E. Ataturk Univ., 25240, Erzurum (Turkey). Faculty of Architecture and Design, Department of Landscape Architecture.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 24 (1) p. 15-24. 2021.*

The study aimed to analyze the visual quality of the Educational Institutions and their Surroundings (EITS) in the campus of Ataturk University in Erzurum city of Turkey. Visual Quality Analysis Questionnaire was applied to 74 students studying at the Faculty of Architecture and Design. The questionnaire consisted of 21 EITS. Results were analyzed using Variance and Duncan multiple comparison. It was determined that Faculty of Fishery (EITS13) had the highest visual quality score (3.243), followed by Agriculture Faculty (EITS1: 3.134) and the Divine Faculty (EITS2: 2.906). The Faculty of Veterinary Medicine had the lowest visual quality score (EITS11: 2.165), followed by High-Tech Research Centre (EITS20: 2.243) and Faculty of Law (EITS16: 2.315). Statistically significant relationship was found between the department of the students and the scores they gave to Sports Science Faculty (EITS1), Education Faculty (EITS4), Faculty of Medicine (EITS10), Faculty of Veterinary Medicine (EITS11), Faculty of Fine Arts and Tourism (EITS15), and Rectorate Building

(EITS19). Among the Visual Quality Criteria (VQC) of EITS, accessibility to the structure (VQC12) was the most effective criterion (2.927, $p<0.05$). This study recommended the correction of design deficiencies to compensate for the lack of visual quality of new buildings or to improve the entire landscape of the campus.

UNIVERSITIES; ENVIRONMENT; LANDSCAPE; PHYSIOGRAPHIC FEATURES; BUILDINGS; TURKEY

C20 - EXTENSION

Competency certification for agricultural workers in Southeast Asia. **Justimbaste, B.S. bejust@dost.gov.ph., Bacani, E.P.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. Special Anniversary Issue. 2018.*
https://www.searca.org/pubs/discussion-papers?pid=420

AGRICULTURAL WORKERS; AGRICULTURAL SECTOR; LEARNING; CERTIFICATION; SOUTH EAST ASIA

Determinants of farmers' knowledge exchange on drought-tolerant maize technology in Kwara State, Nigeria. **Olabanji, O.P. folabanji21@yahoo.com., Ogunlade, I., Omotesho, K.F. University of Ilorin, PMB 1515, Ilorin, Kwara State (Nigeria). Dept. of Agricultural Extension and Rural Development.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 3 (1) p. 44-54. 2021.*
https://doi.org/10.5281/zenodo.8296395

Over the years, interpersonal communication among farmers has been identified as a way farmers share agricultural knowledge among themselves. During this process ideas are exchanged. In the face of inadequacy in the number of extension personnel in Nigeria, there is need to document the effectiveness of farmers' knowledge exchange as an alternative channel of disseminating innovations. Hence, this study assessed the determinants of knowledge exchange on drought tolerant maize (DTMA) technology in Kwara State, Nigeria. A three-stage sampling procedure was used to select 391 main plot managers to be respondents for this study. The mean age of the respondents was 47.6 years. Majority (78%) of them were males, 85.3% married and 81.9% had formal education with an average household size of 9 persons and 20.9 years of farming experience. Data were collected through interview schedule and analyzed using both descriptive and inferential statistics such as frequency, percentage, mean, standard deviation and multiple regression analysis. A small proportion (20.1%) of the respondents belonged to the category of very low knowledge exchange of DTMA. Plot neighbor was indicated as the major communication network through which knowledge exchange occurred among the farmers. Comparative

benefits of the technology (x bar = 3.55) was identified as the most important motivation influencing farmers' decisions to exchange knowledge among themselves. Age, household size, contact with extension agents, and farming experience had significant contribution to the extent of knowledge exchange among the farmers at 0.05 level of significance. It is recommended that farmer-to-farmer extension should be strengthened since it could bridge the gaps in technology transfer and promote adoption of agricultural technologies.

ZEA MAYS; MAIZE; DROUGHT RESISTANCE; FARMERS; DIFFUSION OF INFORMATION; INFORMATION EXCHANGE; NIGERIA; TECHNOLOGY

Knowledge sharing of farmers' adaptation strategies on climate stresses in Benguet, Philippines. **Malabayabas, F.L. flmalabayabas@up.edu.ph., Baconguis, R.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Forestry and Natural Resources.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 2 p. 28-41. 2020.*

This study analyzed the knowledge sharing of adaptation strategies to climate stresses among selected upland farmers in Benguet, Philippines. Mixed method research design was employed, and survey questionnaire and in-depth interviews were used in gathering responses. Fifty-three farmers served as survey respondents in the study while selected individuals from the agriculture sector served as key informants. The four climate stresses identified were: frost, strong typhoons, drought and hail. All of the adaptation strategies for the four climate stresses were categorized based on water management, nutrient management, and pest and diseases management for specific crops. Descriptive statistics and UCINET software were used to analyze knowledge sharing flow. Results showed that knowledge sharing dynamics of farmers were limited to the people they know and trust, and dependent on expected reciprocal exchanges. The results reveal the need for strategies to enhance knowledge dissemination in dispersed, upland areas, given the restricted knowledge sharing behaviour revealed in these findings.

FARMS; HIGHLANDS; FARMERS; ADAPTATION; DIFFUSION OF INFORMATION; TECHNOLOGY TRANSFER; ENVIRONMENT; CLIMATE; STRESS; PHILIPPINES

Network effect: a mechanism for the acceptance of orange-fleshed sweetpotato among rural households in Uganda. **Ndaula, S. ndaulasulah@gmail.com., Matsiko, F. Makerere Univ., Kampala (Uganda). Dept. of Extension and Innovation Studies. Sseguya, H. International Inst. of Tropical Agriculture, Regional Hub for Eastern Africa, Dar es Salaam (Tanzania). Miiro, R. Makerere Univ., Kampala (Uganda). Dept. of Extension and Innovation Studies.** *Journal of Agricultural Research, Development, Extension and*

Technology (Philippines). 2704-3746; 2704-3754. v. 3 (1) p. 25-43. 2021.
https://doi.org/10.5281/zenodo.8296339

With vitamin A deficiency enduring as a major public health challenge for developing countries, the need for successful orange-fleshed sweetpotato (OFSP) delivery campaigns to fight the deficiency remains relevant. However, despite decades of OFSP delivery efforts in Uganda, OFSP acceptance is still low. This study examined the role of network effect (Metcalfe's Law) on OFSP cultivation behavior among rural households in Uganda using a mixed methods design. Data were obtained from a cross-sectional survey data of 341 randomly selected farmers drawn from two rural districts in Uganda and an interview with a sub sample of 42 farmers. The interviews were analyzed using content analysis where network effect concepts were used as data organizing themes. The study revealed OFSP acceptance to be associated with self-reinforcing socially-oriented factors espoused in network effect tradition. Specifically, mutual observation regarding OFSP agriculture resulted in low OFSP cultivation intensity, thereby making access to vines difficult, slowing experienced gratification of OFSP qualities and the attendant cultivation defections over time. This made OFSP acceptance at community level curtailed. This leads to the conclusion that network effects moderate farmers' decisions to switch from cultivating white-fleshed sweetpotato (WFSP) to OFSP. We recommend the adaption of delivery strategies used in telecommunication innovations in delivery efforts of innovations such as OFSP, in order to nurture self-driven acceptance trajectories of these nutrient rich crops.

SWEET POTATOES; TELECOMMUNICATIONS; QUALITY; NETWORK ANALYSIS; RURAL AREAS; HOUSEHOLDS; INNOVATION ADOPTION; RETINOL; VITAMIN DEFICIENCIES; UGANDA

C30 - DOCUMENTATION AND INFORMATION

Developing a KM [Knowledge Management] System: SEARCA's [Southeast Asian Regional Center for Graduate Study and Research in Agriculture] experience. **Cadiz, M.C.H. mchc@searca.org., Ticsay, M.V. mvt@searca.org., Villena, M.M.C.A. mmav@searca.org., Ramos, N.A. Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). nea@searca.org.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. Special Anniversary Issue. 2017.*
https://www.searca.org/pubs/discussion-papers?pid=396

The Southeast Asian Regional Center for Graduate Study and Research in Agriculture's (SEARCA) current five-year plan, its tenth, focuses on inclusive and sustainable agricultural and rural development (ISARD), described as a scheme and approach of engaging multiple stakeholders toward improving the well-being of the rural poor through their improved

natural resource-based livelihoods along with supportive systems and institutions that contribute to food and nutrition security of the wider population beyond present generations. Along ISARD emphases on environmental sustainability, social inclusion, and institutions and governance, SEARCA as a knowledge managing institution with a capacity building mandate, promotes adaptive and social learning, knowledge sharing and use, and knowledge creation with a deliberate effort to capture, store, and make explicit the tangible knowledges generated by its scholars, researchers, and partners.

KNOWLEDGE MANAGEMENT; RURAL DEVELOPMENT; SUSTAINABILITY; KNOWLEDGE ORGANIZATION SYSTEM DEVELOPMENT; KNOWLEDGE ORGANIZATION SYSTEM

D - ADMINISTRATION AND LEGISLATION

D10 - PUBLIC ADMINISTRATION

Fit for a queen: restructuring the Philippine National Standards for queen pineapples. **Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research Development, Los Baños, Laguna (Philippines).** *Policy Brief (Philippines). 2799-1105. v. (3) p. 1-8. 2021.*

ANANAS COMOSUS; VARIETIES; FRUITS; QUALITY; GRADING; STANDARDIZING; STANDARDS; MARKETS; PHILIPPINES

E - AGRICULTURAL ECONOMICS, DEVELOPMENT AND RURAL SOCIOLOGY

E10 - AGRICULTURAL ECONOMICS AND POLICIES

Addressing food security: saba banana and rootcrops as alternative food staples to rice in Quezon Province, Philippines. **Pabuayon, I.M. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Dept. of Agricultural and Applied Economics. Pantoja, B.R. Philippines Un iv. Los Baños, College Laguna (Philippines). Community Innovations Studies. brpantoja@up.edu.ph. Manila, A.C., Santos, M.L.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Cooperatives and Bio-Enterprise Development.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (2) p. 143-168. 2015.*
https://jpad.cpaf.uplb.edu.ph/articles/addressing-food-security-saba-banana-and-rootcrops-as-alternative-food-staples-to-rice-in-quezon-province-philippines/

The Philippines considers rice self-sufficiency as vital to food security; hence, possible alternative food staples are being identified in case of persistent shortfalls in domestic rice production. This paper explores the potential of Saba (cardava) banana, sweet potato,

potato, yam, and cassava as alternative staples for the local communities in the Quezon province, Philippines, which grow all these crops. Socio-economic surveys of 375 farmers, 82 traders, and 625 consumers were conducted in 2013 but covered crop year 2012. Results showed that Saba banana, sweet potato, and cassava had the highest demand among the five crops based on per capita consumption. These crops ranked top three in terms of possible substitutes for rice. However, willingness to substitute is largely for breakfast and relatively less for other meals. While findings indicated a demand for alternative crops, average yield per hectare and production per farm of each of the five crops were low as compared with the provincial average. Despite low production levels, a greater proportion of total produce was marketed reflecting the crops' marketability and potential as additional income source. Recommendations on how to intensify production and to encourage rice substitution particularly with Saba banana, sweet potato, and cassava are forwarded.

MUSA (BANANAS); VARIETIES; SWEET POTATOES; POTATOES; YAMS; CASSAVA; RICE; SIMULATED FOODS; FOOD SECURITY; DEMAND; CROP YIELD; PHILIPPINES

Agricultural clusters approach to enhance competitiveness of smallholder farms is Southeast Asia. **Gregorio, G.B. Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Vicerra, R.V. Department of Agriculture 2nd Floor BSWM Bldg. Elliptical Rd., Diliman, Quezon City (Philippines). Office of the Undersecretary for Policy and Planning. Ancog, R.C., Billedo, N.M.P., Paller, R.A., Corales, Ma.J., Batangantang, I.L. Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines).** *SEARCA Policy Paper (Philippines). 2020-2 p. 1-12. 2020.*
https://www.searca.org/pubs/briefs-notes?pid=471

SMALL FARMS; ECONOMIC COMPETITION; SMALL ENTERPRISES; SOUTH EAST ASIA

Community development methods toward food security: the System of Rice Intensification in Zumalai Subdistrict, Covalima, Timor-Leste. **Vicente, E.F., Dizon, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development. jtdizon@up.edu.ph.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (2) p. 37-73. 2015.*
https://jpad.cpaf.uplb.edu.ph/articles/community-development-methods-toward-food-security-the-system-of-rice-intensification-in-zumalai-subdistrict-covalima-timor-leste/

The study was conducted in Zumalai subdistrict, Covalima in Timor-Leste to analyze the contribution of the System of Rice Intensification (SRI) program. The program was implemented through community development methods, namely: community education,

community organizing, and community resource management to achieve rice security. Using the Slovin's formula, 24 farmer-groups from Raimea village and 17 from Tashilin village were selected through draw lot sampling. From each farmer-group, five members were randomly chosen to comprise 205 respondents to participate in the household survey. Data were analyzed through descriptive and inferential statistics. The findings revealed that majority of the respondents attended various components of the SRI training. The purposes for joining the SRI group included having access to government facilities and incentives, exchanging experiences, sharing resources and labor among members, and working together. The SRI practices were able to secure the communities' environment and maximize the utilization of local resources. The program, which could be sustained with the existing resources in the study sites, could increase rice production. With the increase in rice production, most farmer-respondents did not experience rice shortage after their involvement in the SRI program. Rice production had been sufficient to feed their families all year round. The correlation analysis using the Pearson Chi-square test showed that rice security, measured in terms of indicators of rice availability, rice accessibility, and rice utilization, was significantly correlated with some indicators of the community development methods. Some mechanisms to sustain SRI as a community development strategy are recommended.

ORYZA SATIVA; RICE; COMMUNITY DEVELOPMENT; FARMERS; DEVELOPMENT PROJECTS; FOOD SECURITY; INTENSIFICATION; TIMOR-LESTE

Developing our high value crops: some insights from an insider. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 61-64. 2022.*
https://agriculture.com.ph/2022/02/09/developing-our-high-value-crops-some-insights-from-an-insider/

AGRICULTURE; ECONOMIC POLICIES; TRADE; ENTERPRISES; PROFITABILITY; FOOD SUPPLY; FARMERS; PHILIPPINES

Economic value of Calliandra calothyrsus in watershed rehabilitation in Manolo Fortich, Bukidnon, Philippines. **de Luna, C.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Interdisciplinary Studies Center for Integrtated Natural Resources and Environment Management. ccdeluna@up.edu.ph., Calderon, M.M., Cruz, R.V.O., Tolentino, E.L. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 2 p. 76-84. 2020.*

This study analyzed the economic value of Calliandra calothyrsus Meissn. as a pioneer species in watershed rehabilitation using benefit-cost analysis (BCA). A cashflow was

developed and using the 15% discount rate, the net present value (NPV) and benefit cost ratio (BCR) were computed. Planting C. calothyrsus as pioneer species is financially feasible having a positive NPV of PhP202,090/ha and a BCR of 14 at 12 years rotation. Following the natural order of succession, benefits derived from planting pioneer species, in this case C. calothyrsus, include reduced labor cost for weeding while attaining benefits like fuelwood, honey and fodder production and environmental services like carbon sequestration. C. calothyrsus was used to shade out grasses and weeds, diminish fire hazard, and facilitate colonization of the site by a wider range of species through planting of desired premium species like dipterocarps to accelerate rehabilitation. Rehabilitation of degraded landscapes could accelerate forest succession using pioneer species to create favorable environment for late successional species, and ensure survival with positive contribution to ecosystem services.

CALLIANDRA CALOTHYRSUS; WATERSHEDS; RESOURCE MANAGEMENT; ECONOMIC VALUE; COST BENEFIT ANALYSIS; PHILIPPINES

Estimating the recreational benefits of coral restoration in Northwestern, Philippines. **Abrina, T.A.S. Marine Environment and Resources Foundation, Inc., M329+7JF, UPMSI Building, P. Velasquez Street, U.P. Diliman, Quezon City (Philippines). taraabrina@gmail.com., Bennett, J.W. Australian National Univ., Canberra ACT 0200 (Australia). Crawford School of Public Policy.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 94-101. 2018.*

In this study, the recreational value of restoring corals reefs was estimated in the context of a site in Northwestern Philippines. This study applied the travel cost method with a variation that integrates a contingent behavior question. This allowed for the estimation of marginal benefits in the context of a change in recreational asset quality. The recreational study site, including the reef in its damaged state, gave rise to average per visit benefits of around US$63.00. With a restored reef, that average value increased to approximately US$113.00 per visit. Hence, the average marginal benefits associated with an investment in reef restoration for this case study site is in the order of US$50 per visit, with a 95% confidence interval of US$0.72 million to US$3.34 M/yr.

CORAL REEFS; LARVAE; MARGINAL COSTS; RESOURCE MANAGEMENT; PHILIPPINES

Exploring the link between environmental practices and financial performance: an empirical Study. **de Paula, L.B., Velez, S.L.P. Pontificia Universidad Católica del Peru, Jiron Daniel Alomía Robles N 125, Urbanizacion Los Alamos de Monterrico, Surco, Lima (Peru). Catolica Business School. spalaciov@pucp.edu.pe., Ceballos, H.V., Trujillo, V.M.O. Universidad EAFIT, Medellin, Carrera 49 N 7 sur – 50, Medellin (Colombia). Dept. of**

Finance. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 29-39. 2020.*

Ongoing environmental deterioration has led governments and other institutions to pay closer attention to pollution problems as pollutant emissions can significantly influence and constrain economic growth. Most countries on the American continent use the ISO 14001 standard and the number of new certifications grows year by year. This work empirically explores the influence of ISO 14001 based environmental management systems upon the financial performance of Colombian companies, 133 ISO 14001 certified and 5,036 non-certified firms. A panel data analysis over three years was the data analysis method. This work studied the financial performance of the companies implementing EMS compared to those that did not in one of the most important Latin American economies (Colombia). It was found that a positive relationship exists between the ISO standard and financial performance measured through the companies' Return on Assets (ROA).

ENVIRONMENT; ENVIRONMENTAL PROTECTION; TECHNOLOGY; ECONOMICS; PUBLIC FINANCE; REGULATIONS; ENVIRONMENTAL POLICIES

Food security framework for collaboration. **Teng, P.S. Nanyang Technological Univ. (Singapore). Center for Non-Traditional Security Studies.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2013-5 (Special Anniversary Issue). [2013].*
https://www.searca.org/pubs/discussion-papers?pid=217

FOOD SECURITY; FOOD PRODUCTION; FOOD SUPPLY; IMPORTS; PRICES

Future of smallholder rice farming in Asia: emerging issues, challenges, and opportunities. **Balasubramanian, V.T. Ramya Nursery, 42 Thadagam Road, TVS Nagar Coimbatore 641025 (India). vethaiyab@gmail.com.** *Rice-Based Biosystems Journal (Philippines). v. 4 p. 1-17. 2018.*

Rice is life in Asia, An estimated 140 million smallholders cultivate rice on 132 million hectares of physical rice area (145 million hectares of harvested area in 2014) to produce 667 million metric tons of unhusked rough rice (90% of the global output). Two of the four rice ecologies-irrigated and rainfed lowlands, contribute to 90% of the Asian rice output. Two of the four rice ecologies-irrigated and rainfed lowlands, contribute to 90% of the Asian rice output. The Asian rice sector employs 300 million people in the rice value chain. It is an important staple food for 60% of the Asian population. The mean farm size of one hectare is too small to support a family of 5-6 members. Further, continuous fragmentation of rice farms after each generation poses serious challenges to the viability of rice farming in Asia.

Despite the mounting pressures to quit rice farming, smallholders live and farm. They suffer from poverty, malnutrition, dispossession of land assets, and death. This paper examined the emerging technical and socioeconomic constraints, and policy challenges facing the smallholder and how to manage them for sustainable intensification of rice farming in Asia.

RICE; SMALL FARMS; FARMING SYSTEMS; PRODUCTIVITY; CLIMATIC CHANGE; ASIA

Lessons in forging sustainable partnerships for rice self- sufficiency in CALABARZON [Cavite, Laguna, Batangas, Rizal, Quezon], MIMAROPA [Mindanao, Marinduque, Romblon, Palawan], and Bicol Regions [Philippines]. **Amit, M.G.C., Querijero, N.J.V.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. squerijero@yahoo.com.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 1 (1) p. 59-87. 2012.*
https://jpad.cpaf.uplb.edu.ph/articles/lessons-in-forging-sustainable-partnerships-for-rice-self-sufficiency-in-calabarzon-mimaropa-and-bicol-regions/

In an era of polyvocality and multi-stakeholder partnership, the authors trace the beginnings of an initiative of the University of the Philippines Los Baños (UPLB) and other program partners in addressing food security concern through a devolved agricultural extension service. Building on inter-organizational relations theory and partnership building, UPLB served as a partnership broker among the provincial governments, municipal governments, Department of Agriculture Regional Field Units, the local state universities and colleges, and civil society organizations. The paper documents the beginnings and nuances in brokering partnerships and cites the challenges associated with promoting transdisciplinarity in UPLB known to protect specialized domains.

RICE; FOOD SECURITY; SELF SUFFICIENCY; PARTNERSHIPS; PHILIPPINES

Mungbean industry: carving a trademark through S and T [science and technology]-based. **Sabado, C.M.M. Nueva Viscaya State Univ., Bayombong, Nueva Viscaya (Philippines).** *Fiesta (Philippines). p. 15-16. 2021.*

MUNG BEANS; INDUSTRY; PRODUCTIVITY; TECHNOLOGY; TECHNOLOGY TRANSFER; INNOVATION ADOPTION

Operational policy needs for organic agriculture expansion in the Philippines: focus on vegetables. **Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. for Governance and Rural Development. acrola@up.edu.ph. Pantoja, B.R. Philippines Univ. Los Baños, College Laguna (Philippines). Community Innovations Studies. Chupungco, A.R. Philippines Univ. Los Baños, College Laguna (Philippines). Center for Strategic Planning**

and Policy Studies. Nguyen, M.R. Philippines Univ. Los Baños, College Laguna (Philippines). Community Innovations Studies. Reyes, J.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. for Governance and Rural Development. Madlangbayan, G.T., Umali. M.G., Guiaya, S.G., Martinez, E.Z., Badayos, G.G. Philippines Univ. Los Baños, College Laguna (Philippines). Center for Strategic Planning and Policy Studies. *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (2) p. 169-202. 2015.*
https://jpad.cpaf.uplb.edu.ph/articles/operational-policy-needs-for-organic-agriculture-expansion-in-the-philippines-focus-on-vegetables/

In 2010, the Philippines passed a law (Republic Act No. 10068) to support the expansion of organic agriculture (OA) in the country, with a goal of 5 percent of total production area being devoted to this technology. Available data show that in 2012, only about 0.7 percent of the agricultural land area in the country was devoted to OA production. While several other administrative orders supported the law, there seems to be a need to understand the processes to operationalize the said law. This paper analyzed the production, marketing, and consumption issues surrounding the organic vegetable industry to come up with operational policies to support the implementation of the law. The data came from a survey of 300 vegetable farmers and 180 consumers and non-consumers of organic vegetables supported by key information from government officials, farmers' associations, and traders. Results showed that the most critical constraint to OA production was the high cost of certification, lack of farmers' training on the technology, and access to organic inputs. Alternative certification processes, capacity building for both farme rs and program implementers, and more IEC campaigns on the benefits of OA products are recommended.

VEGETABLES; ORGANIC AGRICULTURE; CERTIFICATION; PRODUCTION; MARKETING; CONSUMPTION; POLICIES; TECHNOLOGY; PHILIPPINES

Philippines rice competitiveness: status, prospects and directions. **Bordey, F.H., Beltran, J.C. jcbeltran@philrice.gov.ph., Moya, P.F. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Launio, C.C. Benguet State Univ., La Trinidad, Benguet (Philippines). Malasa, R.B., Tanzo, I.R., Yusongco, C.G., Paran, S.J.C. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Marciano, E.B., Valencia, Ma.S.C. San Valentin, M.R.L. International Rice Research Inst., Los, Baños, Laguna (Philippines). Dawe, D.C. Food and Agriculture Organization of the United Nation, Bangkok 10200 (Thailand).** *Rice-Based Biosystems Journal (Philippines). v. 4 p. 19-29. 2018.*

As guide to improving Philippine rice competitiveness, this paper examined rice production benchmarks in selected irrigated and intensively cultivated ares in the Philippines, China, Indonesia, India, Thailand, and Vietnam. It profiled yield and production cost across study

sites. It comapred the domestic price of rice in the Philippines to parity prices of imported rice from Vietnam, Thailand, and India. Results of the study showed that exporting countries had lower production costs than importing countries. Vietnam had the least cost of PhP 6.53/kg paddy and the highest grain yield of 20.59 t/ha/yr for 3 crops. In the Philippines, costs was PhP 12.41/kg and yield was 9.52 t/ha/yr for 2 crops. Rice produced in Nueva Ecija cannot compete in Manila wholesale markets with imported rice from Vietnam, Thailand or India and 35% tariff. With 35% tariff, domestic farm prices in Nueva Ecija would fall to PhP 11.77/kg without quantitative restrictions. Farmers have to reduce their production cost from PhP12.41/kg to PhP 6.77/kg paddy to maintain current profit margins. Higher yields from use of hybrid varieties and highly quality seeds, improved organic techniques, and reduced labor cost through direct seeding or use of combine harvesters are key ways to i,prove competitiveness and farmer profits. Improved milling efficiency and capacity utilization are also important.

RICE; PRODUCTION; ECONOMIC COMPETITION; COSTS; GRAIN; CROP YIELD; PHILIPPINES

San Mateo [Isabela, Philippines] starts reaping 'black gold' [mungbean]. **Yap, J.P. Jr.** *Fiesta (Philippines). p. 25-26. 2021.*
https://agriculture.com.ph/2019/06/08/san-mateo-starts-reaping-black-gold/

MUNG BEANS; PRODUCTION; SUPPLY; FARMERS; INCOME; PROCESSING; TECHNOLOGY; PROCESSED PLANT PRODUCTS; PLANTS

Social capital and vulnerability to extreme climate in a semi-urban fishing community in Laguna de Bay, Philippines. **Palanca-Tan, R. Ateneo de Manila Univ., 4th Floor, Leong Hall, Loyola Heights, Quezon City, (Philippines). Dept. of Economics. rtan@ateneo.edu.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 89-101. 2020.*

The study looked into the risks associated with extreme climate events in the case of a semi-urban fishing community surrounding Laguna Lake in the Philippines. A survey was undertaken to determine the economic effects (loss of assets, foregone income, and changes in consumption patterns) of strong typhoons and torrential rains on fishing households. Vulnerability, estimated as the perceived probability of lower consumption after flooding or typhoons, was used to assess the economic impact on households. Household characteristics, including social capital, that may influence consumption vulnerability, were analyzed using a binary probit regression model. Social capital, a multi-dimensional concept consisting of social networks and skills possessed and used by household members to facilitate actions, was modeled using four indicators – two associational (membership in a formal organization and usefulness of informal social

networks) and two behavioral (trust and cooperativeness). Regression results revealed that fishing income and household size significantly affect vulnerability. The higher the fish catch and the smaller the household, the less vulnerable is the household to strong storms and torrential rains. Social capital indicators do not significantly affect consumption vulnerability of households.

INCOME; HOUSEHOLDS; CAPITAL; CLIMATIC CHANGE; CYCLONES; RAIN; RISK; PHILIPPINES

E11 - LAND ECONOMICS AND POLICIES

Change detection of land cover and land use using remote sensing and GIS techniques in Nong Han wetland in Thailand. **Doydee, P. Kasetsart Uni., Chalermphrakiat Sakon Nakhon Province Campus (Thailand). Dept. of Agriculture and Natural Resources. puvadol.d@ku.th.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. *College, Laguna (Philippines). SEARCA. 2020. p. 193-202.*

This paper describes the changes in the different land covers and land uses in the Nong Han wetland, Sakon Nakhon provice, Thailand during the ecotourism project called the Lotus and Water Lily Development Project in 2009. These changes were detected through the use of remote sensing and Geographic Information System (GIS) techniques. The results indicated that there were four major types of land cover and land use changes, namely in the: (1)lotus and water lily area (112, 156 sq m); (2)aquatic vegetation zone (20,970 sq m); (3)paddy field (34,498 sq m); and (4)landfill area (52,386 sq m). Land cover and land use change change (LCLUC) is a key driver resulting in climate change and climate variability. Change detection was recommended to be an approach for remote sensing and GIS. Raster to raster images rectification process must be conducted using the same Geodetic Datum and Map Project. Good evenness and distribution of at least 25 ground control points (GCPs) have to be performed associated with the values of not mean square errors that must be <1.00 in all GCPs. In situ data from actual field survey using GPS receivers with <5 m accuracy, while the number of global navigation satellite system for receiving the signal from outer space must be greater than eight satellites. Then, the LCLUC in the form of rater dataset is converted into binary image files, band interleaved by line, and imported to GIS for map annotation. Remote sensing and GIS are good and quick techniques to determine the LCLUC, with the low cost compared to conventional surveying methods. The analysis of the results showed that most of Nong Han wetland had been significantly, adversely affected by the different classes of land cover and land use changes due to anthropogenic activities.

LAND USE; REMOTE SENSING; GEOGRAPHICAL INFORMATION SYSTEMS; WETLANDS; THAILAND

GIS-based approach to determine suitable settlement areas compatible with the natural environment. **Ardahanlioglu, Z.R. Mugla Sitki Kocman Univ., Mugla (Turke). Dept. of Landscape and Ornamental Plants. Selim, S. Akdeniz Univ. Antalya (Turkey). Dept. of Remote Sensing. serdarselim@akdeniz.ed.tr., Karakus, N. Akdeniz Univ., Antalya (Turkey). Dept. of Remote Sensing and Geographic Information. Cinar, I. Mugla Sitki Kocman Univ., Mugla (Turke). Dept. of Landscape and Ornamental Plants.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 71-82. 2020.*

This study determined the settlement areas that were suitable for the natural environment in the Seydikemer District in Turkey. Within this context, databases related to the natural environment of the region and existing land uses were created using Unmanned Aerial Vehicle images that were digitized and analysed using geographic information systems. Land cover was classified using Random Forest and Maximum Likelihood Classification methods for remote sensing. The natural environmental properties of the study area were determined based on the resulting classification, and the criteria for the suitability of the settlement areas were defined by the Multi-Criteria Decision Analysis and Analytic Hierarchy Process. Accordingly, eight main criteria and their classes of suitability were analysed and evaluated. Assessment of the natural suitable structure of the area was conducted using weighted overlay analysis. Sixteen percent of the survey area was suitable, while 69.01% was moderately suitable and 14.97% was not suitable for use as a settlement area. Considering that this region is in the process of rapid urbanization, The findings of the study are expected to make a significant contribution to the future settlement and land-use plans of the city.

LAND USE PLANNING; GEOGRAPHICAL INFORMATION SYSTEMS; NATURAL RESOURCES; LAND COVER; URBAN PLANNING; TURKEY

Land use change effects of plant and soil properties in a mountainous region of Iran. **Rad, M.H., Ebrahimi, M. University of Zabol, Mofateh Street, Jahad Square, Zabol (Iran). Dept. of Range and Watershed Management. maebrahimi2007@uoz.ac.ir., Shirmohammadi, E. University of Zabol, Mofateh Street, Jahad Square, Zabol (Iran). Dept of Soil Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 47-56. 2018.*

This study was conducted to show the effects of rangeland conversion into agricultural land uses in terms of on plant and soil degradation in Choram rangeland, Iran. Three sites, including dry farming, horticultural and rangeland were selected. Across site, vegetation

factors such as plant production, canopy cover and density were measured. Soil samples were extracted at depths of 0-30 and 30-60 cm. The highest plant productions (60 kg/ha), vegetation cover (30%) and density of class 1 (3 n -sqm) were recorded in the rangeland. The lowest plant productions (19 kg/ha), vegetation cover (0.41%) and density of class 1, 2 and 3(2, 7, 6 n -sqm, respectively) were measured in the horticultural land use. Except saturation percentage, clay, silt and sand there were not significant differences among the soil properties of land uses. However, at depth of 30-60 cm the highest significant organic matter (14.33 kg/ha) and potassium (0.84%) were measured in the rangeland and dry farming land uses, respectively. Habitat conversion from the rangeland to arable lands could change the species properties and result in the reduction of vegetation cover and reduction of soil quality.

LAND USE; PLANTS; SOIL CHEMICOPHYSICAL PROPERTIES; HIGHLANDS; SOIL FERTILITY; RANGELAND SOILS; SOIL DEGRADATION; IRAN ISLAMIC REPUBLIC

E12 - LABOUR AND EMPLOYMENT

Assessment of the level of job satisfaction among faculty members in a Philippine University. **de Guzman, R.S.C., Depositario, D.P.T., Banzon, A.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Agribusiness Management and Entrepreneurship.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 5 (2) p. 55-68. 2019.*
https://jemad.cem.uplb.edu.ph/articles/an-assessment-of-the-level-of-job-satisfaction-among-faculty-members-in-a-philippine-university/

An assessment of levels of satisfaction was conducted among 142 faculty members of a Philippine university. In general, the members of the faculty were satisfied with their jobs. These were due to the personal and professional growth and development, as well as the freedom and flexibility the job has provided them to achieve work-life balance. Though, administrative functions such as promotion, document processing, salary and benefits, and university facilities were evaluated to be relatively less satisfactory. Using regression analysis, it was determined that years of service, gender, number of course preparations, work fulfillment, safety, salary contentment, and career advancement significantly contribute to satisfaction. Further, utilizing factor analysis, six relevant factors related to job satisfaction were identified; workload, social and societal interactions, growth and development, compensation and benefits, administration, and classroom experience. Satisfaction was seen to have moderate and weak positive relationship with organizational citizenship and intent to continue work, respectively. It is recommended that the university should continue creating an environment conducive for personal and professional growth and development through its plans and programs. The insights the research provided call

for more efficient document processing through automation and computerization, thorough review and revision of promotion policies and procedures, and improvements in infrastructure.

PHILIPPINES; WORK SATISFACTION; HUMAN RESOURCES; EDUCATION; UNIVERSITIES

Measuring the impacts of agriculture projects on good job creation in Central and West Asia: implications for economic analysis. **Quilloy, A.J.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Agricultural and Applied Economics. aaquilloy@up.edu.ph., Bui, M.G. Asian Development Bank, Mandaluyong City (Philippines).** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 5 (2) p. 17-33. 2019.*
https://jemad.cem.uplb.edu.ph/articles/measuring-the-impacts-of-agriculture-projects-on-good-job-creation-in-central-and-west-asia-implications-for-economic-analysis/

Using a simple labor market model, this paper demonstrated how the impacts of agriculture projects on the creation of good jobs in the agriculture sector can be estimated. By applying the model to the case of Tajikistan's agriculture, the study found that agriculture projects which promote crop diversity, market connectivity, and agricultural exports have high potential for contributing to the creation of good jobs in the country's agriculture sector. This paper further underscored the relevance of using the good job creation potential as an appropriate indicator for evaluating the economic viability of agricultural projects.

AGRICULTURE; LABOUR MARKET; ECONOMIC ANALYSIS; DEVELOPMENT PROJECTS; EVALUATION

E13 - INVESTMENT, FINANCE AND CREDIT

Community capitals management for household well-being: case studies in two communities in Surin and Buriram Provinces, Thailand. **Suwannakam, I. SED Foundation, 271 Moo 7, Salakdai Subdistrict Mueang District Surin Province (Thailand). Dizon, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 3 (1 and 2) p. 35-59. 2016.*
https://jpad.cpaf.uplb.edu.ph/articles/community-capitals-management-for-household-well-being-case-studies-in-two-communities-in-surin-and-buriram-provinces-thailand/

This study was conducted in two villages in Thailand, Nongtakhem in Buriram province and Somboon in Surin province. It analyzed the community capitals management for household well- being. Data were gathered through household survey, key informant interviews, field

observation, and review of related data. For the survey, 64 households were selected from Nongtakhem and 54 households from Somboon through simple random sampling. Descriptive statistics and t-test were used in the data analysis. Findings show that both villages practiced all the community capitals management strategies (group membership, family planning, sufficiency economy, savings plan, household accounting, and secondary occupation) except family forest management, which was practiced only in Somboon. The benefits acquired from group membership were diverse, but majority of the households in both villages accessed financial assistance from membership groups. Meanwhile, the t-test results show that the households who had members in the Buffalo and Cow Bank in Nongtakhem earned high-average monthly income than the households who did not. The households who were non-members of the Consumer Cooperative in Somboon earned higher monthly income than those who were members. For the difference in household debt, the households in Nongtakhem who were members of the groups had higher mean debt than those who were not because they were able to access sources of credit. For the other strategies, the secondary occupation practiced in Nongtakhem enabled the members to increase household income. For the difference in the household debt, the sufficiency economy strategy was effective in both villages, and the family planning strategy was effective only in Nongtakhem.

HOUSEHOLDS; INCOME; CAPITAL; MANAGEMENT; CREDIT; THAILAND

E14 - DEVELOPMENT ECONOMICS AND POLICIES

Agricultural insurance in Southeast Asia: status and directions. **Yorobe, J.M. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Agricultural and Applied Economics. jmy512000@yahoo.com., Luis, P.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Cooperatives and Bio-Enterprise Development. Burgos, B.M. Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines).** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2015-4. [2015].*
https://www.searca.org/pubs/discussion-papers?pid=328

With climatic shifts becoming more prominent and extreme climatic events becoming more frequent, Southeast Asia (SEA) is considered one of world's most vulnerable to climate change because of its heavy reliance on agriculture (ADB 2009). In 2013, around 40 million people in SEA were affected by natural calamities, many of whom are dependent on agriculture. Loss due to floods amounted to USD 10.7 billion in 2010 (ADB 2014). Super Typhoon Haiyan, the powerful tropical cyclone that hit Southeast Asia on 8 November 2013, is the worst ever recorded, with an economic cost amounting to USD 13 billion (International Business Times 2015). Agricultural interests are fundamental in managing

food security. Local governments are major stakeholders in agriculture as well as the best contenders to partake in a robust finance-based solution, such as insurance. Of the 11 countries in SEA, only six (Indonesia, Malaysia, Philippines, Singapore, Thailand [pilot stage], and Vietnam [pilot stage]) have agricultural insurance programs (World Bank 2010). Several countries have already adopted index insurance program in the region. Basis risk is one of the serious obstacles to the effectiveness of index insurance. However this can be reduced in two ways (Miranda and Farrin 2012): (1) to offer a wider array of index insurance products tailored to different risk exposures; and (2) by constructing indemnity schedules that correlates maximally with policy holder losses. To achieve both requires sound and accurate information, and data from which the index was based. Weather index-based crop insurance that will incorporate historical weather and crop production data is more costeffective and efficient than traditional agricultural insurance. It will reduce farm level monitoring and transaction costs (ADB 2013). The promotion of market-based agricultural insurance is proven to be critical for the emergence of sustainable agricultural insurance program (Mahul and Stutley 2010). The public-private partnership (PPP) can be viewed as an initial step in providing the direction towards the emergence of private led agricultural insurance programs. The role of the government is confined in correcting market and regulatory imperfections for a competitive insurance market to emerge. The SEA countries collaboration in the areas of research and training, institution and capacity building, information sharing and knowledge management, and awareness raising can provide a less costly support service mechanism in the development of a more competitive insurance market. Pooling research funds by governments for insurance purposes will be effective in addressing the information and data needs for a more viable risk and cost assessments. The pan-ASEAN agriculture pool is a collective scheme that can ease the risks associated with agricultural production and food security in the region. The ASEAN Member States (AMS) contribute underwriting capacity based on the relative importance of agriculture trade to their economies (Corona 2013). The AMS which are net consumers of agricultural products will subsidize the insurance premiums of those countries which are net producers, as a result fostering food security and political stability across the region. The main goal of the insurance scheme is to encourage farmers to continue food production despite risks.

AGRICULTURAL INSURANCE; CROP INSURANCE; AGRICULTURAL PRODUCTS; SOUTH EAST ASIA

Capacity development needs assessment in Southeast Asia toward an informed human development program in Inclusive and Sustainable Agricultural and Rural Development (ISARD). **Quimbo, M.A.T. mtquimbo@up.edu.ph., Sulabo, E.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. ecsalubo@yahoo.com.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-*

6164; 2599-3895. No. 2015-5 (Special Anniversary Issue). [2015].
https://www.searca.org/pubs/discussion-papers?pid=312

Global warming and unpredictable weather patterns, decreasing agricultural land area, rural industrialization, increasing urban population, declining enrollment in agriculture programs, lingering rural poverty, fast-paced evolution of new knowledge and technology, and the ASEAN integration are only some of the complex challenges besetting the global agricultural environment in the region. As the leading enabler in the science and practice of agriculture and rural development in Southeast Asia, SEARCA has made the commitment to respond to these challenges by building human, social, and institutional capital through education, research, and action. Recognizing that this changing agricultural environment also provides opportunities for greater beneficial impacts, SEARCA further strengthened its commitment through its 10th Five-Year Plan reformulated mission of strengthening institutional capacities within the framework of Inclusive and Sustainable Agricultural and Rural Development (ISARD) in Southeast Asia. The study was conducted to analyze the capacity development needs of key individuals and institutions to respond to the emerging issues and concerns they face toward an informed human resource development program. It adopted an exploratory and descriptive research design using a combination of survey, interviews, and focus group discussions. Select institutions and key individuals in the frontline of agricultural and rural development work in Southeast Asia served as research participants representing countries such as Cambodia, Timor Leste, Indonesia, Lao PDR, Philippines, Singapore, Thailand, and Vietnam. Qualitative and descriptive approaches were used in data analysis. The study was expected to determine strategies and policy directions to make ISARD human resource development program more responsive and relevant to target institutions and personnel. In organizing the results of the study, six broad categories of competencies from a checklist of about 180 competencies provided to the respondents were determined. These categories of competencies were: management and leadership and planning; agriculture and climate change-related; and research, monitoring and evaluation (M and E) and extension. Institution head-respondents and personnel-respondents employed in the government were asked to prioritize the desired competencies for the institutions and their personnel in order to effectively address emerging problems, issues, and concerns related to agricultural and rural development toward achieving the institutional goals. Prioritization of competencies was done using the criteria of relevance and urgency using a scale of '1' to '3', with '1' as least relevant and least urgent and '3' as most relevant and most urgent. There was generally an existing demand for current capacity building provisions of SEARCA given the desired and prioritized competency areas along SEARCA's training areas of academic leadership, project development and management, research management, and impact assessment of programs with emphasis on food security, climate change, and poverty reduction. Another important result was the identification of new competencies that were both technical and

nontechnical within the determined broad categories. Moreover, it was interesting to find that there was also a desired demand for soft skills or those that refer to an individual's intrapersonal and interpersonal relationships to succeed in work. Some of the soft skills were even identified as among the most relevant and most urgent competencies as pointed out by both the institution-heads and key personnel-respondents. While mismatch was found in a number of desired and priority competency areas as perceived by the respondents, there were also interesting concordant answers in both technical and non-technical areas. There was general agreement on the need for capacity building in the competencies of Planning; Sustainable agriculture; Agricultural knowledge and information system; Climate change related areas; Research proposal writing; and Project design, implementation, monitoring, and evaluation. In the case of desired personnel competencies, institution-heads and key personnel-respondents expressed concurrence in such competencies as Resistance to stress skills; Agricultural knowledge and information system; Agricultural innovations system; Climate change-related areas; Impact assessment; Data analysis and interpretation; Strategic planning; Project design, implementation, monitoring, and evaluation; and Rural-urban interdependencies. Agreement was likewise found in a number of prioritized institutional competencies by the respondent-groups. Specifically, these were Tolerance for uncertainty; Climate change-related areas; Research proposal writing; Impact assessment; Data analysis and interpretation; Project design, implementation, monitoring, and evaluation; Rural tourism/agri-ecotourism; and Rural urban interdependencies. In the case of prioritized personnel competencies, consistency in choices was found in such competencies as Analytic thinking skills; Climate change-related areas; Project design, implementation, monitoring, and evaluation; and Rural tourism/agri-ecotourism.

SUSTAINABILITY; RURAL DEVELOPMENT; LEADERSHIP; MANAGEMENT; DEVELOPMENT PLANS; SOUTH EAST ASIA

Experiences and advocacies of organic farming. **Villegas, P.M. Villegas Organic and Hobby Eco-Tourism Farm, Batangas (Philippines).** Forum on Ogranic and Inorganic Farming: Proceedings. SEARCA, College, Laguna (Philippines). 14 Oct 2019. *PCAARRD [Philippine Council for Agriculture Aquatic and Natural Reasources Research and Development] Information Bulletin (Philippines). 0016-7736. 2021. 104/2021 p. 23-38* .

ORGANIC AGRICULTURE; FARMS; RURAL AREAS; TOURISM; FARMERS; FARMING SYSTEMS; TECHNOLOGY

Farmer Field School as an effective approach in increasing farmers' knowledge, skills, and practices, and in enhancing diffusion of innovations: evidences from selected rice farmers in

Masalasa, Victoria, Tarlac, Philippines. **Ilar, G.Y. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). glenn.ilar@gmail.com.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (2) p. 107-142. 2015.* https://jpad.cpaf.uplb.edu.ph/articles/farmer-field-school-as-an-effective-approach-in-increasing-farmers-knowledge-skills-and-practices-and-in-enhancing-diffusion-of-innovations-evidences-from-selected-rice-farmers-in-masalas/

The study assessed the effectiveness of the Farmer Field School (FFS) approach in increasing the knowledge, skills, and practices of selected rice farmers in Barangay [village] Masalasa, Victoria, Tarlac in the Philippines as well as the diffusion of innovations among them. Empirical evidences were obtained from the 24 farmers who attended the FFS on PalayCheck System and 24 non-participating farmers serving as the control group. The FFS provided farmers with new knowledge and skills on the whole PalayCheck System as demonstrated by the FFS graduates having more knowledge on the PalayCheck component-technologies as compared with non-FFS farmers. All the FFS farmers shared their knowledge to their families, relatives, friends, and other farmers. Farmer- to-farmer diffusion was observed as the FFS farmers shared what they have learned to the non-FFS farmers, who in turn, shared this knowledge with other farmers. Thus, more farmers were reached because of the multiplier effect of farmer-to-farmer diffusion. While the extent of knowledge diffusion, such as the number of farmers and the management practices shared by the participants, were not determined, this case study suggests that FFS can be a good avenue for building the human and social capital of farmers. However, social and technical gains can only be sustained if the appropriate local and national level-institutions, and the necessary supporting mechanisms and policies for continuous capacity development are developed and in place.

ORYZA SATIVA; RICE; FARMERS; EDUCATIONAL INSTITUTIONS; DIFFUSION OF INFORMATION; TRAINING CENTRES; TRAINING PROGRAMMES; TECHNOLOGY; TECHNOLOGY TRANSFER; PHILIPPINES

Influence of melon processing technology on social dynamism and wellbeing of melon processors in the provincial territories of Nigeria. **Oyeleke, O.W. Federal Univ. of Agriculture, Abeokuta (Nigeria). Dept. of Agricultural Extension and Rural Development. oyerdiran_wasiu@yahoo.com.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 3 (1) p. 10-24. 2020.* https://doi.org/10.5281/zenodo.8296289

This study investigated melon processors in Nigeria with respect to their social characteristics and their knowledge and perceptions on melon processing technology. The study also explored the influence of melon processing technology on social dynamism and

wellbeing of melon processors. A sample of 795 melon processors was selected using a three-stage sampling approach. Results show that 68.7% were cosmopolite while 49.8% were members of cooperative societies. The major disadvantages of the technology indicated by the respondents were operational cost and the purchase of the machine. The coefficient of intensity on extension recommendations was very high, as melon processors generally followed recommendations related to proper operations, except for the wearing of gloves. Moreover, 93.2% of the respondents indicated that the technology did not impede access to cooperative credits, 77.4% believed the technology did not cause apprehension, and 66.4% stated that the technology did not affect women interaction and socialization. Principal component analysis showed that 62.9% of the overall variance in well-being was explained by three principal components. namely, aspects related to domains associated with economic prosperity, life satisfaction, and engagement. The study concludes that improved technology influences the well-being of melon processors in northern Nigeria. This study suggests the need for mechanisms that facilitate access to funds of melon processors to reduce the operational and purchasing costs of melon processing technology. Training on safety measures and improved processing techniques are also recommended.

MELONS; PROCESSING; PRODUCTION; TECHNOLOGY; TECHNOLOGY TRANSFER; EQUIPMENT; INNOVATION; NIGERIA

Knowledge sharing of farmers' adaptation strategies on climate stresses in Benguet, Philippines. **Malabayabas, F.L. flmalabayabas@up.edu.ph., Baconguis, R.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Forestry and Natural Resources.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 2 p. 28-41. 2020.*

This study analyzed the knowledge sharing of adaptation strategies to climate stresses among selected upland farmers in Benguet, Philippines. Mixed method research design was employed, and survey questionnaire and in-depth interviews were used in gathering responses. Fifty-three farmers served as survey respondents in the study while selected individuals from the agriculture sector served as key informants. The four climate stresses identified were: frost, strong typhoons, drought and hail. All of the adaptation strategies for the four climate stresses were categorized based on water management, nutrient management, and pest and diseases management for specific crops. Descriptive statistics and UCINET software were used to analyze knowledge sharing flow. Results showed that knowledge sharing dynamics of farmers were limited to the people they know and trust, and dependent on expected reciprocal exchanges. The results reveal the need for strategies to enhance knowledge dissemination in dispersed, upland areas, given the restricted knowledge sharing behaviour revealed in these findings.

FARMS; HIGHLANDS; FARMERS; ADAPTATION; DIFFUSION OF INFORMATION; TECHNOLOGY TRANSFER; ENVIRONMENT; CLIMATE; STRESS; PHILIPPINES

Kopyor coconut research and development management from laboratory methods to publishing, community extension, and commercialization. **Sukendah. Universitas Pembangunan Nasional, Veteran Jawa Timur, Esat Java (Indonesia). sukendah@upnjatim.ac.id.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). *SEARCA. p. 107-122. 2020.*

There is a need to reexamine the methodologies, activities and procedures of research and development (R and D) especially to determine their impacts on national economic development. In this chapter, the author described how kopyor coconut R and D was built in the span of 20 years starting from laboratory to the community, and the market. Kopyor coconut is the Indonesian equivalent of the makapuno of the Philippines, resulting from normal coconut mutation expressed in the endosperm. Research in kopyor coconut was established based on the roadmap that was started in 2002 by the identification of the kopyor coconut germplasm in a farmer's field in the East Java. Then, the series of protocols of embryo culture was done after enough materials were collected from several germplasm sites. In 2005, after completing the embryo culture protocol, the somatic embryogenesis experiments and exploration of the genes that controlled kopyor traits were begun. In 2010, the outputs researches, i.e., embryo culture and zero waste technology of kopyor coconut was developed for five years to produce heterozygous and homozygous kopyor seedlings and some products, such as the following: frozen, meat, ice cream, cocktail, nata de kopyor, biovet fertilizer, and liquid smoke. In 2018, two kopyor products were prepared for commercialization-heterozygous seedlings and frozen meat-supported by the Ministry of Research, Technology and Higher Education. Kopyor coconut R and D produced six kinds of products (in vitro seedling,heterokopyor/heterozygous seedling, meat de copyor frozen meat, ice cream, nata de kopyor, and biovet/biofertilizer). Eight patents of kopyor technologies, equivalent to publications also resulted from the kopyor R and D. But besides the patents, the kopyor researchers have gone and assisted the communities and networked with them to hopefully contribute to their economic and village development. The products (seedling, frozen meat, and ice cream) have been produced and marketed in the villages.

COCOS NUCIFERA; COCONUTS; RESEARCH; TECHNOLOGY; TECHNOLOGY TRANSFER; MARKETING

Learning organization: group dynamics, institutional linkages toward technology adoption, value-adding innovation, and sustainability. **Custodio, P.A., Orencio, P.M., Bacusmo, J.L., Mores, M.C.L., Amora, I.M.J., Bandong, R.J.M., Malayang, D.B.N.** *College, Laguna (Philippines). SEARCA. 2021.*
https://www.searca.org/pubs/monographs?pid=503

Guided by the important lessons, principles and concepts drawn from the 50-year experience of the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) in agricultural and rural development (ARD), an action research was implemented in the Philippines under SEARCA's 10th five-year plan with the overarching theme Inclusive and Sustainable Agricultural and Rural Development (ISARD). It served as the primary basis for launching the flagship program Piloting and Upscaling Effective Models for ISARD, an initiative in demonstrating effective agricultural systems through ISARD models. Needs-based interventions and collaboration with rural communities, partner agencies, and other relevant organizations are the key strategies used in employing the development approach toward achieving the goals of food security and poverty alleviation. The pilot-testing of the ISARD model in two different sites in the Philippines was characterized by small-scale and multi-commodity production systems. A two-way interdisciplinary approach was utilized to examine and assess the ISARD model's viability and simultaneously draw important lessons for more effective implementation of ARD initiatives. The two identified sites and the corresponding projects are as follows: 1. Victoria, Oriental Mindoro: Revitalizing Calamansi Industry in Victoria, Oriental Mindoro through Strengthening Linkages among Farmers, LGU, NGAs, SUCs, CSOs, and the Private Sector; 2.Inopacan, Leyte: Strengthening Linkages among Farmers, Government, and Industry Sectors for Inclusive and Sustainable Rural Development in Inopacan, Leyte. The case studies from two sites featured the success stories of the interventions of ISARD through its components: (1)technical assistance; (2)capacity building; (3)knowledge management; and (4)linkaging networking. The outputs of the workshops, site visits, and meetings with stakeholders are collated as a basis in writing case studies. The cases are based on the experiences of two sites, highlighting the significant role of creating and strengthening organizations, specifically farmer's associations, in rural societies. The dynamics among people in organizations, coupled with linkages to other networks, are pertinent in achieving effective technology and information transfer. Moreover, the sustainability of the ARD projects in the area even after the project implementation period is also contingent of the institutional linkages formed by organizations. In the case of Victoria in Oriental Mindoro, SEARCA, with the Municipal Agriculture Office of the Local Government Unit (LGU) of Victoria and then Mindoro State College of Agriculture and Technology (now university), facilitated the establishment of the Voctoria Kalamnsi Farmers Federation (VKKF). This initiative increased farmers' interest in revitalizing the calamansi industry in Victoria. Starting with 29 members, the organization barangays of Victoria that

largely produce cakamansi. Initially, farmer cooperators were confined to the traditional production and marketing of fresh calamansi. Initially, farmer cooperators were confined to the traditional production and marketing of fresh calamansi fruits, practically missing the potential market opportunities of proven value-adding technologies applicable to calamansi. Looking through the enterprise development point of view, the idea of adding value to fresh calamansi fruits was a good starting point to renew farmers' interest as primary stakeholders. This was followed by the introduction of processing technologies and the conduct of necessary trainings on value-addition, which were successfully applied by the VKFF into what is now a calamansi processing enterprise.

FARMERS; FARMERS ASSOCIATIONS; ORGANIC AGRICULTURE; TECHNOLOGY; DIFFUSION OF INFORMATION; RURAL DEVELOPMENT; SUSTAINABILITY

Mungbean industry: carving a trademark through S and T [science and technology]-based. **Sabado, C.M.M. Nueva Viscaya State Univ., Bayombong, Nueva Viscaya (Philippines).** *Fiesta (Philippines). p. 15-16. 2021.*

MUNG BEANS; INDUSTRY; PRODUCTIVITY; TECHNOLOGY; TECHNOLOGY TRANSFER; INNOVATION ADOPTION

Rice economy and the role of policy in Southeast Asia. **Briones, R.M. Philippine Inst. for Development Studies, 18th Floor, Three Cyberpod Tower, Centris-North Tower, EDSA corner Quezon Ave, Quezon City (Philippines). rbbriones@gmail.com.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2017-3. 2018.* https://www.searca.org/pubs/discussion-papers?pid=398

ORYZA SATIVA; RICE; POLICIES; ECONOMIC SYSTEMS; SOUTH EAST ASIA

Social acceptability of the bioremediation technology for the rehabilitation of an abandoned mined-out area in Mogpog, Marinduque, Philippines. **Alaira, S.A. sofia_alaira@up.edu.ph., Padilla, C.S., Alcantara, E.L. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Aggangan, N.S. Philippines Univ. Los Baños, College, Laguna (Philippines). National Inst. of Molecular Biology and Biotechnology.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 24 (1) p. 77-91. 2021.*

Rehabilitation of mined-out areas poses great challenge because nutrients are depleted and conditions are not conducive for the conditions necessary for the growth and survival of plants. Proper combination of mycorrhizal fungi, nitrogen-fixing bacteria, compost, and lime to support the growth of trees in the poor soil has been discovered by the University of the

Philippines Los Baños National Institute of Microbiology and Biotechnology. Having established a protocol using this formulation, a plant survival rate of 95% was achieved in a bioremediation project implemented by the Institute in a mined-out area in Capayang, Mogpog, Marinduque, Philippines. The social acceptance and adoption of this rehabilitation strategy was determined through a survey interview in the study area with the use of questionnaire. Six factors and nine variables were considered in the assessment. The bioremediation technology was acceptable to the community as indicated by the high percentage of respondents who gave an overall positive response (90%) and who were willing to adopt and recommend it for implementation in other mined-out areas (90%). Binary logistic regression showed that income and distance of residence from the rehabilitation site significantly influenced the respondents' decision to accept the technology. Future bioremediation initiatives should also consider the participation and acceptance of stakeholders to ensure sustainability. Indigenous and endemic planting materials should be used in rehabilitation.

BIOREMEDIATION; TECHNOLOGY; TECHNOLOGY TRANSFER; RESOURCE MANAGEMENT; PHILIPPINES

E16 - PRODUCTION ECONOMICS

Assessment of the factors affecting the efficiency of yellow corn farmers in selected provinces in the Philippines. **Cabangbang, J.A. jacabangbang@up.edu.ph., Quicoy, C.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Agribusiness Management and Entrepreneurship.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 5 (2) p. 69-77. 2019.*
https://jemad.cem.uplb.edu.ph/articles/assessment-of-the-factors-affecting-the-efficiency-of-yellow-corn-farmers-in-selected-provinces-in-the-philippines/

The paper is an empirical study of the technical efficiency of yellow corn farmers in selected provinces of the Philippines using cross section data from 154 corn farmers. It aimed to determine the level of input utilization, profitability of yellow corn and determine the factors affecting corn productivity and technical efficiency. A Stochastic Frontier Production Function Model through maxim um likelihood estimation (MLE) Method was used to estimate farm-level technical efficiency. Analysis showed that, on the average, yellow corn farmers used 91.7 kilogram of seeds; applied 224 kilograms of nitrogen, 49 kilograms of Phosphorous, 9 kilograms of Potassium; and applied PhP 3,039 worth of agro -chemicals in one production season. The results also showed that the average technical efficiency of yellow corn farmers was 67.6 percent. It was found that the amount of seeds, nitrogen and potassium fertilizers, and agro-chemicals used are significant factors influencing the productivity of yellow corn in the study areas. Moreover, factors such as the level of

education of the farmers; years of farmers' experience in yellow corn production; and training and seminars attended by the farmers showed positive effects on the farm-level technical efficiency of yellow corn farms.

MAIZE; FARMERS; EFFICIENCY; MATHEMATICAL MODELS; FARM INPUTS; PRODUCTIVITY

Community development methods toward food security: the System of Rice Intensification in Zumalai Subdistrict, Covalima, Timor-Leste. **Vicente, E.F., Dizon, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development. jtdizon@up.edu.ph.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (2) p. 37-73. 2015.*
https://jpad.cpaf.uplb.edu.ph/articles/community-development-methods-toward-food-security-the-system-of-rice-intensification-in-zumalai-subdistrict-covalima-timor-leste/

The study was conducted in Zumalai subdistrict, Covalima in Timor-Leste to analyze the contribution of the System of Rice Intensification (SRI) program. The program was implemented through community development methods, namely: community education, community organizing, and community resource management to achieve rice security. Using the Slovin's formula, 24 farmer-groups from Raimea village and 17 from Tashilin village were selected through draw lot sampling. From each farmer-group, five members were randomly chosen to comprise 205 respondents to participate in the household survey. Data were analyzed through descriptive and inferential statistics. The findings revealed that majority of the respondents attended various components of the SRI training. The purposes for joining the SRI group included having access to government facilities and incentives, exchanging experiences, sharing resources and labor among members, and working together. The SRI practices were able to secure the communities' environment and maximize the utilization of local resources. The program, which could be sustained with the existing resources in the study sites, could increase rice production. With the increase in rice production, most farmer-respondents did not experience rice shortage after their involvement in the SRI program. Rice production had been sufficient to feed their families all year round. The correlation analysis using the Pearson Chi-square test showed that rice security, measured in terms of indicators of rice availability, rice accessibility, and rice utilization, was significantly correlated with some indicators of the community development methods. Some mechanisms to sustain SRI as a community development strategy are recommended.

ORYZA SATIVA; RICE; COMMUNITY DEVELOPMENT; FARMERS; DEVELOPMENT PROJECTS; FOOD SECURITY; INTENSIFICATION; TIMOR-LESTE

E20 - ORGANIZATION, ADMINISTRATION AND MANAGEMENT OF AGRICULTURAL ENTERPRISES OR FARMS

Agricultural insurance in Southeast Asia: status and directions. **Yorobe, J.M. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Agricultural and Applied Economics. jmy512000@yahoo.com., Luis, P.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Cooperatives and Bio-Enterprise Development. Burgos, B.M. Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines).** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2015-4. [2015].*
https://www.searca.org/pubs/discussion-papers?pid=328

With climatic shifts becoming more prominent and extreme climatic events becoming more frequent, Southeast Asia (SEA) is considered one of world's most vulnerable to climate change because of its heavy reliance on agriculture (ADB 2009). In 2013, around 40 million people in SEA were affected by natural calamities, many of whom are dependent on agriculture. Loss due to floods amounted to USD 10.7 billion in 2010 (ADB 2014). Super Typhoon Haiyan, the powerful tropical cyclone that hit Southeast Asia on 8 November 2013, is the worst ever recorded, with an economic cost amounting to USD 13 billion (International Business Times 2015). Agricultural interests are fundamental in managing food security. Local governments are major stakeholders in agriculture as well as the best contenders to partake in a robust finance-based solution, such as insurance. Of the 11 countries in SEA, only six (Indonesia, Malaysia, Philippines, Singapore, Thailand [pilot stage], and Vietnam [pilot stage]) have agricultural insurance programs (World Bank 2010). Several countries have already adopted index insurance program in the region. Basis risk is one of the serious obstacles to the effectiveness of index insurance. However this can be reduced in two ways (Miranda and Farrin 2012): (1) to offer a wider array of index insurance products tailored to different risk exposures; and (2) by constructing indemnity schedules that correlates maximally with policy holder losses. To achieve both requires sound and accurate information, and data from which the index was based. Weather index-based crop insurance that will incorporate historical weather and crop production data is more costeffective and efficient than traditional agricultural insurance. It will reduce farm level monitoring and transaction costs (ADB 2013). The promotion of market-based agricultural insurance is proven to be critical for the emergence of sustainable agricultural insurance program (Mahul and Stutley 2010). The public-private partnership (PPP) can be viewed as an initial step in providing the direction towards the emergence of private led agricultural insurance programs. The role of the government is confined in correcting market and regulatory imperfections for a competitive insurance market to emerge. The SEA countries collaboration in the areas of research and training, institution and capacity building, information sharing and knowledge management, and awareness raising can provide a less

costly support service mechanism in the development of a more competitive insurance market. Pooling research funds by governments for insurance purposes will be effective in addressing the information and data needs for a more viable risk and cost assessments. The pan-ASEAN agriculture pool is a collective scheme that can ease the risks associated with agricultural production and food security in the region. The ASEAN Member States (AMS) contribute underwriting capacity based on the relative importance of agriculture trade to their economies (Corona 2013). The AMS which are net consumers of agricultural products will subsidize the insurance premiums of those countries which are net producers, as a result fostering food security and political stability across the region. The main goal of the insurance scheme is to encourage farmers to continue food production despite risks.

AGRICULTURAL INSURANCE; CROP INSURANCE; AGRICULTURAL PRODUCTS; SOUTH EAST ASIA

Agricultural insurance in the Philippines: enhancing resilience to climate change. **Cajucom, N.R. Philippine Crop Insurance Corporation, Diliman, Quezon City (Philippines). rmg@pcic.gov.ph., nrc_2015@yahoo.com.sg.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2017-1 p. 1-31. 2017.*
https://www.searca.org/pubs/discussion-papers?pid=382

AGRICULTURAL INSURANCE; FARMS; POLICIES; CLIMATIC CHANGE; PHILIPPINES

Agriculture monthly inspired reader to start own farm; now first DOT-accredited farm tourism destination in Bohol [Philippines]. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 32-35. 2021.*
https://agriculture.com.ph/2020/12/14/agriculture-monthly-inspired-reader-to-start-own-farm-now-first-dot-accredited-farm-tourism-destination-in-bohol/

VEGETABLE CROPS; ANIMALS; FARMS; FARMING SYSTEMS; AQUACULTURE; RURAL AREAS; TOURISM; PHILIPPINES

Benefit-sharing mechanisms in community-based forest management in the Philippines. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). *Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. 2020. p. 16-23.*

FOREST MANAGEMENT; COMMUNAL FORESTS; FORESTRY; SUSTAINABILITY; PHILIPPINES

Community forestry in Cambodia: a review of the contribution of community forestry to livelihoods after 25 years of development. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. *2020. p. 39-43.*

FOREST LAND; FOREST MANAGEMENT; COMMUNAL FORESTS; FORESTRY; CAMBODIA

Conservation and consumption of goods and nature-based recreation: a community based ecotourism project. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. *2022. p. 31-35.*

COMMUNAL FORESTS; FORESTRY; RURAL AREAS; TOURISM; FARMS; SOCIAL PARTICIPATION; RESOURCE MANAGEMENT

Developing an environmental education program for the mangrove forest-based ecotourism in Juru Seberang community forest, Belitung, Indonesia. ***Anon.*** *Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. 2020. p. 27-30.*

COMMUNAL FORESTS; FORESTRY; MANGROVES; RURAL AREAS; TOURISM; SOCIAL PARTICIPATION; RESOURCE MANAGEMENT; INDONESIA

Factors affecting farmer participation in the Philippine Crop Insurance Cooperation's Rice Crop Insurance Program: the case of Laskeshore Communities in Laguna, Philippines. **Rola, A.C.C. acrola@up.edu.ph., Aragon, C.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Economics and Management.** *Rice-Based Biosystems Journal (Philippines). v. 4 p. 41-50. 2018.*

Cop insurance is a coping mechanism by which the farmer is identified if there is crop failure due to natural calamities such as droughts, floods, typhoons, and plant pests, However, there is low participation of rice farmers in the crop insurance program of the Philippines. This study determined the following: (a)socio-economic characteristics of farmer-respondents in the lakeshore communities of Laguna, (b) factors that influence farmers' decision to participate or not to participate in the Philippine Crop Insurance Cooperation-Rice Crop Insurance Corporation-Rice Crop Insurance Program (PCIC-RCIP) and (c) reasons for participation and non-participation in the RCIP. Descriptive and inferential

statistics were used in the analysis of data. Ways to promote wider participation in the RCIP were suggested. Results showed that majority reasons for farmers' participation in the Program were (a)securing rice crop insurance was one of the requirements of Land Bank prior to expanding loans to farmers and (b) participation in the insurance program was essential to avoid risk in rice farming. The major reasons cited for non-participation were farmers' lack of awareness of the existence of the insurance program and their 'being busy' to attend to the documentation requirements of the Program. The logit analysis showed that the knowledge of farmers about crop insurance, tenure status, and the distance from the lakeshore influenced the participation of the farmers in the RCIP.

RICE; CROP INSURANCE; FARMERS; PARTICIPATION; DISASTERS; RURAL COMMUNITIES; PHILIPPINES

Farmers' daughter develops a farm resort that earns profit and preserves the environment.
Taculao, P.B.S. *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 55-56. 2021.*
https://agriculture.com.ph/2020/11/13/farmers-daughter-develops-a-farm-resort-that-earns-profit-and-preserves-the-environment/

FARMS; TOURISM; RURAL AREAS; VEGETABLE CROPS; LIVESTOCK; FARMING SYSTEMS; PROFIT

Farming practices in smallholder pig production in Vietnam: implications for food safety.
Nguyen Thi Thu Huyen. huyenquyet2002@gmail.com., Nguyen Thi Duong Nga. ngantd@gmail.com., Pham Van Hung. Vietnam National Univ. of Agriculture (Vietnam). Faculty of Economic and Rural Development. pvhung@vnu.edu.vn., Lapar, Ma.L.A. International Rice Research Inst., College, Laguna (Philippines). L.Lapar@cgiar.org., Ninh Xuan Trung. Vietnam National Univ. of Agriculture (Vietnam). Faculty of Economic and Rural Development. xuanthrunghua@gmail.com., Unger, F. International Rice Research Inst., College, Laguna (Philippines). F.Unger@cgiar.org., Nguyen Van Pho. Vietnam National Univ. of Agriculture (Vietnam). Dept. of Academic Affairs. nvphoph@gmail.com. *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 4 (2) p. 1-14. 2018.*
https://jemad.cem.uplb.edu.ph/articles/farming-practices-in-smallholder-pig-production-in-vietnam-implications-for-food-safety/

This paper aims to examine changes in pig farming practices that can improve food safety of pig products in Vietnamese smallholder pig production. The study covered 615 pig households, which were analyzed using descriptive statistical analysis. Results show that there is an increased trend of using own-produced piglets because farmers can apply strict vaccine scheme for their piglets. The percentage of farmers applying vaccine in pig

production varies much depending on the type of diseases and location. Besides vaccine, farmers follow good farming practices such as applying 'all-in all-out' rule, isolating new pigs, spraying disinfectant and cleaning pig barn regularly, and restricting visitors away from the pig pens. T-test results show that there are significant differences in some farming practices between the two provinces considered in the study. In general, farmers in Hung Yen adopt better production practices than farmers in Nghe An in terms of preventing pig diseases and dealing with sick and dead pigs. However, some farmers are also engaged in risky practices such as slaughtering sick pigs for home consumption, selling sick pigs to slaughterhouses at lower price, and throwing away dead pigs instead of properly disposing them. Increasing awareness of farmers about the importance of adopting good farming practices through training and use of mass media could mitigate food safety and animal health risks from pig production.

SWINE; ANIMAL PRODUCTION; SMALL FARMS; FARMING SYSTEMS; FOOD SAFETY; VIET NAM

Flowers for you. **Ancheta, A.V.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 14. 2022.*

HELIANTHUS ANNUUS; FLOWERS; FARMS; FARM MANAGEMENT; RURAL AREAS; TOURISM

Government employee's bid to start anew in the province led him towards farming. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 50-53. 2022.* https://agriculture.com.ph/2021/06/28/government-employees-bid-to-start-anew-in-the-province-led-him-towards-farming/

THEOBROMA CACAO; FRUIT TREES; FARMING SYSTEMS; PROCESSING; PROCESSED PLANT PRODUCTS; RURAL AREAS; TOURISM

Growing rice, vegetables, and fish allows a family to save money on store-bought food. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 47-49. 2022.* https://agriculture.com.ph/2021/01/26/growing-rice-vegetables-and-fish-allows-a-family-to-save-money-on-store-bought-food/

FARMS; CROPS; LIVESTOCK; PRODUCTION; FARMING SYSTEMS; PLANT ESTABLISHMENT; FARM MANAGEMENT

Impact of total quality management and Environmental Management System on Sustainable Performance of Selected Industries in Pakistan. **Tasleem, M. Centers of Excellence in Science and Applied Technologies H-11/4, Islamabad (Pakistan). m.tasleem@ceme.nust.edu.pk., Khan, N. Riphah International Univ., Islamabad**

(Pakistan). Nisar, A. Centers of Excellence in Science and Applied Technologies H-11/4, Islamabad (Pakistan). *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 30-38. 2018.*

The concept of sustainability has gained due attention and recognition over the years, which has fundamentally broadened the scale of organizational mission in three dimensions of sustainability. To attain sustainable performance, organizations have been using various strategies, among which is Total Quality Management (TQM) that is recognized as the most famous. The ISO 14001 Environmental Management System (EMS) standard can also be beneficial to address sustainability concerns among organizations. This study identifies both TQM and ISO 14001 as important strategies to examine influence on sustainable performance including economic, social and environmental sustainability. Through a survey of 92 organizations, it was found out that high-TQM organizations were better in performance and sustainability. On the other hand, EMS standard implementation does not significantly influence economical and social sustainability but significantly influences environmental sustainability and overall sustainability performance. The study brought clarity to the matter that TQM can outperform within each sustainability dimension, and that EMS is more influential to environmental performance.

ENVIRONMENTAL MANAGEMENT; INDUSTRY; SUSTAINABILITY; QUALITY ASSURANCE; SOCIOECONOMIC ORGANIZATION; PAKISTAN

Improving the training guide on village forestry management planning. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. *College, Laguna (Philippines). SEARCA. 2020. p. 59-62.*

COMMUNAL FORESTS; FORESTRY; VILLAGES; FOREST MANAGEMENT; TRAINING PROGRAMMES; LOCAL GOVERNMENT; LAO PEOPLE'S DEMOCRATIC REPUBLIC

Prescription for wellness led brothers to start farming. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 42-44. 2021.*
https://agriculture.com.ph/2020/10/12/prescription-for-wellness-led-brothers-to-start-farming/

VEGETABLE CROPS; FRUIT CROPS; ANIMALS; BIRDS; APIDAE; FARMING SYSTEMS; GARDENING; FARMS; RURAL AREAS; TOURISM

Profiling Study of the creative industry artists of Baguio City, the First Creative City in the Philippines. **de Guzman, R.S.C. Philippines Univ. Los Baños, College, Laguna (Philippines).**

Dept. of Agribusiness Management and Entrepreneurship. rcdeguzman5@up.edu.ph. *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 6 (1) p. 33-56. 2020.*
https://jemad.cem.uplb.edu.ph/articles/a-profiling-study-of-the-creative-industry-artists-of-baguio-city-the-first-creative-city-in-the-philippines/

Research among 56 creative industries' artists was conducted to serve as a foundation in creating and implementing plans for Baguio Creative City. This study evaluated artists' creative and business dimensions to determine the experiences and challenges they encounter. Generally, artists participate in the creative economy where the art market thrives. Artists, who do not consider themselves good businessmen, encountered typical enterprises' challenges: finding customers, marketing products, managing finances, and operations. Their most pressing concerns were limited government support and lack of creative spaces. There is a need to develop the creative and entrepreneurial skills among artists and the city's infrastructure. It is recommended that the local government establish creative spaces to showcase artists' works and performances while serving as a marketplace. Formal registration of artists is advised to professionalize their roles and achieve better representation in public policy together with private interest groups, universities, and the government.

INDUSTRY; ENTERPRISES; MARKETING; INFRASTRUCTURE; PHILIPPINES

Remote forest farm in Rizal [Philippines] boasts of an all-natural and authentic farm experience. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 57-59. 2021.*
https://agriculture.com.ph/2020/09/11/a-remote-forest-farm-in-rizal-boasts-of-an-all-natural-and-authentic-farm-experience-part-1/

FRUIT TREES; RURAL AREAS; FARMS; FARMING SYSTEMS; TOURISM; PHILIPPINES

Retired corporate employee as now a full-time farmer. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 43-45. 2022.*
https://agriculture.com.ph/2020/09/19/retired-corporate-worker-is-now-a-full-time-farmer/

VEGETABLE CROPS; RURAL AREAS; TOURISM; FARMS; FARMING SYSTEMS; FARMERS

This couple started a farm to provide for their family that later became a successful aquaculture venture that sustains their community. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 12-14. 2022.*

https://agriculture.com.ph/2021/02/08/couple-started-a-farm-to-provide-for-their-family-later-became-a-successful-aquaculture-farm-that-sustains-their-community/

FRUIT TREES; VEGETABLE CROPS; ZEA MAYS; ORYZA SATIVA; FISHES; FISHERY PRODUCTION; AQUACULTURE; LIVESTOCK

Youth-led social enterprise promotes local coffee and champions sustainability in support of Filipino farmers. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 30-31. 2021.*
https://agriculture.com.ph/2020/11/23/youth-led-social-enterprise-promotes-local-coffee-and-champions-sustainability-in-support-of-filipino-farmers/

COFFEE; ENTERPRISES; SOCIAL PARTICIPATION; YOUTH; SMALL FARMS; PLANT ESTABLISHMENT; FOOD TECHNOLOGY; FARMERS; FARMS

E21 - AGRO-INDUSTRY

Impact of total quality management and Environmental Management System on Sustainable Performance of Selected Industries in Pakistan. **Tasleem, M. Centers of Excellence in Science and Applied Technologies H-11/4, Islamabad (Pakistan). m.tasleem@ceme.nust.edu.pk., Khan, N. Riphah International Univ., Islamabad (Pakistan). Nisar, A. Centers of Excellence in Science and Applied Technologies H-11/4, Islamabad (Pakistan).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 30-38. 2018.*

The concept of sustainability has gained due attention and recognition over the years, which has fundamentally broadened the scale of organizational mission in three dimensions of sustainability. To attain sustainable performance, organizations have been using various strategies, among which is Total Quality Management (TQM) that is recognized as the most famous. The ISO 14001 Environmental Management System (EMS) standard can also be beneficial to address sustainability concerns among organizations. This study identifies both TQM and ISO 14001 as important strategies to examine influence on sustainable performance including economic, social and environmental sustainability. Through a survey of 92 organizations, it was found out that high-TQM organizations were better in performance and sustainability. On the other hand, EMS standard implementation does not significantly influence economical and social sustainability but significantly influences environmental sustainability and overall sustainability performance. The study brought clarity to the matter that TQM can outperform within each sustainability dimension, and that EMS is more influential to environmental performance.

ENVIRONMENTAL MANAGEMENT; INDUSTRY; SUSTAINABILITY; QUALITY ASSURANCE; SOCIOECONOMIC ORGANIZATION; PAKISTAN

Involvement of women in farm decision-making and adaptive capacity to extreme events of farming households in Ligao City, Albay, Philippines. **Tapia, M.A., Pulhin, J.M. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Forestry and Forest Governance. Nelson, G.L.M. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Sciences. Predo, A.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources. Peria, A.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Office of the Coordinator for Research, Extension, and Linkages. Peras, R.J.J. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Forestry and Forest Governance. Lasco, R.D. International Centre for Research in Agroforestry, Los Baños, Laguna (Philippines). Pulhin, F.B., Evangelista, R.J.P. Philippines Univ. Los Baños, College Laguna (Philippines). Forestry Development Center.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 70-81. 2018.*

This study examined the involvement of women in agricultural decision-making among farming households in Ligao City, Albay, Philippines and related this to enhancement or decline of their adaptive capacity to extreme weather events. Data were collected through a household survey in the three selected barangays [villages] representing coastal, lowland and upland communities. More than 50% of husbands solely made decisions on choice of food crops, cash crops, tree species, and farm production. This parallel findings in the Philippines showing male dominance in agricultural production. Nevertheless, women still participated in decision-making in a limited way as 13-16% of them singly decided on behalf of the household while 30-38% made decisions together with the husband. Following the Sustainable Livelihood Framework, an adaptive capacity index was developed for the households. The analysis revealed that 96.17% of the respondents had low (<0.5) and 3.83% had medium adaptive capacity (>0.5), with all scores ranging from 0.0982 to 0.6171. Age and choice of trees species by husband positively influence adaptive capacity, while choice of cash crops by husband has negative relationship. Farm decision-making is gendered, and giving authority to the person with more capabilities to make effective decisions based on his/her relationship to this resource-based livelihood should be considered despite prevalent notion of the dominance of one gender.

FARMING SYSTEMS; HOUSEHOLDS; ROLE OF WOMEN; FARMS; DECISION MAKING; PHILIPPINES

Socio-economic and environmental impacts of bioethanol production from sugarcane (Saccharum officinarum) and molasses in the Philippines. **Demafelis, R.B. rbdemafelis@up.edu.ph., Movillon, J.L. Philippines Univ. Los Baños, College, Laguna**

(Philippines). Dept. of Chemical Engineering. Predo, C.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Forestry and Natural Resources. Maligalig, D.S. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Statistics. Eleazar, P.J.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Development Communication. Magadia, B.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 96-110. 2020.*

As the Philippine bioethanol industry reaches a decade and the debate on what bioethanol blending shall be imposed, this study assessed the socio-economic and environmental impacts of domestic bioethanol production parallel to the objectives of the biofuels law. Bioethanol production in the country has generated significant jobs or an estimated jobs of about 2,073 based on the actual bioethanol processing data for Crop Year (CY) 2017-2018 for the three bioethanol production systems (BPS) studied; and could potentially reach 10,620 jobs if mill capacities of the two bioethanol plants are met. Additionally, bioethanol industry was perceived to have a positive change for sugarcane farmers in terms of employment opportunities and cash income from bioethanol-related operations. The domestic bioethanol industry has even opened additional revenues to bioethanol-related industries of about PhP 1.2 B (23.9 M USD) for CY 2017-2018 and could even reach to PhP 3.0 B (60.4 M USD) if bioethanol plants can attain its installed mill and cogeneration capacities. Environmental impact assessment study, on the other hand, revealed that domestic bioethanol production can reduce GHG emissions by about 68 to 91% for the four BPS evaluated, compared to business-as-usual scenario of using fossil fuel.

SACCHARUM OFFICINARUM; MOLASSES; BIOFUELS; ENVIRONMENTAL IMPACT; PRODUCTION; PHILIPPINES

E40 - COOPERATIVES

Factors affecting the savings of cooperative members in the City of Calamba [Philippines] Cooperatives and Livelihood Development Department (CLDD). **Espanto, F.S., Dorado, R.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Economics. radorado@up.edu.ph.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 5 (2) p. 79-96. 2019.*
https://jemad.cem.uplb.edu.ph/articles/factors-affecting-the-savings-of-cooperative-members-in-the-city-of-calamba-cooperatives-and-livelihood-development-department-cldd/

Cooperative is a significant tool in savings mobilization. The City of Calamba [Philippines] Cooperatives and Livelihood Development Department (CLDD), established over twenty

years, aims for an efficient savings and investment schemes for Calamba residents. This study attempts to identify the determinants of saving behavior of Calamba City cooperative members in assisted by CLDD. Specifically, the study aims to determine the socio-economic characteristics of members, determine the effect of cooperative on the savings of its members, and to determine whether the type of cooperative affects the savings of the members. Using primary and secondary data from the cooperative members and staff of cooperatives members of CLDD in Calamba City, an Ordinary Least Squares (OLS) was conducted to determine the factors that affect the savings of cooperative members. Results show that cooperatives affect the savings mobilization of its members. Among the four types of cooperatives, Credit Cooperative affects the savings of its members the most. The length of membership and credit, are both significant and positively related to savings of members. Other variables found to be significantly affecting savings of cooperative members were sex, age, educational attainment and income.

PHILIPPINES; COOPERATIVES; SAVINGS; SOCIOECONOMIC DEVELOPMENT

Impact of cooperative membership on household welfare: evidence from calamansi farmers in Oriental Mindoro, Philippines. **Jimenez, C.D., Catelo, S.P., Elauria, M.M. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Dept. of Agricultural and Applied Economics. Sajise, AJ.U. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Economics. ausajise@up.edu.ph.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 4 (2) p. 27-44. 2018.*

This study assessed the impact of cooperative membership on welfare of calamansi farmers in Oriental Mindoro, Philippines. An endogenous switching regression (ESR) that accounts for selection bias resulting from both observable and unobservable heterogeneities was employed to analyze the impact of cooperative membership on household consumption expenditure. Differences between the two groups of farmers with respect to their consumption expenditure determinants were observed. Higher household consumption expenditure is associated with younger farmer non-members who rely on traders for price information. Cooperative membership also has a heterogeneous impact on welfare among its members. The cooperatives under study are most effective in improving welfare among members with relatively bigger household size, higher volume of calamansi sales, and higher income from other sources. Results also reveal that cooperative membership significantly increases household welfare measured in terms of household consumption expenditure.

CALAMONDINS; FARMERS ASSOCIATIONS; COOPERATIVES; COOPERATIVE FARMING; HOUSEHOLDS; WELFARE ECONOMICS; PHILIPPINES

Multidimensional poverty among calamansi farmers in Oriental Mindoro, Philippines: does cooperative membership matters? **Jimenez, C.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Agricultural and Applied Economics. Mina, C.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Cooperatives and Bio-Enterprise Development. Catelo, S.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept of Agricultural and Applied Economics. spcatelo@up.edu.ph.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 6 (1) p. 1-13. 2019.* https://jemad.cem.uplb.edu.ph/articles/multidimensional-poverty-among-calamansi-farmersin-oriental-mindoro-philippines-does-cooperative-membership-matter/

This study analyzed the role of cooperatives in alleviating poverty among calamansi farming households in Oriental Mindoro, Philippines. The Multidimensional Poverty Index (MPI), and Endogenous Switching Regression (ESR) were employed to analyze the poverty alleviating impacts of cooperative membership. The MPI of farmer-members and non-members were estimated at 1% and 11%, respectively suggesting that more non-member farmers experience multidimensional poverty than farmer-members. Results of the ESR model show that cooperative membership significantly reduces poverty by 4.44 points when assessed in terms of multidimensional deprivation index. In the counterfactual case, non-member farmers would have reduced the deprivation index by about 19.14 had they chosen to be a cooperative member.

CALAMONDINS; FARMERS; HOUSEHOLDS; COOPERATIVES; POVERTY; MODELS; PHILIPPINES

Stakeholder convergence in the revitalization of community-based enterprises: the case of Halog West Producers' Cooperative in La Union, Philippines. **Duque, J.P.R.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Cooperatives and Bio-Enterprise Development. jdduque1@up.edu.ph., Dizon, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 4 (2) p. 15-25. 2018.* https://jemad.cem.uplb.edu.ph/articles/stakeholder-convergence-in-the-revitalization-of-community-based-enterprises-the-case-of-halog-west-producers-cooperative-in-la-union-philippines/

Stakeholder convergence is a widely practiced approach in development particularly towards developing sustainable community-based enterprises. This study aims to assess the contributions of convergence in the sustainability of these enterprises by examining the case of the chichacorn enterprise of Halog West Producers' Cooperative. Results show that convergence was instrumental in the revival of the enterprise with the institutional support that enabled the enterprise to develop its capacities to continue and improve its operations, promising a more sustainable enterprise in the long run. Specifically, the study

found that effective partnership, streamlined inter-agency coordination, and clear communication among stakeholders are significant factors contributing to the sustainability of the enterprise.

PHILIPPINES; COOPERATIVES; COMMUNITY INVOLVEMENT; ENTERPRISES

E50 - RURAL SOCIOLOGY AND SOCIAL SECURITY

Assessing the biodiversity and utilization of non-timber forest products in a community forestry in Thailand for rural livelihood and conservation. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). *SEARCA. 2020. p. 51-55.*

COMMUNAL FORESTS; FORESTRY; NONWOOD FOREST PRODUCTS; BIODIVERSITY; USES; RESOURCE CONSERVATION; SOCIAL PARTICIPATION; THAILAND

Assessing the potential on non-timber forest products for the development of value chain and community forestry enterprises in Northerland Thailand. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. *2020. p. 45-50.*

COMMUNAL FORESTS; FORESTRY; NONWOOD FOREST PRODUCTS; MARKETING; ENTERPRISES; COMMUNITY DEVELOPMENT; THAILAND

Assessment of changes in agroecosystem health in Guangzhou, China. **Gang Wang. Guangdong Univ. of Technology, Guangzhou 510520 (China). School of Management. Dongsheng Guan. Sun Yat-sen Univ., Guangzhou 510275 (China). School of Environmental Science and Engineering. eesgds@gmail.sysu.edu.cn., Qiuping Zhang. Guangdong Provincial Key Lab. of Environmental Pollution Control and Remediations Technology, Guangzhou 510275 (China). Mervin Richard Peart. The Univ. of Hong Kong, Hong Kong (China). Dept. of Geography. Xiao Ling, Yujuan Chen, Zhu Yuanwei. Sun Yat-sen Univ., Guangzhou 510275 (China). School of Environmental Science and Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 20-35. 2019.*

Agroecosystem health refers to the extent to which a healthy agroecosystem can meet socioeconomic and biophysical needs of all residents over time. According to the attempts at assessing agroecosystem health, agroecosystem health depends on both functional and structural characteristics at regional level. However, both functional and structural

characteristics have been altered from their natural state by industrialization and urbanization. Thus, this study reports a system-based assessment index to evaluate the health statue of agroecosystem in Guangzhou, South China. Agroecosystem health index (AHI) of Guangzhou decreased from 0.78 in 2000 to 0.71 in 2010. It indicated that this agroecosystem was at relatively healthy state. However, functions of both cultural service and economic sustainable development were not successful as they represented 'worst' and 'sub-healthy', respectively. With the decreased values between 0.7 and 0.9, the other indices also revealed the need for caution. Particularly, both habitat structure index and provisioning service index exhibited well defined declines during this study period. This study suggests that AHI can be potentially employed to monitor the temporal change in agroecosystem health status, although AHI has some certain limitations and needs further improvement for the complexity of agroecosystems.

AGROECOSYSTEMS; HEALTH; SUSTAINABILITY; CHINA

Assessment of KSU [Kalinga State University] employees on high-risk factors on health. **Bayangan, E.P., Saguibo, J.E., Bagtang, E.T., Daogas, C., Torres, R.C.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 17-22. 2022.*

A workplace health risk assessment can help employees take ownership of their health, prevent them from chronic diseases, and improve their general well-being. Moreover, health risk assessments can reduce absenteeism and improve workplace wellness programs. The basis of any excellent health and fitness program addresses helping employees go for healthy behaviors. The habit of having unhealthy diets and insufficient physical activity can result in elevated blood glucose, high blood cholesterol, and high blood pressure. All of these can affect productivity in the workplace. The study assesses the health status of the Kalinga State University employees in terms of sex, age, and service length through Google form. It was found out that several KSU employees were hypertensive. The study found out that males have a higher incidence of hypertension than female employees. Further, less than ten years in the service have a more significant percentage of having hypertension than those in the service for a more extended period. Diabetes, heart disease, and anemia were not health issues of KSU employees, although they were considered high-risk factors. The respondents were asked what physical activities they are engaged in and found out that the male employees were more engaged in moderate the vigorous physical activity than the female employees. Further, the respondents said that they pay a visit to a doctor only when they feel sick. From the findings, a health assessment among the employees is recommended, which shall be conducted annually to provide feedback that will encourage them to take action to fit. A health and fitness program is highly commendable to control job strain and have lower absenteeism and presenteeism brought by unhealthy employees.

HEALTH; UNIVERSITIES; WORKING POPULATION; RISK; FEMALES; ANIMALS

Assessment of non-timber forest products in the mountainous regions in Myanmar toward community forestry development. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. *College, Laguna (Philippines). SEARCA. 2020. p. 39-43.*

COMMUNAL FORESTS; FORESTRY; NONWOOD FOREST PRODUCTS; MARKETING; COMMUNITY DEVELOPMENT; MYANMAR

Capacity development needs assessment in Southeast Asia toward an informed human development program in Inclusive and Sustainable Agricultural and Rural Development (ISARD). **Quimbo, M.A.T. mtquimbo@up.edu.ph., Sulabo, E.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. ecsalubo@yahoo.com.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2015-5 (Special Anniversary Issue). [2015].* https://www.searca.org/pubs/discussion-papers?pid=312

Global warming and unpredictable weather patterns, decreasing agricultural land area, rural industrialization, increasing urban population, declining enrollment in agriculture programs, lingering rural poverty, fast-paced evolution of new knowledge and technology, and the ASEAN integration are only some of the complex challenges besetting the global agricultural environment in the region. As the leading enabler in the science and practice of agriculture and rural development in Southeast Asia, SEARCA has made the commitment to respond to these challenges by building human, social, and institutional capital through education, research, and action. Recognizing that this changing agricultural environment also provides opportunities for greater beneficial impacts, SEARCA further strengthened its commitment through its 10th Five-Year Plan reformulated mission of strengthening institutional capacities within the framework of Inclusive and Sustainable Agricultural and Rural Development (ISARD) in Southeast Asia. The study was conducted to analyze the capacity development needs of key individuals and institutions to respond to the emerging issues and concerns they face toward an informed human resource development program. It adopted an exploratory and descriptive research design using a combination of survey, interviews, and focus group discussions. Select institutions and key individuals in the frontline of agricultural and rural development work in Southeast Asia served as research participants representing countries such as Cambodia, Timor Leste, Indonesia, Lao PDR, Philippines, Singapore, Thailand, and Vietnam. Qualitative and descriptive approaches were used in data analysis. The study was expected to determine strategies and policy directions

to make ISARD human resource development program more responsive and relevant to target institutions and personnel. In organizing the results of the study, six broad categories of competencies from a checklist of about 180 competencies provided to the respondents were determined. These categories of competencies were: management and leadership and planning; agriculture and climate change-related; and research, monitoring and evaluation (M and E) and extension. Institution head-respondents and personnel-respondents employed in the government were asked to prioritize the desired competencies for the institutions and their personnel in order to effectively address emerging problems, issues, and concerns related to agricultural and rural development toward achieving the institutional goals. Prioritization of competencies was done using the criteria of relevance and urgency using a scale of '1' to '3', with '1' as least relevant and least urgent and '3' as most relevant and most urgent. There was generally an existing demand for current capacity building provisions of SEARCA given the desired and prioritized competency areas along SEARCA's training areas of academic leadership, project development and management, research management, and impact assessment of programs with emphasis on food security, climate change, and poverty reduction. Another important result was the identification of new competencies that were both technical and nontechnical within the determined broad categories. Moreover, it was interesting to find that there was also a desired demand for soft skills or those that refer to an individual's intrapersonal and interpersonal relationships to succeed in work. Some of the soft skills were even identified as among the most relevant and most urgent competencies as pointed out by both the institution-heads and key personnel-respondents. While mismatch was found in a number of desired and priority competency areas as perceived by the respondents, there were also interesting concordant answers in both technical and non-technical areas. There was general agreement on the need for capacity building in the competencies of Planning; Sustainable agriculture; Agricultural knowledge and information system; Climate change related areas; Research proposal writing; and Project design, implementation, monitoring, and evaluation. In the case of desired personnel competencies, institution-heads and key personnel-respondents expressed concurrence in such competencies as Resistance to stress skills; Agricultural knowledge and information system; Agricultural innovations system; Climate change-related areas; Impact assessment; Data analysis and interpretation; Strategic planning; Project design, implementation, monitoring, and evaluation; and Rural-urban interdependencies. Agreement was likewise found in a number of prioritized institutional competencies by the respondent-groups. Specifically, these were Tolerance for uncertainty; Climate change-related areas; Research proposal writing; Impact assessment; Data analysis and interpretation; Project design, implementation, monitoring, and evaluation; Rural tourism/agri-ecotourism; and Rural urban interdependencies. In the case of prioritized personnel competencies, consistency in choices was found in such competencies as Analytic thinking skills; Climate change-related

areas; Project design, implementation, monitoring, and evaluation; and Rural tourism/agri-ecotourism.

SUSTAINABILITY; RURAL DEVELOPMENT; LEADERSHIP; MANAGEMENT; DEVELOPMENT PLANS; SOUTH EAST ASIA

Health assessment of health and emergency service front liners before and during the COVID-19 pandemic. **Banwa, T.P., Bulalet, R.V., Naag, A.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 7-16. 2022.*

The outbreak of coranavirus disease 2019 (COVID-19) in December 2019 from Wuhan, China, affected the Philippines in January 2020. To contain the virus, President Duterte imposed an Enhanced Community Quarantine (ECQ) effectively on March 17, 2020, over entire Luzon. The Interagency task force (IATF) identified the health and emergency services frontliners such as public and private health workers and their services providers, workers and volunteers of the Philippine Red Cross and WHO, employees of health maintenance organizations, health insurance officers, disaster and risk management officers, and public safety officers. Specially, this study determined the demographic profile of the respondents perception before and during the COVID-19 pandemic in terms of; availability of necessary medical supplies, availability of personal protective equipment, bodyweight, overall health condition, respondents' medical condition and vitamins/supplements, problems encountered and factors that negatively affect the function of health and emergency service front liner during the pandemic. The study adopted the descriptive method. The researchers used online questionnaire through Google Forms to pandemic adversely affected the health status of the respondents. The insufficiency of essential medical supplies and personal protective equipment, conflicting guidelines, interference from political leaders, concern to family members are perceived by the respondents to affect adversely their work and health during this pandemic. Taking of necessary immunity-boosting vitamins and supplements is crucial in the fight against COVID-19. Young and single female frontliners play an essential role of fighting the COVID-19 pandemic at the community-based health care units. The researchers recommend that necessary medical supplies and personal protective equipment be available on time for use; that concerned authorities and agencies prioritize the employment status and full financial benefits of frontliners, that concerned authorities implement and follow clear necessary guidelines, and the political leaders pay a role model in following community quarantine guidelines in the fight against COVID-19.

HEALTH; HEALTH PROTECTION; HEALTH SERVICES; HUMAN DISEASES; EPIDEMICS

Indigenous practices and climate change responses of Ati and Suludnon farmers in Iloilo, Philippines. **Nelson, G.L.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development. gmnelson@up.edu.ph., Zamora, O.B., de Guzman, L.E.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. Tatlonghari, R.V. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Science Communication. Espaldon, M.V.O. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Brillon, J.A. West Visayas Univ.-Labunao Campus, Iloilo 5042 (Philippines). Coll. of Agriculture anf Forestry.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 87-98. 2019.*

Climate change has become a major threat to the livelihoods of many farmers in the Philippines, particularly among the indigenous groups. It has been recognized that traditional knowledge is an important source of information for climate change adaptation, for embedded into it are coping strategies evolved through and passed on to generations. This study documented through key informant interviews, focus group discussions and farm visits the indigenous knowledge for climate change adaptation of the Suludnons and Ati in Iloilo [Philippines]. Since 2003, their communities experienced climate change as manifested by strong typhoons, landslides, and the various forms of crop and human diseases. Their responses to climate change include biodiversity-based cropping systems, changes in cropping calendar, use of indigenous varieties, consumption of non-traditional/wild foods, indigenous warning systems and diversified income sources. Both indigenous groups are beneficiaries of government and non-government projects, grants and agricultural trainings where they learned new farming technologies. The traditional practices combined with the adoption of selected agricultural technologies have helped the have helped the Suludnon and the Ati groups become become sustainable and climate-resilient farming communities amidst the adverse impact of climate change on their lives.

CROPS; CULTURAL BEHAVIOUR; ETHNIC GROUPS; FARMERS; CLIMATIC CHANGE; ADAPTATION; FARMING SYSTEMS; PHILIPPINES

Influence of ethical leadership on employees' work-related stress and organizational commitment: evidence from developing country. **Lantican, C.A.O. Department of Science and Technology-Forest Product Research and Development Inst., College, Laguna (Philippines). carl_lantican@dlsu.edu.ph.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 6 (1) p. 15-31. 2020.*
https://jemad.cem.uplb.edu.ph/articles/the-influence-of-ethical-leadership-on-employees-work-related-stress-and-organizational-commitment-evidence-from-a-developing-country/

This paper examined the influence of ethical leadership on work-related stress and employee commitment within the theoretical foundations of social exchange and social learning theories. Rank-and-file employees from a service oriented organization were surveyed to measure their perceptions on the ethical behaviors of their leaders and how this is related to work-related stress and employees' organizational commitment. Results verified that in the Philippines, perceived ethical leadership leads to a reduction of employee's work-related stress. Also, the detrimental effect of work-related stress on the organizational commitment of employees was confirmed. However, this effect may be reduced significantly through ethical leadership. It is recommended that companies enforce and practice ethical leadership behaviors to motivate positive behavioural outcomes from employees and circumvent the negative effects of work-related stress.

ETHICS; LEADERSHIP; EMPLOYEE ATTITUDE; ORGANIZATIONS; STRESS; DEVELOPING COUNTRIES

Involvement of women in farm decision-making and adaptive capacity to extreme events of farming households in Ligao City, Albay, Philippines. **Tapia, M.A., Pulhin, J.M. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Forestry and Forest Governance. Nelson, G.L.M. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Sciences. Predo, A.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources. Peria, A.S. Philippines Univ. Los Baños, College, Laguna (Philippines). Office of the Coordinator for Research, Extension, and Linkages. Peras, R.J.J. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Forestry and Forest Governance. Lasco, R.D. International Centre for Research in Agroforestry, Los Baños, Laguna (Philippines). Pulhin, F.B., Evangelista, R.J.P. Philippines Univ. Los Baños, College Laguna (Philippines). Forestry Development Center.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 70-81. 2018.*

This study examined the involvement of women in agricultural decision-making among farming households in Ligao City, Albay, Philippines and related this to enhancement or decline of their adaptive capacity to extreme weather events. Data were collected through a household survey in the three selected barangays [villages] representing coastal, lowland and upland communities. More than 50% of husbands solely made decisions on choice of food crops, cash crops, tree species, and farm production. This parallel findings in the Philippines showing male dominance in agricultural production. Nevertheless, women still participated in decision-making in a limited way as 13-16% of them singly decided on behalf of the household while 30-38% made decisions together with the husband. Following the Sustainable Livelihood Framework, an adaptive capacity index was developed for the households. The analysis revealed that 96.17% of the respondents had low (<0.5) and 3.83% had medium adaptive capacity (>0.5), with all scores ranging from 0.0982 to 0.6171. Age

and choice of trees species by husband positively influence adaptive capacity, while choice of cash crops by husband has negative relationship. Farm decision-making is gendered, and giving authority to the person with more capabilities to make effective decisions based on his/her relationship to this resource-based livelihood should be considered despite prevalent notion of the dominance of one gender.

FARMING SYSTEMS; HOUSEHOLDS; ROLE OF WOMEN; FARMS; DECISION MAKING; PHILIPPINES

Local collaborative engagement toward sustainability of upland farming communities in the Philippines. **Landicho, L.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Agroforestry. Dizon, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). *SEARCA. 2020. p. 23-49.*

In this chapter, the authors argue that local collaborative engagement is essential towards sustainability of whole upland farming communities in the Philippines. Local collaborative engagement refers to the partnership of local development organizations, particularly the local government units (LGUs), with the upland farming communities, as well as the interactions among the structures and processes within those farming communities. This conclusion is based on the results of the study conducted in nine pilot upland communities of the Conservation Farming Villages (CFV) program in Albay, Ifugao and Negros Oriental. From seven focus group discussions and a farm household survey of 230 upland farmers, research results revealed that the study steps sites in Albay and Negros Oriental had moderate levels of sustainability of 0.26 and 0.49 respectively, while the study site in Ifugao had a low level of -0.46. The level of sustainability was determined using the community capitals framework, which puts emphasis on the seven capitals, namely: human, social, natural, physical, financial, cultural, and political capitals as determinants of a sustainable community. Specifically, human, social, and political capitals were found higher in Albay and Negros Oriental. Active collaboration between LGUs and the upland farming communities in the two study sites had resulted in the following: (1)continuous technical capability-building of upland farmers; (2)maintenanve and expansion of the model agroforestry farm sites; (3)continuous operation of the CFV farmers' association; and (4) institutionalization of local policies that were in line with conservation farming. Logistics regression revealed that informal policies and verbal agreements, formal policies and programs, and the Filipino practice of bayanihan help determine the sustainability of upland farming communities.

HIGHLANDS; RURAL COMMUNITIES; RURAL DEVELOPMENT; AGROFORESTRY; SUSTAINABILITY; PHILIPPINES

Mother tongue based language education in Philippines and Cambodia: a comparative study. **Lang-ay, P.L.D., Sannadan, J.G.M.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 72-94. 2020.*

The implementation of Mother Tongue-Based Multilingual Education addresses numerous educational issues in the Philippines and Cambodia by recognizing a child's mother tongue, culture, and context as the foundation of learning. The study used literature juxtaposition and qualitative meta-analysis to conduct a rigorous secondary qualitative analysis of primary qualitative findings. This is to provide a more comprehensive description of the implementation of MTB-MLE in both countries and its perceived effects on the indigenous communities. The study determined that most mother tongue-based education in both countries occur in the non-formal sector, particularly at the preschool or adult literacy classes. Most programs are run by non-government actors, such as local and international NGOs and other civil society actors. It further concludes that this learning initiative helped the marginalized minorities by supporting the utilization of their mother tongue and helping them make sense of the words and the world they are in. This learning initiative would encourage students to achieve more and would allow them to relate their everyday reality to reality nationally, internationally, and globally.

EDUCATION; ETHNIC GROUPS; INDIGENOUS KNOWLEDGE; CULTURAL VALUES; CAMBODIA; PHILIPPINES

Multisectoral participation in the development of an index for community wellbeing. **Buot, M.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Human Kinetics. mmbuot@up.edu.ph., Cardenas, V.R., Dizon, J.T., Quimbo, M.A.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development. Nelson, G.L.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Social Sciences.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 243-260.*

Many Filipinos are affected severely dis disasters. Knowing, how and why some communities are capable of springing back to pre-disaster conditions, while other communities struggle to recover, even when there are numerous relief operations provided, is worth examining. Toward this end, constructing a valid measure of community wellbeing (CWB) in the form of an index with multisectoral participation, is the goal of the

study being reported in this chapter. Purposive sampling was used in selecting the sites, which have recently experienced natural disasters (the provinces of Albay, Bohol, and Leyte in the Philippines). A CWB index (CWBi) therefore was developed as reference for each local government unit (LGU) to use in determining which among the dimensions of CWB need enhancement so that communities will have satisfactory CWB. The analytical hierarchical process (AHP) was applied to deductively choose indicators, in order to create dimension indices such as for the built, financial, political, sociocultural and natural capitals. The CWBi for selected localities, exposed to frequent Mayon Volcano eruptions in Albay, the devastating earthquake in Bohol, and typhoon Yolanda (International name Haiyan) in Leyte, were 0.602, 0.576, and 0.606, respectively. The disasters strongly influenced the overall CWBi in all the localities, implying that household attributes, sense of community and networks, and level of trust and emotional connection, were important indicators enhancing CWB in the aftermath of natural disasters. Incidentally, the natural capital contributed the least to the CWB in the aftermath of natural disasters. Incidentally, the natural capital contributed the least to the CWBi, in all the localities studied, with dimension values of 0.011, 0.14, and 0.21 for Albay, Bohol, and Leyte, respectively. The economic and political capitals and how low dimension values as well, calling for a re-examination of the policies by the concerned LGUs. There is a need to enhance the CWB a re-examination of the policies by the concerned LGUs. There is a need to enhance the CWB values foe every indicator selected in this study to increase the CWBi. Community education will be a great help. The current data implies that CWB is a function of trust, governance, functional literacy, and healthy natural environment. implying that household attributes, sense of community and networks, and level of trust and emotional connection.

RURAL COMMUNITIES; HOUSEHOLDS; DISASTERS; HEALTH SERVICES; LOCAL GOVERNMENT; RURAL DEVELOPMENT

Participation of beneficiaries in community health care program: the case of Tanghpre Parish, Kachin State, Myanmar. **Aung, P.M.M. Community and Health Development, Myitkyina, Kachin State (Myanmar). Dizon, J.T. jtdizon@up.edu.ph., Quimbo, M.A.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development. Bustos, A.R. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Human Nutrition and Food.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (1) p. 25-57. 2015.*
https://jpad.cpaf.uplb.edu.ph/articles/participation-of-beneficiaries-in-community-health-care-program-the-case-of-tanghpre-parish-kachin-state-myanmar/

This study determined the perception on the participation level of village people as beneficiaries of a community health care project, which served as a development strategy in four villages of Tangphre Parish in Kachin State, Myanmar. A total of 62 beneficiaries

including one project staff served as respondents of the study. Data were collected through a combination of individual survey and key informant interviews. Results of the survey were analyzed using descriptive statistics. Results showed that the perceived level of participation was moderate in all phases. Project activities such as health prevention trainings; support for basic needs; and provision of medicines, supplementation and treatment; and referral services were the motivating factors that increased the participation of the grassroots. The beneficiaries' contributions in terms of their resources like food, labor, shelter, knowledge, and time were indicators of their commitment to the project. Highly favorable attitude, improved skills, and knowledge of the community health care workers, health and development committees, and project staff were important factors that encouraged the beneficiaries to achieve the project's objectives. Political conflicts and lack of transportation were found to be the major barriers to program implementation. Hence, there is a need to address the conflicts and improve the peace and order situation in the villages. There should also be a close collaboration of the Community Health Care and Development Program with the national government and the Kachin Independence Association to address a wide range of issues in attaining basic needs and in improving all aspects of the people's lives.

HEALTH SERVICES; SOCIAL PARTICIPATION; DEVELOPMENT PROJECTS; PROJECT MANAGEMENT; PHILIPPINES

Persistence of poverty among the Badjaos of Bongao, Tawi-Tawi, ARMM, Philippines. **Usman, K. Tawi-Tawi Regional Agricultural Coll., Nalil, Bongao, Tawi-Tawi (Philippines). Baconguis, R.D.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. rdbaconguis@up.edu.ph.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 3 (1 and 2) p. 151-185. 2016.*
https://jpad.cpaf.uplb.edu.ph/articles/persistence-of-poverty-among-the-badjaos-of-bongao-tawi-tawi-armm-philippines/

The study sought to understand the persistence of poverty among the Badjao people in Tawi-Tawi, Autonomous Region of Muslim Mindanao (ARMM), Philippines. Considered the poorest in their communities, Badjaos are Sea Gypsies of Sulu and Celebes seas who are scattered in different coastal areas in Mindanao. Specifically, the study aimed to determine the educational background, psychological outlook, economic, nutrition and health conditions, political and social capabilities, and access to government services of the Badjaos. These factors are referred to as conditions that facilitate or hinder mobility in society. Thus, their absence can further bind people in a state of poverty or what is referred to as deprivation trap. Semi-structured questionnaires were used to investigate the socio-economic conditions of the respondents. Two gate keepers helped the researchers identify the respondents based on their availability and willingness to discuss their situations. The

selected research sites were two villages in Bongao, Tawi-Tawi, which are known as Badjao communities. Results showed that respondents suffer from a deprivation trap, a condition that keeps people in poverty. A model for program implementation that is guided by collaboration, networking, and cultural sensitivity is proposed. Program components of the proposed model focus on informative, persuasive, participatory, and formative interventions.

ETHNIC GROUPS; POVERTY; PROJECT MANAGEMENT; LOCAL GOVERNMENT; HEALTH SERVICES; GOVERNMENT; PUBLIC SERVICES; NUTRITIONAL REQUIREMENTS; BASIC NEEDS; PHILIPPINES

Profiling Study of the creative industry artists of Baguio City, the First Creative City in the Philippines. **de Guzman, R.S.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Agribusiness Management and Entrepreneurship. rcdeguzman5@up.edu.ph.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 6 (1) p. 33-56. 2020.*
https://jemad.cem.uplb.edu.ph/articles/a-profiling-study-of-the-creative-industry-artists-of-baguio-city-the-first-creative-city-in-the-philippines/

Research among 56 creative industries' artists was conducted to serve as a foundation in creating and implementing plans for Baguio Creative City. This study evaluated artists' creative and business dimensions to determine the experiences and challenges they encounter. Generally, artists participate in the creative economy where the art market thrives. Artists, who do not consider themselves good businessmen, encountered typical enterprises' challenges: finding customers, marketing products, managing finances, and operations. Their most pressing concerns were limited government support and lack of creative spaces. There is a need to develop the creative and entrepreneurial skills among artists and the city's infrastructure. It is recommended that the local government establish creative spaces to showcase artists' works and performances while serving as a marketplace. Formal registration of artists is advised to professionalize their roles and achieve better representation in public policy together with private interest groups, universities, and the government.

INDUSTRY; ENTERPRISES; MARKETING; INFRASTRUCTURE; PHILIPPINES

Saving and spending behavior of household before and during COVID-19 pandemic. **Bagtang, E.T., Saguibo, J.E.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 125-133. 2020.*

This study examined the saving and spending behavior of 131 respondents before and during the quarantine period due to pandemic COVID 19. An online survey was done to determine their saving practices and spending pattern on goods and services. Descriptive methods were used, and standard deviation was used to determine the respondents' reliability. Results indicate that before and during the declaration of COVID 19 pandemic have allotted 5 percent and below savings and spent on essential goods but there was a decrease of percentage on the propensity to save during the pandemic because of ob displacement. The decrease in income has affected the savings practices only high-income groups have saved at home and in banks. Bank withdrawals have decreased because of restrictions imposed by authorities in business transactions outside residences. The majority of the respondents saved 5% and below in a bank before and during pandemic for education and medical purposes while they spend a weekly budget of below PhP 5,000 on food, shelter, clothing, education, medicine, transportation, and less expenditure on non-essential goods. The respondents' spending behavior changed during the quarantine period on food, shelter accessories, clothing, travel, low expenditures on luxury goods, and outside entertainment services and their grocery expenditures have increased due to bulk buying among households. E-commerce and delivery of food and essentials goods were observed during the pandemic. These was a considerable change of lifestyle where families stayed at home bonding of food trippings and increased household media expenses during the pandemic. Non-essential goods expenditures have pegged down because the focus of expenses was concentrated on the necessities like food and medicine households. The computed standard deviations of all indicators before and during a pandemic are low, which means that age, sex, family size, income, educational attainment, employment status has affected on the saving and spending behavior of households during the pandemic.

HOUSEHOLDS; FAMILIES; FAMILY BUDGET; INCOME; EMPLOYMENT; EDUCATION; EPIDEMICS

Schistosoma japonicum in the Philippines: its epidemiology, diagnostics, control, and elimination. **Tenorio, J.C.B. jctenorio@usm.edu.ph., Molina, E.C. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Coll. of Veterinary Medicine.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 3 (1) p. 71-87. 2021.*
https://doi.org/10.5281/zenodo.8296530

Schistosoma japonicum infections continue to be a public health concern in China, the Philippines, and Indonesia. In the Philippines, it has a focal distribution wherein an estimated 12.4 million people are at risk of infection, while 2.7 million are directly exposed across 12 regions. The country's latest national prevalence revealed that some endemic communities had already reached infection control status. Recent advancements in

schistosomiasis diagnostic s have resulted in the development of assays that have superior diagnostic performance. The cost of adopting these novel techniques remains a huge bottleneck for those with developing economies and underfunded control and elimination programs like the Philippines. Mass Drug Administration (MDA) has significantly reduced the schistosomiasis morbidity rates in the Philippines through its protracted implementation. MDA fatigue among beneficiaries resulting in non-compliance has been reported. Control and elimination efforts still need continued local and national governmental support. A One Health approach is called for if the goal of transmission interruption in all endemic communities is to be achieved by 2025. This paper reviews the recent research and updates on S. japonicum infections in terms of disease occurrence, advancements in diagnostic techniques and approaches, and its treatment, prevention, control, and elimination in the Philippines and its neighboring countries.

SCHISTOSOMA JAPONICUM; EPIDEMIOLOGY; DIAGNOSIS; SCHISTOSOMIASIS; DISEASE CONTROL; DISEASE TRANSMISSION; PUBLIC HEALTH; PHILIPPINES

Social vulnerability and adaptive capacity to climate change impacts of women-headed households in the Philippines: a comparative analysis. **Delfino, A.N. Partido State Univ., San Juan Evangelista Street, Goa, 4422 Camarines Sur (Philippines). ariel.delfino@parsu.edu.ph., Dizon, J.T., Quimbo, M.A.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Depositario, D.P.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Economics and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (2) p. 36-54. 2019.*

This study analyzed the social vulnerability and adaptive capacity to climate change impacts of women-headed households in two remote coastal communities in Lagonoy, Camarines Sur. Quantitative method following descriptive-correlational research design was employed. Out of 281 WHHs, 162 were randomly selected as the respondents of this study. Descriptive statistics, principal component analysis (PCA), t-test for independent samples, and multiple linear regression analysis were used to analyze the data. Women-headed households in the two remote coastal communities have moderate to high vulnerability in terms of demographic, economic, and social factors. No significant difference was found in their level of social vulnerability; however, a substantial difference was found in the adaptive capacity of the respondents from the East and North coastal communities. Multiple linear regression analysis revealed that the number of household members with disabilities, affiliation with social groups, time travel of the respondents, and household size were significant factors influencing social vulnerability in the two remote coastal communities. The study recommends formulating effective climate change policies and responsive strategies that

enhance the rights and welfare of these households for equal distribution and access to resources, especially in socio-political structures in the community.

WOMEN; HOUSEHOLDS; ROLE OF WOMEN; ADAPTATION; CLIMATIC CHANGE; COSTS; SOCIAL STRUCTURE; PHILIPPINES

Theoretical concepts and practice of community organizing. **Dizon, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 1 (1) p. 89-123. 2012.*
https://jpad.cpaf.uplb.edu.ph/articles/theoretical-concepts-and-practice-of-community-organizing/

Community organizing, one of the methods in community development, is a Western concept adopted in the Philippines. The different definitions of foreign and local authors highlight the nature of community organizing as a process by which a community identifies its problems and finds solutions through collective mobilization of the people and resources. This paper discusses the theoretical concepts of community organizing, which include its ideological background and value orientations, assumptions and propositions, goals, approaches, and principles. Towards the end, the paper discusses the steps involved in community organizing and forwards a conceptual framework of community organizing focused on people empowerment and based on the concept of people-centered participatory development.

RURAL COMMUNITIES; COMMUNITY DEVELOPMENT; SOCIAL PARTICIPATION; COMMUNITY INVOLVEMENT

Toward building collaborative capacity: assessment of service delivery in Makati Homeville, Laguna, Philippines. **Amores, C.C. Malayan Colleges Laguna, Cabuyao, Laguna (Philippines). Center for Student Services. ccamores30@gmail.com., Querijero, N.J.V.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 3 (1 and 2) p. 1-31. 2016.*
https://jpad.cpaf.uplb.edu.ph/articles/toward-building-collaborative-capacity-assessment-of-service-delivery-in-makati-homeville-laguna-philippines/

This study assessed the service delivery in Makati Homeville (MH), Calauan in Laguna, Philippines. Specifically, it analyzed the perceived strength of the collaborative capacity of the Makati Social Welfare and Development-Extension Office (MSWD-EO) in the areas of accountability, outcomes, delivery and alignment, and proposed mechanisms by which service delivery can be scaled up to ensure sustainability. The Collaborate and United

Nations Development Programme's Collaborative Capacity Framework was adopted to examine key areas of public service delivery where collaboration could be strengthened to ensure better outcomes. The perceived strength was measured by computing the mean scores of respondents' numerical rating for each statement. The data from qualitative sources were used to validate numerical data and track the historical development of MH. It was revealed that despite the collaborative initiatives taking place in MH, some basic services needed improvement, particularly access to livelihood, electricity, and potable water. The perceived strength of MSWD-EO's collaborative capacity was 'strong' across key areas of service delivery. A closer examination of qualitative data, however, revealed some weak areas in the design (outcomes), risk (alignment), innovation (delivery), and transparency (accountability). Putting collaborative framework at work would require mobilizing substantial resources and overcoming constraints in project management. It is necessary that a framework for inter-local government relations governing off-city resettlement is formulated, approval of House Bill 5144 is secured, and a memorandum of agreement be signed between Makati and Calauan Local Government Units.

LOCAL GOVERNMENT; RURAL AREAS; GOVERNMENT; PUBLIC SERVICES; SOCIAL SERVICES; BASIC NEEDS; PROJECT MANAGEMENT; SUSTAINABILITY; PHILIPPINES

E70 - TRADE, MARKETING AND DISTRIBUTION

Building a resilient and inclusive vegetable supply chain through PCAARRD's [Philippine Council for Agriculture, Aquatic and Natural Resources, Research, and Development] vegetable production and marketing project. **Tiamson, P.G., Abeleda, M.F.** *PCAARRD Monitor (Philippines). 0116-3140. v. 5 (2) p. 30-31. 2020.*

VEGETABLES; PRODUCTION; MARKETING; FARMERS; CONSUMERS; SUPPLY

Market composition and performance of firms in broiler, chicken egg, and swine production: implications to the Philippine Competition Act. **Curibot, J.P. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Socioeconomics Div. jpcuribot@up.edu.ph., Elca, C.D. cdelca@up.edu.ph., Neric, C.M.T. catolentino2@up.edu.ph., Gordoncillo, P.U. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Dept. of Agricultural and Applied Economics. pugordoncillo@up.edu.ph.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 5(2) p. 1-16. 2019.*
https://jemad.cem.uplb.edu.ph/articles/market-composition-and-performance-of-firms-in-broiler-chicken-egg-and-swine-production-implications-to-the-philippine-competition-act/

The Philippine Competition Act promotes free and fair market competition to improve market efficiency and protect consumer welfare. Thus, it is necessary to examine and assess the nature of competition in any industry. This was done by conducting the study of broiler, chicken egg, and swine industries using the market structure-conduct performance approach. The degree of firm concentration, barriers to entry, profitability of production, return on investment, and share in every peso spent by the consumers were determined. Based on the analysis, markets for chicken egg and pork were fairly competitive while that of chicken meat was oligopolistic. Huge capital investment also showed to be a hindrance for greater competition in all the industries. Large share in consumer's peso was more likely an issue in the chicken meat market than in chicken egg and swine. Monitoring the behavior of large firms, reducing structural barriers, and increasing production efficiencies are necessary to improve markets of these industries thus ensuring a vibrant competition.

BROILER CHICKENS; ENTERPRISES; MARKETING; ECONOMIC COMPETITION; PROFITABILITY

Organizational transformation of a public-private partnership: the case of the Nueva Vizcaya Agricultural Terminal, Philippines. **Montes, N.B.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Agribusiness Management and Entrepreneurship. Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Pabuayon, I.M., Depositario, D.P.T. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Dept. of Agricultural and Applied Economics. Atienza, V.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. ndmontes@up.edu.ph.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 4 (2) p. 57-72. 2018.*
https://jemad.cem.uplb.edu.ph/articles/organizational-transformation-of-a-public-private-partnership-the-case-of-the-nueva-vizcaya-agricultural-terminal-philippines/

The Nueva Vizcaya Agricultural Terminal (NVAT), Philippines is a mixed capital public-private joint venture established in Nueva Vizcaya in 2004 to address problems such as lack of markets and keen market competition. This study aims to describe NVAT's organizational transformation, determine key factors that drove its transformation, and assess its current performance. The research made use of key informant interviews (KIIs), focused group discussions (FGDs), direct observations, and secondary data from records and manuals. Results show that transformation was achieved through crucial changes in governance, structure, core processes, culture, and strategies. The key drivers of transformation were the growing demand for fresh fruits and vegetables, dedicated leadership, and collective goal for good governance, among others. Through a farmers' empowerment strategy and improved trading activities, operations were improved significantly. There were concrete gains in terms of relevance, effectiveness, efficiency, profitability, diversity, and sustainability. An entrepreneurial culture which promotes creativity and innovation should,

however, be fostered in the organization. It was also recommended that NVAT should develop a succession plan, implement a continuing training and education process, and put in place a monitoring and evaluation mechanism.

AGRICULTURAL PRODUCTS; PARTNERSHIPS; MARKETS; MARKETING CHANNELS; DEMAND; PHILIPPINES

Rebuilding the farm-to-fork model: a resilient agricultural food supply chain. **Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research Development, Los Baños, Laguna (Philippines).** *Policy Brief (Philippines). 2799-1105. v. 1 (2) p. 1-12. 2021.*

FARMS; PRODUCTION; TECHNOLOGY; MARKETING; SUPPLY; COSTS; MARKETS

E71 - INTERNATIONAL TRADE

Improving the Vietnamese tea value chain in the international market: the case of Thai Nguyen Province. **Le Van Hung. hunglevan78@gmail.com., Vu Ngoc Quyen. vnquyen84@gmail.com., Nguyen Dinh Hoa. Vietnam Academy of Social Sciences (Vietnam). Vietnam Inst. of Economics. nguyendinhhoaktp@gmail.com.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 5 (2) p. 35-53. 2019.*
https://jemad.cem.uplb.edu.ph/articles/improving-the-vietnamese-tea-value-chain-in-the-international-market-the-case-of-thai-nguyen-province/

Tea production is considered the key sector in Thai Nguyen Province for its provision of livelihood to 40% of rural households. The province is also best known for its traditional green teas with a century history. Based on the primary data collected through field surveys and key informant interviews in Thai Nguyen city and Dai Tu district, the analysis of Thai Nguyen's tea value chain was done by segments and key players. Thai Nguyen's tea is mainly consumed domestically while tea in Vietnam in general is intended more for export. Results of the analysis showed significant differences in gaining profits among key players. In particular, tea growers with certified production earned more than those with non-certified farming practices. Better profits were also concentrated in the group of Kinh farmers and tea growers in Thai Nguyen City or in tea growing households with higher education levels and with production and/or market linkages. Lower profits from exports of tea materials and the decrease in export volumes in recent years would imply weak competitiveness of Thai Nguyen's tea exports, which was mainly attributed to nonstandardized farming practices, small-scale production and non-rigorous control of food hygiene and safety. In order to improve the tea value chain in the international market, it is

necessary to develop a quality-focused strategy for tea products in Thai-Nguyen province, improve the social recognition of GAP-certified households producing tea and provide incentives for GAP-adoption and renewal of certification, increase investment in irrigation infrastructure, provide adequate R and D funding for the diversification of tea products and development of environment-friendly packaging materials, plan and establish a processing cluster for tea products, and coordinate and support enterprises to provide updated market information and trade promotion for tea products.

TEA; PRODUCTION; MARKETS; INTERNATIONAL TRADE; VIET NAM

E73 - CONSUMER ECONOMICS

Factors influencing consumption behavior of choco-carabao milk in Visayas State University (VSU), Baybay, Leyte, Philippines. **Preciados, J.S. lemuel.preciado@vsu.edu.ph., Catchero, F.C. Visayas State Univ., Baybay, Lete (Philippines). Dept. of Economics. mamaicatchero@gmail.com.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 6 (1) p. 71-83. 2020.*
https://jemad.cem.uplb.edu.ph/articles/factors-influencing-consumption-behavior-of-chococarabao-milk-in-visayas-state-university-vsu-baybay-city-leyte-philippines/

This study assessed the factors influencing the consumption behavior of Philippine Carabao Center's (PCC) choco-carabao milk at Visayas State University (VSU), Baybay City Leyte. Using proportionate random sampling, the study surveyed a total of 630 respondents. Consumption behavior was measured through the frequency of purchase, the number of bottles purchased per week, and the estimated weekly budget and expenditure for choco-carabao milk. These behaviors were analyzed using three different regression models. Results showed that different variables affected these measures of consumption behavior. The frequency of purchasing was mostly influenced by parental influence and the level of education of faculty and staff. On the other hand, the number of bottles purchased per week was negatively affected by the level of education, the distance of the shop, and the friendliness of store staff. Finally, the weekly budget for choco-carabao milk was negatively affected by the distance to the store and the price of the product.

COCOA BEVERAGES; WATER BUFFALOES; MILK PRODUCTS; CONSUMPTION; CONSUMER BEHAVIOUR; MODELS; PHILIPPINES

E80 - HOME ECONOMICS, INDUSTRIES AND CRAFTS

Baguio [Philippines] weaving company finds a new market with its line of hand-dyed handwoven products. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 29-31. 2022.*

https://agriculture.com.ph/2021/10/02/baguio-weaving-company-finds-a-new-market-with-its-line-of-hand-dyed-handwoven-products/

DYE PLANTS; FIBRES; DYES; HANDICRAFTS; PHILIPPINES

Last of the asinderos: a look at Bohol's [Philippines] heritage 'unbroken' salt. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 54-57. 2022.* https://agriculture.com.ph/2021/10/24/the-last-of-the-asinderos-a-look-at-bohols-heritage-unbroken-salt/

SALTS; PROCESSING; COTTAGE INDUSTRY; PHILIPPINES

E90 - AGRARIAN STRUCTURE

Double difference approach to impact evaluation: case of the effects of the Comprehensive Agrarian Reform Program (CARP) on poverty. **Gordoncillo, P.U. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Agricultural Economics. pugordoncillo@gmail.com.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (1) p. 95-109. 2015.* https://jpad.cpaf.uplb.edu.ph/articles/double-difference-approach-to-impact-evaluation-case-of-the-effects-of-the-comprehensive-agrarian-reform-program-carp-on-poverty/

The Comprehensive Agrarian Reform Program of the Philippines has been one of the major programs of the government since its implementation in 1988. Over the years, a considerable amount of financial resources has been spent for the program that an impact evaluation is merited. Studies have established the impact of the program on some outcome variables like income and poverty. However, the studies done were limited to either a temporal comparison between the period before and after the program or a comparison between the beneficiaries and non-beneficiaries of the program. This study explored the double difference approach to verify the findings of the previous studies. The paper showed that the findings based on either the before- after or with-without comparison were not validated with the double difference approach. The paper recommends that further research be done with a more rigorous design to ensure validity of the estimation of the impacts of the program.

AGRARIAN REFORM; AGRICULTURAL POLICIES; GOVERNMENT; RURAL DEVELOPMENT; POVERTY

F - PLANT SCIENCE AND PRODUCTION

F01 - CROP HUSBANDRY

10 tips to grow melons in container. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p.60. 2022.*
https://agriculture.com.ph/2021/01/23/10-tips-to-grow-melons-in-containers/

CUCUMIS MELO; MELONS; CONTAINER PLANTING; CROP MANAGEMENT; CULTURAL METHODS; HARVESTING; STORAGE

12 plants believed to bring luck owners. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 56-57. 2022.*
https://agriculture.com.ph/2022/02/07/12-plants-believed-to-bring-luck-to-their-owners/

ORNAMENTAL PLANTS; AMENITY PLANTING; DOMESTIC GARDENS; DECORATIVE USES

85 year-old retired businessman keeps active by gardening during the pandemic. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 48-50. 2021.*
https://agriculture.com.ph/2021/06/06/85-year-old-retired-businessman-keeps-active-by-gardening-during-the-pandemic/

VEGETABLE CROPS; FRUIT TREES; GARDENS; SMALL FARMS; SMALL FARMS; PLANTING

Age doesn't matter: young farmer's track record proves that farming can be a viable career. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 36-41. 2021.*

VEGETABLE CROPS; CROP MANAGEMENT; PLANT ESTABLISHMENT; FARMS; CERTIFICATION; ORGANIC AGRICULTURE; FARMING SYSTEMS; FARMERS

Agro-morphological characterization and evaluation of heirloom rice in Tanudan, Kalinga [Philippines]. **Ganotice, F.L., Calagui, J.C.P., Loreto, J.B., Likigan, E.V. Kalinga State Univ., Bulanao, Tabuk City, Kalinga (Philippines).** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 28-38. 2019.*
https://researchextension.ksu.edu.ph/index.php/research-development/faculty-researches/2019-volume-1/8-2019/5-agro-morphological-characterization-and-evaluation-of-heirloom-rice-in-tanudan-kalinga

The study entitled Agro-Morphological Characterization and Evaluation of Heirloom Rice in Lubuagan, Kalinga [Philippines] from January to August 2019 at Lubo, Lubugan, Kalinga. It

was undertaken to determine the characteristics of the two Heirloom Cultivars in Tanudan condition. Randomized Complete Block Design was used in a 450 square meter. The study used the International Rice Research Institute (IRRI) Descriptors for wild and cultivated Rice as Guide in the collection of heirloom rice agro-morphological characteristics of the traditional landraces. Variations of Distinct characteristics on the morphological traits of Intan and Guinannay varied on the following: anthocyanin coloration and intensity of green color of the leaf blades, collar color; ligule color, culm habit, culm underlying node color; lemma apiculus color; awn distribution, awn color; panicle branches attitude, panicle testability, lemma and palea color, and caryopsis color. Quantitative traits of the two varieties were recorded. Intan has greater plant height at maturity, number of culm per plant, culm length, greater number of tillers per plant, longer panicle length, longer leaf blade, and wider flag leaf. Though, Guinannay have longer grains, greater number of panicles, longer size of ligule, wider leaf blade, wider diameter of culm, longer awn, and wider width grains. Thus, plants that have greater number of tillers, longer panicle, longer and greater culm number, wider flag leaf produce greater yields and longer grains have greater grain weight.

ORYZA SATIVA; RICE; VARIETIES; GENOTYPES; EVALUATION; CROP YIELD; INDIGENOUS ORGANISMS; AGRONOMIC CHARACTERS; PLANT ANATOMY; PHILIPPINES

Assessment of the factors affecting the efficiency of yellow corn farmers in selected provinces in the Philippines. **Cabangbang, J.A. jacabangbang@up.edu.ph., Quicoy, C.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Agribusiness Management and Entrepreneurship.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 5 (2) p. 69-77. 2019.*
https://jemad.cem.uplb.edu.ph/articles/assessment-of-the-factors-affecting-the-efficiency-of-yellow-corn-farmers-in-selected-provinces-in-the-philippines/

The paper is an empirical study of the technical efficiency of yellow corn farmers in selected provinces of the Philippines using cross section data from 154 corn farmers. It aimed to determine the level of input utilization, profitability of yellow corn and determine the factors affecting corn productivity and technical efficiency. A Stochastic Frontier Production Function Model through maxim um likelihood estimation (MLE) Method was used to estimate farm-level technical efficiency. Analysis showed that, on the average, yellow corn farmers used 91.7 kilogram of seeds; applied 224 kilograms of nitrogen, 49 kilograms of Phosphorous, 9 kilograms of Potassium; and applied PhP 3,039 worth of agro -chemicals in one production season. The results also showed that the average technical efficiency of yellow corn farmers was 67.6 percent. It was found that the amount of seeds, nitrogen and potassium fertilizers, and agro-chemicals used are significant factors influencing the productivity of yellow corn in the study areas. Moreover, factors such as the level of

education of the farmers; years of farmers' experience in yellow corn production; and training and seminars attended by the farmers showed positive effects on the farm-level technical efficiency of yellow corn farms.

MAIZE; FARMERS; EFFICIENCY; MATHEMATICAL MODELS; FARM INPUTS; PRODUCTIVITY

Balatong [mungbean]: the black gold of San Mateo [Isabela, Philippines]. **Pascual, C.K.B.** *Fiesta (Philippines). p. 5-6. 2021.*

MUNG BEANS; PRODUCTION; DIVERSIFICATION; INDUSTRY; CROP MANAGEMENT; PHILIPPINES

Basic care for begonias for name gardeners. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 50-51. 2022.*
https://agriculture.com.ph/2021/01/15/basic-care-for-begonias-for-home-gardeners/

BEGONIA; HERBACEOUS ORNAMENTALS; GARDENS; GARDENING; FERTILIZERS; FERTILIZER APPLICATION

Caloocan [Philippines] parish's urban farming project integrates rabbit production with urban agriculture. **Veneracion, A.M.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 19-21. 2022.*
https://agriculture.com.ph/2022/01/14/caloocan-parishs-urban-farming-project-integrates-rabbit-production-with-urban-agriculture/

VEGETABLE CROPS; URBAN AGRICULTURE; HYDROPONICS; RABBITS; PRODUCTION; PHILIPPINES

Cebu [Philippines] family expanded their growing space from a home garden. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (9) p. 20-22. 2022.*
https://agriculture.com.ph/2021/02/04/cebu-family-expanded-their-growing-space-from-a-home-garden-to-an-integrated-farm/

CROPS; ANIMALS; CROP MANAGEMENT; PLANT ESTABLISHMENT; INTEGRATED PLANT PRODUCTION; PHILIPPINES; AGROSILVOPASTORAL SYSTEMS

Collaboration among stakeholders: key to the organic agriculture movement in Negros Occidental [Philippines]. **Gasmen, A.D. Department of Agriculture 2nd Floor BSWM Bldg. Elliptical Rd., Diliman, Quezon City (Philippines). Agriculture Training Inst. Baconguis, R.D.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and**

Rural Development. *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (1) p. 59-93. 2015.*
https://jpad.cpaf.uplb.edu.ph/articles/collaboration-among-stakeholders-key-to-the-organic-agriculture-movement-in-negros-occidental/

The organic agriculture movement in Negros Occidental can be traced back in the 1970s through the advocacy of the civil society. The movement received significant push when the local government issued policies and formulated programs that supported organic agriculture, and further, when the private sector supported the marketing of the produce. This paper explores collaboration among organic practitioners, government agencies, and the private sector as well as their interactions that significantly advanced organic agriculture. The research is an intrinsic case study as it investigates organic agriculture through in-depth data collection involving multiple sources of information. Results show patterns of interaction as evidenced by established networks and collaborative arrangements among organic practitioners - as individuals and organized groups - as well as interaction among agencies and institutions - public and private - that provide support services. Pressing needs for inputs, technical support, and market drew organic practitioners together to interact. Organic policies and programs, organic certification and market support, among others, were integral in bringing together support agencies and other stakeholders, which created opportunities for collaboration. Despite active collaboration, full development of the organic sector remains elusive. A model is proposed to maximize local market potentials through partnership between big and small farmers.

ORGANIC AGRICULTURE; LOCAL GOVERNMENT; PARTICIPATION; PRIVATE SECTOR; PROJECT MANAGEMENT; DEVELOPMENT PROJECTS; PHILIPPINES

Coloocan [Philippines] housewife grows fruit-bearing trees in containers. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 58-60. 2022.*
https://agriculture.com.ph/2020/12/10/caloocan-housewife-grows-fruit-bearing-trees-in-containers/

FRUIT TREES; CONTAINER PLANTING; DOMESTIC GARDENS; GARDENING; PLANT ESTABLISHMENT; FERTILIZERS; FERTILIZER APPLICATION; PHILIPPINES

Comparison of the health cost of organic and conventional vegetable cultivation in Getasan Sub-district, Semarang, Indonesia. **Asfawi, S. supriyono.asfawi@dsn.dinus.ac.id., Probandari, A. Universitas Dian Nuswantoro, Semarang (Indonesia). Dept. of Public Health. Setyono, P. Universitas Sebelas Maret, Surakarta, (Indonesia). Faculty of Medicine. Hartono. Universitas Sebelas Maret, Surakarta (Indonesia). Dept. of**

Environmental Science. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 24 (1) p. 36-44. 2021.*

Environmental damage will disrupt the ecosystem to support life. Unsustainable agriculture can be a source of environmental degradation. Conventional agriculture may have an effect on the environment, thus the participation of various parties in sustainable agriculture is needed. Organic agriculture is developed as an environmentally friendly agricultural cultivation with many benefits. Compared to the attention on occupational health, safety and environmental problems, economic motives receive less attention. This study aims to calculate the costs arising from the health impacts of vegetable cultivation. There were 314 respondents interviewed in this study. There were significant differences in the sickness complaints felt by respondents; organic farmer groups have the potential to incur health costs of Rp. 30,333.33, while the conventional group is higher, with a cost of Rp. 103.303.57 (US$ 7.38). Organic farming has a better impact because it uses natural ingredients and is not bad for health. The potential losses arising from health cases also show a high and significant number ($p < 0.001$).

VEGETABLE CROPS; ORGANIC AGRICULTURE; INDIGENOUS KNOWLEDGE; FARMS; HEALTH; COSTS; SUSTAINABILITY; INDONESIA

Criminology graduate pursues a career as an agripreneur sells farm-ready seedlings from his demo farm. **Taculao, P.B.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 36-39. 2022.* https://agriculture.com.ph/2021/02/15/criminology-graduate-pursues-a-career-as-an-agripreneur-sells-farm-ready-seedlings-from-his-demo-farm/

MOMORDICA CHARANTIA; VEGETABLE CROPS; PLANTING; SEEDLINGS; FARMS

Determinants of farmers' knowledge exchange on drought-tolerant maize technology in Kwara State, Nigeria. **Olabanji, O.P. folabanji21@yahoo.com., Ogunlade, I., Omotesho, K.F. University of Ilorin, PMB 1515, Ilorin, Kwara State (Nigeria). Dept. of Agricultural Extension and Rural Development.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 3 (1) p. 44-54. 2021.* file:///C:/Users/UPLB/Downloads/Olabanji,+O.P.+et+al.+-+Determinants+of+farmers'+knowledge+exchange+on+drought-tolerant+maize-1.pdf

Over the years, interpersonal communication among farmers has been identified as a way farmers share agricultural knowledge among themselves. During this process ideas are exchanged. In the face of inadequacy in the number of extension personnel in Nigeria, there is need to document the effectiveness of farmers' knowledge exchange as an alternative channel of disseminating innovations. Hence, this study assessed the determinants of

knowledge exchange on drought tolerant maize (DTMA) technology in Kwara State, Nigeria. A three-stage sampling procedure was used to select 391 main plot managers to be respondents for this study. The mean age of the respondents was 47.6 years. Majority (78%) of them were males, 85.3% married and 81.9% had formal education with an average household size of 9 persons and 20.9 years of farming experience. Data were collected through interview schedule and analyzed using both descriptive and inferential statistics such as frequency, percentage, mean, standard deviation and multiple regression analysis. A small proportion (20.1%) of the respondents belonged to the category of very low knowledge exchange of DTMA. Plot neighbor was indicated as the major communication network through which knowledge exchange occurred among the farmers. Comparative benefits of the technology (x bar = 3.55) was identified as the most important motivation influencing farmers' decisions to exchange knowledge among themselves. Age, household size, contact with extension agents, and farming experience had significant contribution to the extent of knowledge exchange among the farmers at 0.05 level of significance. It is recommended that farmer-to-farmer extension should be strengthened since it could bridge the gaps in technology transfer and promote adoption of agricultural technologies.

ZEA MAYS; MAIZE; DROUGHT RESISTANCE; FARMERS; DIFFUSION OF INFORMATION; INFORMATION EXCHANGE; NIGERIA; TECHNOLOGY

Doctor and ornamental enthusiast expands to crops for their family's consumption. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 6-8. 2022.* https://agriculture.com.ph/2021/01/21/doctor-and-ornamental-enthusiast-expands-to-crops-for-their-familys-consumption/

CROPS; PLANTING; CROP MANAGEMENT; FISHES; FARMING SYSTEMS

Documenting permaculture farm landscapes in the Philippines using a drone with a smartphone. **Flores, J.J.M. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. jabezjoshuaflores@gmail.com., Bagunu, A.K. Permaculture Research Philippines (Philippines). Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 71-86.*

The emergence of unmanned aerial vehicles (UAVs) has led their widespread use in agriculture by scientists and farmers for the purposes of mapping, monitoring, and landscape management. However, the high cost of drones, together with the risk and

difficulty of flying any drone, has marginalized the small-scale farmers from exploring the potential of the AUV technology appropriate to their context. In this report, the authors aim to introduce a simple documentation methodology to small-scale permaculture farmers using a budget-friendly drone that would promote permaculture design, agroecological farm management, and stimulate environmental awareness. The study developed a 10-step methodology based on experience in the field that maximizes the features on the drone. Originally intended as an entry-level AUV, the Ryze Tello was used as documentation tool to generate baseline data of farm biodiversity and system component interactions as well as landscape heterogeneity. Using aerial photos from the drone's built-in camera, the researchers were able to gather valuable data in four small-scale permaculture farms in the Philippines. Collecting such data would enable farmers to observe and interpret both anthropogenic and natural patterns and processes occurring throughout the year. The results of the study suggest the development of more drones like the Tello with improved features in the near future to empower more farmers to make design-based decisions that would ensure both farm productivity and ecosystem health.

FARMS; LANDSCAPE; ALTERNATIVE AGRICULTURE; MONITORING; TECHNOLOGY; AERIAL SURVEYING; PHOTOGRAPHY; REMOTE SENSING

Employee revives parents' Cavite [Philippines] farm as source of food and additional income. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 49-52. 2021.* https://agriculture.com.ph/2020/12/07/employee-revives-parents-cavite-farm-as-source-of-food-and-additional-income/

VEGETABLE CROPS; FRUIT TREES; FARMS; CROP MANAGEMENT; CROPS; INCOME; FOOD PRODUCTION

Enjoying the best of both worlds: mainstreaming organic practices in the conventional agriculture. **Javier, E.Q. Philippines Univ. Los Baños, College, Laguna (Philippines).** Forum on Ogranic and Inorganic Farming: Proceedings. SEARCA, College, Laguna (Philippines). 14 Oct 2019. *PCAARRD [Philippine Council for Agriculture Aquatic and Natural Reasources Research and Development] Information Bulletin (Philippines). 0016-7736. 2021. No. 104/2021 p. 75-88.*

ORGANIC AGRICULTURE; ORGANIC FERTILIZERS; BOTANICAL PESTICIDES; FARMING SYSTEMS; TECHNOLOGY

Establishment of herbal nursery and utilization of medicinal plants helping pregnant, breastfeeding mother and under-five children using herbal medicine in Dilag Tabuk City Kalinga [Philippines]. **Apatas, N.V., Balocnit, D.A., Naag, A.B., Patong, I.G., Bulalet, R.V.,**

Angalao, L.A. *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 1-6. 2020.*

Traditional practices like herbal gardening and utilization of medicinal plant resources are very much anticipated as they are plenty in locality. This medicinal plant uses for the prevention and manages minor illnesses. Organic healing is very much needed in society because of the most common use of drugs due to increased living costs and increasingly prices of pharmacological products. Herbal plants are readily available plant resources allow community people to access, especially for those in remote of far-flung areas. The program's goal is to empower the community, mainly serving the poorest of the poor, the less privileged, the deprived, and the oppressed, and to extend help and support to the community to uplift the living status of the people through increased resiliency. knowledge, and awareness. Moreover, the study aimed to assess the knowledge, skills, and interest of the participants during the implementation of the activity using the same evaluation forms of the Health Education and Information Helping Pregnant, Breastfeeding Mother and Under-Five children using Herbal Medicine-Phase 2-Establishment of Herbal Nursery and Utilization of Medicinal Plants in Dilag Tabuk City Kalinga [Philippines].

DRUG PLANTS; PLANTING; PLANT ESTABLISHMENT; PLANT NURSERIES; INDIGENOUS KNOWLEDGE; SOCIAL PARTICIPATION; MOTHERS; PRESCHOOL CHILDREN; PHILIPPINES

Experiences and advocacies of organic farming. **Villegas, P.M. Villegas Organic and Hobby Eco-Tourism Farm, Batangas (Philippines).** Forum on Ogranic and Inorganic Farming: Proceedings. SEARCA, College, Laguna (Philippines). 14 Oct 2019. *PCAARRD [Philippine Council for Agriculture Aquatic and Natural Reasources Research and Development] Information Bulletin (Philippines). 2021. No. 104/2021 p. 23-38*.

ORGANIC AGRICULTURE; FARMS; RURAL AREAS; TOURISM; FARMERS; FARMING SYSTEMS; TECHNOLOGY

Fair, nutritious, and sustainable: how the participatory guarantee System makes organic certification accessible to small farmers and all consumers. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p.26; 28-29. 2021.*
https://agriculture.com.ph/2021/03/14/fair-nutritious-and-sustainable-how-the-participatory-guarantee-system-makes-organic-certification-accessible-to-small-farmers-and-all-consumers/

ORGANIC AGRICULTURE; SMALL FARMS; CERTIFICATION; FARMERS; FARMS; CONSUMERS

Farmers' daughter develops a farm resort that earns profit and preserves the environment. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 55-56. 2021.* https://agriculture.com.ph/2020/11/13/farmers-daughter-develops-a-farm-resort-that-earns-profit-and-preserves-the-environment/

FARMS; TOURISM; RURAL AREAS; VEGETABLE CROPS; LIVESTOCK; FARMING SYSTEMS; PROFIT

Farmers' perception on the health and environmental benefits of organic rice production in the Philippines: implications for further policy research. **Madlangbayan, G.T. gtmadlangbayan@up.edu.ph., Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 3 (1 and 2) p. 127-150. 2016.* https://jpad.cpaf.uplb.edu.ph/articles/farmers-perception-on-the-health-and-environmental-benefits-of-organic-rice-production-in-the-philippines-implications-for-further-policy-research/

Conventional rice production with the use of chemicals was found to have negative externalities both to the farmers' health and the farming environment. Organic agriculture technologies were developed to minimize such impacts. This paper explores the empirical support of the health and environmental benefits of organic agriculture by generating data from a survey of rice farmers and focus group discussions in rice farming communities. The respondents came from rice farming areas in the country where early adoptors of the organic rice farming system were located. The results of the analysis suggest that farmers fail to recognize the relationship between the perceived social benefits with economic benefits that they could derive from adopting organic agriculture farming system. Future policy research using multidisciplinary approaches is recommended where technical data can support the socio-economic analysis.

ORYZA SATIVA; ORGANIC AGRICULTURE; ENVIRONMENTAL IMPACT; HEALTH; FARMERS; PHILIPPINES

Filipina in France grows Philippine vegetables in her garden. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 32-34. 2022.* https://agriculture.com.ph/2021/02/06/filipina-in-france-grows-philippine-vegetables-in-her-overseas-garden/

VEGETABLE CROPS; DOMESTIC GARDENS; PLANTING; WATERING; CROP MANAGEMENT; CROPS; PHILIPPINES

Flowers for you. **Ancheta, A.V.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 14. 2022.*

HELIANTHUS ANNUUS; FLOWERS; FARMS; FARM MANAGEMENT; RURAL AREAS; TOURISM

Former Agri trainee in Japan now a successful agripreneur. **Palarca, V.T.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 60-61. 2021.*
https://agriculture.com.ph/2021/08/22/former-agri-trainee-in-japan-now-a-successful-agripreneur/

VEGETABLE CROPS; PLANTING; LIVESTOCK; FARMING SYSTEMS; FARMS; TRAINING PROGRAMMES

Former food franchiser turns organic practitioner in North Cotabato [Philippines]. **Rubio, R.M.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p.11-14. 2021.*
https://agriculture.com.ph/2021/05/30/former-food-franchiser-turns-organic-practitioner-in-north-cotabato/

VEGETABLE CROPS; FRUITS; ORGANIC AGRICULTURE; TECHNOLOGY; TECHNOLOGY TRANSFER; FARMS; PROCESSED PLANT PRODUCTS; PHILIPPINES

From a to h: how a gardener shifted his interest from anthuruins to Hoyas. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 23-25. 2022.*
https://agriculture.com.ph/2021/01/22/from-a-to-h-how-a-gardener-shifted-his-interest-from-anthuriums-to-hoyas/

ORNAMENTAL PLANTS; VARIETIES; DOMESTIC GARDENS; GARDENING; WATERING; CROP MANAGEMENT

Gardener with Parkinson's finds respite in growing mayanas. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 52-53. 2022.*
https://agriculture.com.ph/2021/02/05/gardener-with-parkinsons-finds-respite-in-growing-mayanas/

ORNAMENTAL PLANTS; GARDENING; GARDENS; PLANTING; PLANTS; PLANT ESTABLISHMENT

Government employee's bid to start anew in the province led him towards farming. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 50-53. 2022.*
https://agriculture.com.ph/2021/06/28/government-employees-bid-to-start-anew-in-the-province-led-him-towards-farming/

THEOBROMA CACAO; FRUIT TREES; FARMING SYSTEMS; PROCESSING; PROCESSED PLANT PRODUCTS; RURAL AREAS; TOURISM

Head's up for cabbage farming. **Ancheta, A.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 15-17. 2022.*

BRASSICA OLERACEA CAPITATA; CABBAGES; PLANTING; CROP MANAGEMENT; CULTURAL METHODS; HARVESTING

Household resources and practices toward native rice sufficiency in Khoune District, Xiengkhouang Province, Lao PDR. **Chanthavongsa, K. Dept. of Agriculture and Forestry, Xiengkhouand Province (Lao PDR). Degener, J., Quimbo, M.A.T. mtquimbo@up.edu.ph., Amit, M.G.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (2) p. 75-105. 2015.*
https://jpad.cpaf.uplb.edu.ph/articles/household-resources-and-practices-toward-native-rice-sufficiency-in-khoune-district-xiengkhouang-province-lao-pdr/

A case study was conducted in Na-Ou and Xang villages in Khoune district, Xiengkhouang province, Lao PDR to discuss the households' resources and practices in attaining native rice sufficiency. Data were gathered through a combination of methods that included a survey of 91 households, focus group discussions, key informant interviews, actual field observations, and secondary data analysis. The study villages are largely rural, popular nationwide for their native sticky rice varieties, and regarded as models in native sticky rice production. There are also areas of wetland for rice cultivation that are suited to grow the age-old native sticky rice varieties. The native rice farmers in these villages are rice self-sufficient because of their household resources and practices. In their households, they possess adequate farming experiences, land parcels, household technology, farm tools, basic farm machinery, organic fertilizers, rice storage system, and positive attitude and unwavering intent to crop their age-old sticky rice varieties. Their household level practices that contribute to their native rice sufficiency are use of technology that is fundamentally traditional and suitable to the place; engaging in husband-wife enterprise; familial and communal rice farming; and seed variety preservation.

ORYZA SATIVA; RICE; INDIGENOUS ORGANISMS; PRODUCTION; FOOD SUPPLY; SELF SUFFICIENCY; HOUSEHOLDS; LAO PEOPLE'S DEMOCRATIC REPUBLIC

How to grow, care, and earn from blue ternate. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 58-59. 2022.*

https://agriculture.com.ph/2021/01/27/how-to-grow-care-and-earn-from-blue-ternate/

CLITORIA TERNATEA; PLANTING; GARDENING; DRUG PLANTS; CROP MANAGEMENT

Interactive rice production zoning: a web-based system for climate change adaptation in Thailand. **Samranpong, C. Chiang Mai Univ. (Thailand). Center for Agricultural Resource System Research. Rossopa, B. Prachin Buri Research Center (Thailand). Rice Dept. Kaemuangmoon, T. Chiang Mai Univ. (Thailand). Center for Agricultural Resource System Research. Buddahboon, C. Ubon Ratchathani Rice Research Center (Thailand). Jintrawet, A. Chiang Mai Univ. (Thailand). Center for Agricultural Resource System Research.** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *2018. p. 175-185 .*

The Interactive Rice Production Zoning (iPRZ) is a web-based spatial decision support tool for rice production zoning in Thailand. The working group of the project used an open source approach through Google MAp application programming interface, coded with HTML5 and JavaScript. Four groups of maps can be displayed on iRPZ, including maps that show rice variety group, farmers' rice yield and the Rice Department's rice yield (based on good rice technology practice), suitability of rice field, and rice agricultural economic zoning. The iRPZ also provides graphs, charts, and descriptive information. Spatial database from the Department of Agricultural Extensions, Land Development Department, Rice Department, and other related attributes were integrated into iRPZ. Any data scale mismatch caused by multiple data sources was corrected. The iRPZ bridges that gap by using the 'majority approach' at the subdistrict scale as the unit of analysis and display.

CLIMATIC CHANGE; ADAPTATION; RICE; PRODUCTION; ZONING; TECHNOLOGY; THAILAND

IT [Information Technology] architect who has been gardening since his youth now grows food for his family. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 60-63. 2021.*
https://agriculture.com.ph/2020/08/29/an-it-architect-who-has-been-gardening-since-his-youth-now-grows-food-for-his-family/

VEGETABLE CROPS; FRUIT TREES; GARDENING; PLANTING; URBAN AREAS; URBAN AGRICULTURE

Millennial realizes the impracticality of purchasing produce in stores, opts to grow food on her balcony. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 27-29. 2022.*

https://agriculture.com.ph/2020/12/05/millennial-realizes-the-impracticality-of-purchasing-produce-in-stores-opts-to-grow-food-on-her-balcony/

VEGETABLE CROPS; URBAN AGRICULTURE; GARDENING; PLANT ESTABLISHMENT; HERBACEOUS PLANTS

Monggo planting offers viable income for Isabela [Philippines] farmers. **Edale, M.G. Jr. ALM/MGE/PIA-2, Isabela (Philippines).** *Fiesta (Philippines). p. 23-24. 2021.*

MUNG BEANS; PLANTING; FARMERS; INCOME; PROFIT; PHILIPPINES

Nurse's mislabeled dwarf variety Philodendron selloum grew to a large size. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p.24-25. 2021.* https://agriculture.com.ph/2020/12/11/nurses-mislabeled-dwarf-variety-philodendron-selloum-grew-to-a-large-size/

PHILODENDRON; VARIETIES; ORNAMENTAL PLANTS; PLANTING; GARDENS; INCOME

Parañaque [Philippines] hobbyist grows giant golden pothos in his flourishing backyard garden. **Mendenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 26-28. 2022.* https://agriculture.com.ph/2020/12/17/paranaque-hobbyist-grows-giant-golden-pothos-in-his-flourishing-backyard-garden/

ORNAMENTAL PLANTS; VEGETABLE CROPS; DOMESTIC GARDENS; PLANTING; PLANTS; PLANT PROPAGATION; PHILIPPINES

Plant collector finds beauty in the symmetry of his stapeliads. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 20-22. 2022.* https://agriculture.com.ph/2020/12/25/plant-collector-finds-beauty-in-the-symmetry-of-his-stapeliads/

ORNAMENTAL PLANTS; FLOWERS; PLANTING; PLANTS; DOMESTIC GARDENS; GARDENING; CULTURAL METHODS

Prescription for wellness led brothers to start farming. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 42-44. 2021.* https://agriculture.com.ph/2020/10/12/prescription-for-wellness-led-brothers-to-start-farming/

VEGETABLE CROPS; FRUIT CROPS; ANIMALS; BIRDS; APIDAE; FARMING SYSTEMS; GARDENING; FARMS; RURAL AREAS; TOURISM

R and D [research and development] initiatives in cities. **Anon.** *Fiesta (Philippines). p. 4-6. 2021.*

CITRUS; SPECIES; PLANTING; CROP MANAGEMENT; PROPAGATION MATERIALS; QUALITY; RESEARCH

Registered nurse pursues longtime farming dream after leaving profession. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 43-46. 2022.* https://agriculture.com.ph/2021/06/19/registered-nurse-pursues-longtime-farming-dream-after-leaving-profession/

ORNAMENTAL PLANTS; VEGETABLE CROPS; FARMS; RURAL AREAS; TOURISM; MARKETING

Remote forest farm in Rizal [Philippines] boasts of an all-natural and authentic farm experience. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 57-59. 2021.* https://agriculture.com.ph/2020/09/11/a-remote-forest-farm-in-rizal-boasts-of-an-all-natural-and-authentic-farm-experience-part-1/

FRUIT TREES; RURAL AREAS; FARMS; FARMING SYSTEMS; TOURISM; PHILIPPINES

Retiree in Mindanao [Philippines] turns her home into a flourishing indoor garden. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 45-47. 2021.* https://agriculture.com.ph/2020/10/24/retiree-in-mindanao-turns-her-home-into-a-flourishing-indoor-garden/

ORNAMENTAL PLANTS; PLANTING; FARMING SYSTEMS; SMALL FARMS; PLANT PROPAGATION; PHILIPPINES

Retiree's farm produces sweetest variety of jackfruit and earns about P50,000 a month. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 6; 8. 2022.* https://agriculture.com.ph/2021/01/19/retirees-farm-produces-the-sweetest-variety-of-jackfruit-and-earns-about-%e2%82%b150000-a-month/
ARTOCARPUS HETEROPHYLLUS; VARIETIES; FRUIT CROPS; ORCHARDS; FARMING SYSTEMS; PHYSICAL CONTROL

Rhizobacteria in Cyperus iria L.: elucidating its plant growth-promoting potentials. **Gadia, G.L.E. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Graduate**

School. Jumao-as, C.M. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Biological Sciences. Tanabe, M.E.N. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Graduate School. maelneyra@gmail.com. *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 2 (1) p. 23-30. 2020.*
https://doi.org/10.5281/zenodo.8245684

Excessive use of synthetic agents in agricultural production entails negative impacts in the environment. Hence, the search for effective and environment-friendly methods is imperative. This study explored the rhizosphere of Cyperus iria L., a common rice weed, for potential plant growth-promoting rhizobacteria. Fifteen rhizobacterial isolates were tested in vitro for plant growth-promoting characteristics such as phosphate solubilization, ammonia production, catalase production, and antifungal activity. Phosphate solubilization was tested by plating the isolates on Pikovskaya agar while ammonia production was determined via Nessler's reagent. Catalase production was determined using 3% hydrogen peroxide, while antifungal activity was tested against a plant pathogen, Rhizoctonia solani. Results showed that among the fifteen rhizobacterial isolates, five were phosphate solubilizers while eight showed antifungal activity against R. solani. All isolates tested positive for catalase test and negative for ammonia production. Based on the in vitro screening, the highest phosphate solubilization was observed in Curtobacterium sp. while significant antifungal activity against R. solani was demonstrated by Bacillus sp. It can be concluded that the rhizosphere of C. iria is associated with bacteria that can be further studied to elucidate its plant growth-promoting potential.

CYPERUS; SPECIES; RHIZOBACTERIA; AMMONIA; ANTIFUNGAL PROPERTIES; PLANT PRODUCTION

Sagada [Mountain Province, Philippines] farmer champions sustainable coffee. **Maches, D.J.** *Agriculture (Philippines). 0118-857-7. v. 26 (9) p. 12; 14. 2022.*
https://agriculture.com.ph/2022/03/25/sagada-farmer-champions-sustainable-coffee/

COFFEA; COFFEE; FARMS; HIGHLANDS; PRODUCTION LOCATION; HUMAN BEHAVIOUR; PLANT ESTABLISHMENT; AGROFORESTRY; PHILIPPINES

Science and practice of inorganic farming. **Sanchez, P.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural Systems Inst.** Forum on Ogranic and Inorganic Farming: Proceedings. SEARCA, College, Laguna (Philippines). 14 Oct 2019. *PCAARRD [Philippine Council for Agriculture Aquatic and Natural Reasources Research and Development] Information Bulletin (Philippines). 0016-7736. 2021. No. 104/2021 p. 39-57.*

FERTILIZER APPLICATION; INORGANIC FERTILIZERS; ENVIRONMENTAL IMPACT ASSESSMENT; FARMS; PRODUCTIVITY; SOIL FERTILITY; CROP PERFORMANCE

Science and practice of organic farming. **Maghirang, R.G. aPhilippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding.** Forum on Ogranic and Inorganic Farming: Proceedings. SEARCA, College, Laguna (Philippines). 14 Oct 2019. *PCAARRD [Philippine Council for Agriculture Aquatic and Natural Reasources Research and Development] Information Bulletin (Philippines). 0016-7736. 2021.* No. 104/2021 p. 3-22.

ORGANIC AGRICULTURE; ENVIRONMENTAL IMPACT ASSESSMENT; AGRICULTURE; AGRICULTURAL ECONOMICS; CROP YIELD

Scientific base of integrated organic and inorganic farming in the Philippines. **Rasco, E.T. Jr. Department of Science and Technology-National Academy of Science and Technology, Bicutan, Taguig, Metro Manila (Philippines).** Forum on Ogranic and Inorganic Farming: Proceedings. SEARCA, College, Laguna (Philippines). 14 Oct 2019. *PCAARRD [Philippine Council for Agriculture Aquatic and Natural Reasources Research and Development] Information Bulletin (Philippines). 0016-7736. 2021. No. 104/2021 p. 59-74.*

ORGANIC AGRICULTURE; INORGANIC FERTILIZERS; BIOFERTILIZERS; FERTILIZER APPLICATION; FARMING SYSTEMS; TECHNOLOGY; CROP YIELD; PHILIPPINES

Scientific-based and nature-inspired farming: integration of organic and inorganic farming practices, a win-win strategy. **Anon.** Forum on Ogranic and Inorganic Farming: Proceedings. SEARCA, College, Laguna (Philippines). 14 Oct 2019. *PCAARRD [Philippine Council for Agriculture Aquatic and Natural Reasources Research and Development] Information Bulletin (Philippines). 0016-7736. 2021. No. 104/2021 p. 89-94.*

ORGANIC AGRICULTURE; ORGANIC FERTILIZERS; SOIL FERTILITY; NUTRITIONAL REQUIREMENTS

Small farm in Cavite [Philippines] is a source of food and extra income for this family. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 54-56. 2021.* https://agriculture.com.ph/2020/10/06/small-farm-in-cavite-is-a-source-of-food-and-extra-income-for-this-family/

ANTIDESMA BUNIUS; MULBERRIES; CROPS; EDIBLE FUNGI; ORGANIC AGRICULTURE; SMALL FARMS; PHILIPPINES

Small space gardening: Palawan's plantito pursued. **Mendenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p.20-22. 2021.*
https://agriculture.com.ph/2020/11/26/small-space-gardening-palawans-plantito-pursued-his-love-for-ornamentals-during-quarantine-and-now-owns-over-1000-plants-in-his-80-sqm-home/

ORNAMENTAL PLANTS; PLANTING; GARDENING; GARDENS; CROP MANAGEMENT; PLANT ESTABLISHMENT

Survey and characterization of indigenous food plants in Ilocos Norte, Philippines. **Antonio, M.A. Mariano Marcos State Univ., Roosevelt Avenue Brgy. 12 San Blas, Paoay, 2902 Ilocos Norte (Philippines). menisaantonio@yahoo.com., Utrera, R.T., Agustin, E.O., Jamias, D.L., Badar, A.J., Pascua, M.E.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2011-2. [2016].*
https://www.searca.org/pubs/discussion-papers?pid=130

Indigenous and traditional edible plant species, usually referred to as indigenous food plants (IFPs), are disappearing at an alarming rate, posing serious threats to food security and agricultural production especially in areas that depend on them for food and livelihood. This study was undertaken to document the indigenous food plants (IFPs) of seven upland and remote municipalities of Ilocos Norte province, Philippines. It generated information on the IFP's identity and taxonomic nomenclature, socioeconomic importance, ethnobotany, and geographic location. A total of 46 IFPs representing 27 plant families were identified. Most of them were wild species; the others were landraces or native varieties of cultivated crops. The identified IFPs are important plant genetic resources contributing to food sufficiency, nutrition, and household income supplements in the study sites. Ethnobotanical data indicate that the plants have become an integral part of the people's daily diet, adapting to a wide range of geomorphic and soil conditions. Recognizing the benefits of these IFPs, the upland communities conserve them through in situ1 conservation and conservation by use. Additionally, the Mariano Marcos State University (MMSU) collected available germplasm and maintains them as living plants and seeds. To prevent further genetic erosion and consequently protect the IFPs from extinction, collaborative efforts and interventions among various stakeholders should be instituted and strengthened.

INDIGENOUS ORGANISMS; PLANTS; FOOD SECURITY; SURVEYS; PHILIPPINES

Sustainable livelihoods-based assessment of adaptive capacity to climate change: the case of organic and conventional vegetable farmers in La Trinidad, Benguet, Philippines. **Colting-Pulumbarit, C. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Social Development Services. ccpulumbarit@up.edu.ph., Lasco, R.D. International Centre for**

Research in Agroforestry, Los Baños, Laguna (Philippines). Rebancos, C.M., Caladilla, J.O. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 57-69. 2018.*

Climate change adaptation is vital for farmers in developing countries due to the high vulnerability of agricultural livelihoods. Scientific literature proposed that organic farming is a promising adaptation strategy, but micro-level studies are lacking. This study compared the adaptive capacity to climate risks of organic and conventional vegetable farmers in La Trinidad, Benguet in the Philippines. Guided by the Sustainable Livelihoods framework, thirty variables under the five livelihood capitals were used to compute Household Adaptive Capacity Index (HACI). Organic farming households have higher adaptive capacity than the conventional group, and have higher natural, financial, human, and social capital. The higher adaptive capacity of organic farmers was due to farm practices related to organic agriculture such as crop diversification, sustainable land management, and participation in organizations. This indicated that organic farming potentially enhances adaptive capacity of vegetable farming households. Findings support literature on the contribution of organic farming to the resilience of agricultural systems. Increased support toward higher adoption of organic farming in areas with similar context is recommended for adaptive management to climate change.

ORGANIC AGRICULTURE; VEGETABLES; FARMERS; SUSTAINABILITY; CLIMATIC CHANGE; INDIGENOUS KNOWLEDGE; HOUSEHOLDS; ADAPTATION; PHILIPPINES

Tarlac [Philippines]-based urban garden shop sources rare species from all over the country. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 45-46. 2022.* https://agriculture.com.ph/2021/01/18/tarlac-based-urban-garden-shop-sources-rare-spices-from-all-over-the-country-provides-local-community-with-quality-products/

URBAN AGRICULTURE; GARDENING; PLANTING; CULINARY HERBS; SPICES; PROPAGATION MATERIALS; PHILIPPINES

Urban gardener grows food in plastic drums amid the quarantine for their family's food security. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 40-42. 2021.* https://agriculture.com.ph/2020/11/14/urban-gardener-grows-food-in-plastic-drums-amid-the-quarantine-for-their-familys-food-security/

VEGETABLE CROPS; PLANTING; PLANT CONTAINERS; DOMESTIC GARDENS; GARDENING; FARMING SYSTEMS

Valuing groundwater in a productive aquifer using the production function approach: the case of rice production in Limban, Laguna, Philippines. **Quilloy, AJ. A. aaquilloy@up.edu.ph., Yorobe, J.M. Jr. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Dept. of Agricultural and Applied Economics. Ella, V.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Agricultural Engineering. Lansigan, F.P. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Statistics. Cruz, R.V.O. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 4(2) p. 45-56. 2018.*
https://jemad.cem.uplb.edu.ph/articles/valuing-groundwater-in-a-productive-aquifer-using-the-production-function-approach-the-case-of-rice-production-in-lumban-laguna-philippines/

Establishment of the price of groundwater is a necessary step in designing means for its sustainable management in rice production. There are several techniques that can be used in groundwater valuation. It is important to identify a valuation method that is appropriate to existing natural conditions within which the groundwater is situated. This paper aims to estimate the value of groundwater in a productive aquifer that is located in Lumban, Laguna, Philippines. Based on an estimated rice production function, the paper revealed that the value of groundwater extracted for rice production is approximately PhP 1.13 per m3 . Out of this estimated economic value, resource rent is roughly 66% while the remainder covers the financial cost associated with groundwater extraction.

ORYZA SATIVA; PRODUCTION; RICE FIELDS; PRODUCTION FUNCTIONS; GROUNDWATER; GROUNDWATER TABLE; PHILIPPINES

Want to start making money from cacao? be prepared to wait about four years. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 25-26. 2022.*
https://agriculture.com.ph/2021/08/08/want-to-start-making-money-from-cacao-be-prepared-to-wait-about-four-years/

THEOBROMA CACAO; PLANTING; LAND MANAGEMENT; FRUITING; FOOD TECHNOLOGY; PROCESSED PLANT PRODUCTS

Working hard in the dark to mushrooming success. **Chiu, R.A.H.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) 2021. p. 57-59.*

PLEUROTUS OSTREATUS; EDIBLE FUNGI; PLANTING; FOOD TECHNOLOGY; HEALTH FOODS

Young agripreneur follows his desire to take an agricultural career and succeeds in building and running a garden business. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 40-42. 2022.*
https://agriculture.com.ph/2021/02/02/young-agripreneur-follows-his-desire-to-take-an-agricultural-career-earns-roughly-100k-a-month-from-his-garden-business/

ORNAMENTAL PLANTS; PLANTING; DOMESTIC GARDENS; CULTURAL METHODS

Young chef couple started a farm to supply their own food and businesses. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 46-48. 2021.*
https://agriculture.com.ph/2020/09/24/young-chef-couple-started-a-farm-to-supply-their-own-food-and-businesses1/

VEGETABLE CROPS; CULINARY HERBS; PLANTING; CROP MANAGEMENT; CROPS; SWINE; FARMING SYSTEMS

Young seafarer grows grapes to get back on his feet. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 53-54. 2021.*
https://agriculture.com.ph/2020/11/16/young-seafarer-grows-grapes-to-get-back-on-his-feet/

GRAPES; VITIS; SPECIES; PLANTING; PLANT PRODUCTION; FARMING SYSTEMS

Zambales [Philippines] author turns her personal her garden into a thriving side business. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 31-32. 2022.*
https://agriculture.com.ph/2021/02/16/zambales-author-turned-her-personal-herb-garden-into-a-thriving-side-business/

ORYZA SATIVA; MANIHOT ESCULENTA; CASSAVA; CULINARY HERBS; PLANTING; FARMS; GARDENING; PHILIPPINES

F03 - SEED PRODUCTION AND PROCESSING

Local Balinese Seeds Preservation Project. **Mahayuni, G.A.K.S. IDEP Foundation, Br. Medahan, Desa Kamenuh, Sukawati, Gianyar 80582, Bali (Indonesia).** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2019-1. 2019.*
https://www.searca.org/pubs/discussion-papers?pid=450

Indonesia, one of the largest agricultural countries, is facing environmental threats and extinction of local seeds. Over time, more and more farmers have been depending on

hybrid and transgenic seeds that need inputs, such as chemical pesticides, fungicides, and fertilizers. Farmers have to buy from companies that produce seeds and chemical fertilizers. Furthermore, this practice is eradicating Indonesia's indigenous plants and biodiversity, such as local squash and local beans that Balinese people usually used for ceremonies. The Local Balinese Seeds Preservation Project of the IDEP Foundation (Yayasan IDEP Selaras Alam) aims to implement sustainable agriculture in the communities of Bali. IDEP Foundation is a nonprofit organization that supports sustainable development through permaculture. Its seed preservation project seeks to implement seed-saving activities in local communities that are located in Banjar Dauh Uma, Batuan village, Sukawati, Gianyar regency. Seed saving, which is also part of permaculture principles, is a high-potential method to implement in any agricultural field. This is also an urgent matter for farmers in Indonesia and needs to be developed because Indonesia does not have an integrated seed bank on a national scale. The one-year project was completed in several stages. The first stage was a desk study on seed varieties that currently exist in Bali, local Balinese seeds, and disbursement areas. The next phase was implementing the local seed-saving process, improving the quality of seeds, and educating the communities about local seeds development. The goal was to come up with the first complete collection of local Balinese seeds that could be replicated in other areas across Indonesia and other Southeast Asian countries. This project targeted to benefit 10 households in Banjar Dauh Uma that would be able to produce and grow their own food. Furthermore, the project aimed to promote savings and generate additional income from surplus seeds that IDEP Foundation helps distribute to markets in Bali.

SEED STORAGE; SUSTAINABILITY; SEEDS; QUALITY; LOCAL GOVERNMENT

F04 - FERTILIZING

Basic care for begonias for name gardeners. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 50-51. 2022.*
https://agriculture.com.ph/2021/01/15/basic-care-for-begonias-for-home-gardeners/
BEGONIA; HERBACEOUS ORNAMENTALS; GARDENS; GARDENING; FERTILIZERS; FERTILIZER APPLICATION

Carrageenan PGP (plant growth promoter) can boost mungbean yield. **Corpuz, R.S., Nguyen, Ma.N.R., Atienza, M.V.** *Fiesta (Philippines). p. 7-8. 2021.*

MUNG BEANS; VIGNA RADIATA RADIATA; CROP YIELD; YIELD INCREASES; CARRAGEENANS; FOLIAR APPLICATION; PLANT GROWTH SUBSTANCES

Enhancing leaf mustard (Brassica juncea L.) productivity using nitrogen-based fermented plant juice (FPJ). **Denona, M.A. Southern Christian Coll., Cotobato (Philippines). Coll of Agriculture. mndenona@gmail.com. Baladjay, A.A., Turnos, N.A. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Coll. of Agriculture.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 2 (1) p. 31-39. 2020.*
https://doi.org/10.5281/zenodo.8248046

Enjoying the best of both worlds: mainstreaming organic practices in the conventional agriculture. **Javier, E.Q. Philippines Univ. Los Baños, College, Laguna (Philippines).** Forum on Ogranic and Inorganic Farming: Proceedings. SEARCA, College, Laguna (Philippines). 14 Oct 2019. *PCAARRD [Philippine Council for Agriculture Aquatic and Natural Reasources Research and Development] Information Bulletin (Philippines). 0016-7736. 2021. No. 104/2021 p. 75-88.*

ORGANIC AGRICULTURE; ORGANIC FERTILIZERS; BOTANICAL PESTICIDES; FARMING SYSTEMS; TECHNOLOGY

Science and practice of inorganic farming. **Sanchez, P.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural Systems Inst.** Forum on Ogranic and Inorganic Farming: Proceedings. SEARCA, College, Laguna (Philippines). 14 Oct 2019. *PCAARRD [Philippine Council for Agriculture Aquatic and Natural Reasources Research and Development] Information Bulletin (Philippines). 0016-7736. 2021.*

FERTILIZER APPLICATION; INORGANIC FERTILIZERS; ENVIRONMENTAL IMPACT ASSESSMENT; FARMS; PRODUCTIVITY; SOIL FERTILITY; CROP PERFORMANCE

The use of fermented plant juice (FPJ) as liquid fertilizer is widely practiced in organic farms. However, the length of fermentation and levels of concentration vary and its use in leaf mustard production has not yet been explore d. This study was conducted to enhance the productivity of Brassica juncea L. in terms of weight, yield, and yield-related parameters across three FPJ concentrations (1.5 tbsp/L, 2.0 tbsp/L, 2.5 tbsp/L) and three durations of fermentation (5 days, 10 days, 15 days). Results showed no significant effect of duration or concentration on the weight of marketable plants or plant biomass. However, for plant biomass, a significant interaction was found bet ween duration and concentration. With respect to return on investment (ROI) and benefit-cost ratio (BCR), there was a significant effect of concentration. A higher concentration resulted to a higher production cost. Results revealed that the different durations of fermentation and concentrations of FPJ had no significant effect on the productivity of B. juncea. However, based on ROI and BCR, lower

FPJ concentrations were shown to be cost-effective. Thus, the recommendation is to use FPJ at 1.5 tbsp/L fermented over a 5-day duration.

BRASSICA JUNCEA; MUSTARD; NITROGEN; PROCESSED PLANT PRODUCTS; CROP YIELD; PLANT EXTRACTS; FERMENTATION; FERTILIZERS; FERTILIZER APPLICATION; COST BENEFIT ANALYSIS

Scientific base of integrated organic and inorganic farming in the Philippines. **Rasco, E.T. Jr. Department of Science and Technology-National Academy of Science and Technology, Bicutan, Taguig, Metro Manila (Philippines).** Forum on Ogranic and Inorganic Farming: Proceedings. SEARCA, College, Laguna (Philippines). 14 Oct 2019. *PCAARRD [Philippine Council for Agriculture Aquatic and Natural Reasources Research and Development] Information Bulletin (Philippines). 0016-7736. 2021. No. 104/2021 p. 59-74.*

ORGANIC AGRICULTURE; INORGANIC FERTILIZERS; BIOFERTILIZERS; FERTILIZER APPLICATION; FARMING SYSTEMS; TECHNOLOGY; CROP YIELD; PHILIPPINES

Scientific-based and nature-inspired farming: integration of organic and inorganic farming practices, a win-win strategy. **Anon.** *Forum on Ogranic and Inorganic Farming: Proceedings. SEARCA, College, Laguna (Philippines). 14 Oct 2019. PCAARRD [Philippine Council for Agriculture Aquatic and Natural Reasources Research and Development] Information Bulletin (Philippines). 0016-7736. 2021. No. 104/2021 p. 89-94 .*
ORGANIC AGRICULTURE; ORGANIC FERTILIZERS; SOIL FERTILITY; NUTRITIONAL REQUIREMENTS

F06 - IRRIGATION

Comparative analysis of the National and Communal Irrigation Systems' water governance: the Philippines case. **Nguyen, M.R. Philippines Univ. Los Baños, College Laguna (Philippines). Community Innovations Studies. mrnguyen@up.edu.ph., Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development. Arcala-Hall, R. Philippines Univ. Los Baños, College Laguna (Philippines). Div. of Social Sciences. Lizada, J.C. Philippines Univ. Visayas, Miagao, Iloilo (Philippines). Coll. of Management. Abansi, C.L. Philippines Univ. Baguio, Benguet (Philippines). Inst. of Management Faculty. David, M.E. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 22 (2) p. 21-35. 2015.*
https://jpad.cpaf.uplb.edu.ph/articles/comparative-analysis-of-the-national-and-communal-irrigation-systems-water-governance-the-philippines-case/

Using Saleth and Dinar's water governance framework, the study characterized irrigators' associations and examined how they operate and how they are managed. A total of 128 association presidents were surveyed in ten provinces in the Philippines and were asked about their knowledge and perception on the organization, natural resource policies, and water status in the locality. The National Irrigation Systems (NIS) still has a formal structure as influenced by the National Irrigation Administration (NIA), but it is assuming the characteristics of the Communal Irrigation Systems (CIS) management because of the paradigm shift to participatory irrigation management. The CIS, on the other hand, may remain to be an informal organization that is mimicking the character of the NIS, or it may become more formal in operation. The irrigators' associations were guided by institutional processes in water pricing. They differed on the basis and the average amount charged, and on modes of collection. Pricing did not reflect the true value of water with amounts set arbitrarily, and collections aimed at partial or full cost recovery. Water administration is concerned with governance of water organization, policy and decision making, functional capacity, and government's level of influence on the water organization. Water managers of NIS and CIS had dissimilar perceptions on irrigation water quality and quantity. Water laws (surface water, forest, and land use) were viewed to have moderate to very strong linkage. Water rights were perceived to be common or shared equally by community members. Arising mainly from water scheduling/distribution, conflicts were resolved within the association or at the barangay (village) government.

IRRIGATION SYSTEMS; NATURAL RESOURCES; POLICIES; WATER; ORGANIZATIONS; LOCAL GOVERNMENT; PHILIPPINES

Water governance framework in Sta. Cruz River Watershed, Laguna, Philippines. **Pintor, L.L. Department of Environment and Natural Resources, College, Laguna (Philippines). Ecosystems Research and Development Bureau. lynlei4@gmail.com., Dizon, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 54-66. 2019.*

Since food security relies on sustainable water supply, this study developed an irrigation water governance framework in order to achieve an effective water irrigation supply. It was conducted in Pila and Sta. Cruz, Laguna with 176 members of the 26 Irrigation Associations. Spearman Rho correlation was used to analyzed the relationship between water governance variables and availability of water. Hindering factors include insufficient water supply during the dry season, deforestation and quarrying, and the limited funds for rehabilitation of the irrigation canals. Majority of the respondents positively declared that their rice production is enough for their household consumption. However, they occasionally experience rice shortage due to strong typhoon and dam was damage by

strong typhoon but there is still food security at the household level since rice is available in the market.There is a positive strong linear association between management of water resources and regulation of irrigation water and availability of water. Regulation of irrigation water and the availability of irrigation water were found to have a strong linear relationship. The IA is at the core of the water governance model since ownership of the irrigation system was already transferred by the NIA to the IA. With these, the study recommended that the political, social, and economic aspects, and administrative systems should be taken into consideration. However, various institutions play a vital role for the IA to address the different factors. Through this, good water governance can be achieved resulting to water security thereby achieving rice security.

RICE; IRRIGATION WATER; WATERSHEDS; MODELS; FOOD SECURITY; PRODUCTION; WATER AVAILABILITY; PHILIPPINES

F08 - CROPPING PATTERNS AND SYSTEMS

Cebu [Philippines] family expanded their growing space from a home garden. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (9) p. 20-22. 2022.* https://agriculture.com.ph/2021/02/04/cebu-family-expanded-their-growing-space-from-a-home-garden-to-an-integrated-farm/

CROPS; ANIMALS; CROP MANAGEMENT; PLANT ESTABLISHMENT; INTEGRATED PLANT PRODUCTION; PHILIPPINES; AGROSILVOPASTORAL SYSTEMS

Development pathways of upland farmers in selected sites of Conservation Farming Villages (CFV) program in the Philippines. **Landicho, L.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Agroforestry. ldlandicho@up.edu.ph.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 2 p. 60-75. 2020.*

This study analyzed the livelihoods of upland farmers in the pilot sites of Conservation Farming Villages in Ligao City, Albay and La Libertad, Negros Oriental, Philippines from 2000-2015. It also identified the development pathways based on the livelihood change in the 15-year period, and analyzed the determinants of farmers' choice of development pathways. Development pathway is a pattern of change in the livelihood strategies in response to stimuli. The focus group discussions and farm household survey involving 200 farmer-respondents revealed that from intensified food crops production in 2000-2005, the upland farmers have shifted to crop diversification and conservation farming practices combined with non-farm employment in 2006-2015. Thus, five development pathways were identified, namely: reduction of monocropping; expansion of conservation in

monocropping; expansion of conservation in multiple cropping; intensification of agroforestry; and intensification of agroforestry with non-farm employment. Multinomial logistics regression revealed that age, income, and policies determine the farmers' choice of development pathways. The pathway 'intensification of agroforestry and non-farm employment' has the highest likelihood of being chosen with a mean predicted probability of 0.40. There is a need to sustain the promotion of agroforestry and conservation farming practices in the upland communities, highlighting the economic and ecological services of agroforestry systems and conservation farming practices, and with active engagement of local governments.

AGROFORESTRY; HIGHLANDS; FARMERS; CONSERVATION TILLAGE; PHILIPPINES

Doctor and ornamental enthusiast expands to crops for their family's consumption. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 6-8. 2022.* https://agriculture.com.ph/2021/01/21/doctor-and-ornamental-enthusiast-expands-to-crops-for-their-familys-consumption/

CROPS; PLANTING; CROP MANAGEMENT; FISHES; FARMING SYSTEMS

Family farm practices natural farming to provide safe, healthy produce. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 51-53. 2021.* https://agriculture.com.ph/2020/08/28/family-farm-practices-natural-farming-to-provide-safe-healthy-produce-part-1/

ORGANIC AGRICULTURE; CROPS; FRUIT TREES; CHICKENS; FARMING SYSTEMS; COMPOSTING

Former Agri trainee in Japan now a successful agripreneur. **Palarca, V.T.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 60-61. 2021.* https://agriculture.com.ph/2021/08/22/former-agri-trainee-in-japan-now-a-successful-agripreneur/

VEGETABLE CROPS; PLANTING; LIVESTOCK; FARMING SYSTEMS; FARMS; TRAINING PROGRAMMES

Former employee now farms full time in his integrated Parañaque [Philippines] farm and apiary. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 47-49. 2022.* https://agriculture.com.ph/2021/06/14/former-employee-now-farms-full-time-in-his-integrated-paranaque-farm-and-apiary/

APICULTURE; HIVES; VEGETABLE CROPS; LIVESTOCK; CHICKENS; FARMING SYSTEMS; SMALL FARMS; PHILIPPINES

Growing rice, vegetables, and fish allows a family to save money on store-bought food. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 47-49. 2022.* https://agriculture.com.ph/2021/01/26/growing-rice-vegetables-and-fish-allows-a-family-to-save-money-on-store-bought-food/

FARMS; CROPS; LIVESTOCK; PRODUCTION; FARMING SYSTEMS; PLANT ESTABLISHMENT; FARM MANAGEMENT

Predicting sustainability of agroforestry in a customary forest (Hutan Marga) in Lampung Province, Indonesia. **Wulandari, C. Lampung Univ. Bandarlampung (Indonesia). Dept. of Forestry. chs.wulandari@gmail.com.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2015-1. [2015].* https://www.searca.org/pubs/discussion-papers?pid=295

Lampung Province has a critical forest encroachment problem that has to be solved immediately. One way to solve this problem is to ensure the sustainability of the hutan marga or customary forest as one kind of private forest which can provide farmers their daily needs. It belongs communally to the indigenous people of Buay Belunguh in West Lampung District. The community manages the hutan marga in West Lampung by agroforestry. To be able to meet the needs of the community, it should be managed in a sustainable manner. Unfortunately, the factors that affect the sustainability of agroforestry in the customary forest and priority ranking on the factors that significantly affect the sustainability have not been recognized until now. This research was conducted in three villages (Bakhu, Bedudu, and Sukarame) where the communities manage the forest communally. The result of the logit analysis showed that the most influential variables on hutan marga sustainability are the availability of labor and the soil condition. From the analysis results, the level of farming index is moderate with a score of 65.6. This means that on average, there are three types of agricultural activities in the customary forest because the communities practice intercropping vegetables, trees, coffee, and cacao. In addition, they also raise chickens and goats as well as maintain fish ponds. Thus, it is not surprising that 72.33 percent of the respondents have incomes above IDR 3,600,000 per month. With so many kinds of agricultural activities that are carried out in the hutan marga, such require a sufficient number of laborers. The analysis showed that the number of laborers is an influential variable to the sustainability of the customary forest. The soil condition (i.e., soil nitrogen and soil texture) also have an effect on sustainability. The soil fertility condition is from fair to good. Also based on the analysis results, the level of the communities' social acceptability index in the three research sites is high with a score of 74.92. Thus, SAI is

considered an influential variable in the sustainability of the customary forest. The length of residence in the three villages is also a significant variable such that a person's skills, knowledge, and attitude are affected as he or she resides longer in the community.

AGROFORESTRY; FORESTS; SUSTAINABILITY; FOREST MANAGEMENT; FOREST PROTECTION; FOREST RESERVES; FOREST RESOURCES; INDONESIA

Retired corporate employee as now a full-time farmer. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 43-45. 2022.*
https://agriculture.com.ph/2020/09/19/retired-corporate-worker-is-now-a-full-time-farmer/

VEGETABLE CROPS; RURAL AREAS; TOURISM; FARMS; FARMING SYSTEMS; FARMERS

Sagada [Mountain Province, Philippines] farmer champions sustainable coffee. **Maches, D.J.** *Agriculture (Philippines). 0118-857-7. v. 26 (9) p. 12; 14. 2022.*
https://agriculture.com.ph/2022/03/25/sagada-farmer-champions-sustainable-coffee/

COFFEA; COFFEE; FARMS; HIGHLANDS; PRODUCTION LOCATION; HUMAN BEHAVIOUR; PLANT ESTABLISHMENT; AGROFORESTRY; PHILIPPINES

Scaling up agroforestry promotion for sustainable development of selected smallholder farmers in the Philippines. **Comia, R.A., Landicho, L.D. ldlandicho@gmail.com. Baliton, R.S., Cabahug, R.E.D., Paelmo, R.F. Philippines Univ. Los Baños, College, Laguna (Philippines).** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2017-4. 2018.*
https://www.searca.org/pubs/discussion-papers?pid=410

This paper highlights the results of a year-long research, which looked at the food security potentials of agroforestry systems in selected upland communities in the provinces of Nueva Vizcaya, Benguet, and Quezon in the Philippines. It characterized the different agroforestry models and systems practiced by the smallholder farmers and assessed their current state in terms of social, economic, and environmental dimensions. Data gathered through transect mapping and farm visits revealed that majority of smallholder farmers in the research sites practiced agroforestry, but with varied components. Alley cropping and contour planting are the dominant agroforestry systems in Nueva Vizcaya; vegetable-based and coffee-based multistorey system are more common in Benguet; and vegetable-based multistorey systems are widely practiced in Quezon. Meanwhile, the agrobiodiversity assessment indicated that the diversity of agroforestry systems in the three study sites are low to moderate. This implies the need to improve the present agroforestry practices into

more diverse systems. The analysis revealed that farmers in the three study sites have moderate to high levels of food security. However, smallholder farmers engaged in agroforestry and multiple cropping have higher levels of food security, compared with those engaged in monocropping and relay cropping. This shows that agroforestry systems help ensure food security by making multiple food products and farm components available throughout the year, at the same time, providing income for purchasing other food items. Agroforestry systems also contribute to ecological stability as it promotes biodiversity and carbon sequestration, which can significantly contribute toward climate change mitigation. The ecological and socioeconomic contributions of agroforestry provide firm basis to continuously promote agroforestry in any upland development program implemented by the government and non-government sectors.

SMALL FARMS; AGROFORESTRY; SUSTAINABLE DEVELOPMENT; FOOD SECURITY; CLIMATIC CHANGE; FARMERS; PHILIPPINES

Social-ecological transitions in a cattle-based silvopastoral system in Southern Luzon, Philippines. **Galang, E.I.N. eegalang@up.edu.ph., Calub, B.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural Systems Inst.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 2 p. 1-13. 2020.*

Social-ecological transitions in the silvopastoral system of San Isidro, Rosario, Batangas, Philippines were analyzed using land cover trends and community perceptions. A combination of remote sensing processing, randomized survey, and participatory approaches were conducted. Four of six land cover categories (forests/orchards, grasslands, crop fields and water bodies) were identified to be sources of ecosystem services in the landscape which are essential for cattle farming. In 2000, the landscape became an on-farm research site on cattle farming. Coupled with other social factors such as land privatization and infrastructure development, this has reshaped land cover changes over time. In response, cattle farming dynamics, especially during critical dry periods, have adapted through measures such as switching to greater supplementation of commercial feeds. Despite social-ecological transitions, the cattle-based silvopastoral system in the landscape has persisted by exhibiting key principles of resilience such as diversity, connectivity, and feedback management. However, concerns on further impacts of key issues (e.g., land privatization) should be addressed to sustain the cattle-based silvopastoral system in the landscape. This study provides critical insights on how natural resource management by communities and policies by decision makers should carefully consider their potential impacts in sustaining locally important ecosystem services in the face of rapidly transitioning social-ecological systems.

AGROFORESTRY; CATTLE; SILVOPASTORAL SYSTEMS; ECOLOGY; SERVICES; PHILIPPINES

Socio-economic impacts of smallholder tree farming in the Caraga Administrative Region, Philippines. **Peras, R.J.J. rjperas@up.edu.ph., Pulhin, J.M., Grefalda, L.B., Santos, E.P. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Forestry and Forest Governance. Gilbero, J.S. Ecosystems Research and Development Bureau-Department of Environment and Natural Resources-Caraga Region (Philippines). Rebugio, L.L. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Forestry and Forest Governance.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 2 p. 85-95. 2020.*

Tree farming is becoming infamous among smallholders in the Caraga Administrative Region, the acclaimed 'timber corridor' of the Philippines. Despite the region's favorable bio-physical condition to tree farming, attractive cash benefits, and market availability compared to other regions of the country, tree farming has become less attractive to smallholders. The smallholders remained poor and marginalized even as the region's poverty incidence continually declined in the last three decades. This study seeks to determine the socioeconomic impacts of smallholder tree farming in the region. Using both qualitative and quantitative analyses, the study revealed that tree and non-tree farmers alike perceived positive and statistically significant changes on livelihood sources, income, equity, asset accumulation, education, level of trust, reciprocity and cohesiveness in the community as a result of tree farming. However, although income was improved with tree farming, benefits were considered inequitable among different stakeholders; those endowed with financial capital captured much of the economic benefits. Worse, the lack of financial resources has led some smallholder tree farmers to accommodate arrangements such as dependence on the purchase order (PO) holders who have control over the price of logs that put them into a disadvantaged situation, which consequently locked them in impoverished condition. The study recommends the institutionalization of an effective need-oriented extension program for smallholder tree farmers, investment in market diversification and vertical integration of tree products to make smallholder tree farming more sustainable and equitable.

CATTLE; TREES; SILVOPASTORAL SYSTEMS; INCOME; COST BENEFIT ANALYSIS; PHILIPPINES

Spatial and productivity measurements in traditional rice-based ecosystems (TRBEs) in highly Cordillera [Philippines]. **Gomez, R.A. Jr. Benguet State Univ., La Trinidad, Benguet (Philippines). r.gomezjr@bsu.edu.ph., romeochiba@yahoo.com.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. *College, Laguna (Philippines). SEARCA. 2020. p. 11-21*.

This chapter focuses on traditional agroecosystems that exemplify indigenous culture revolving around native rice. Studies conducted in a number of site within the highlands depict the use of the transect method in estimating the spatial extent of different land uses, or in this particular study, different land utilization types. This chapter demonstrates the practical procedure and formula for measuring the area of individual rice terraces pond parcels. Also presented are various studies conducted in attempting to determine the productivity of traditional rice varieties in the traditional way of quantification (i.e., in terms of bundled rice panicles) and their equivalent amounts in the conventional units (i.e., the metric system of measurement). The results of various studies in the municipalities in the provinces of Ifugao and Benguet are used to demonstrate the application of such methods.

ORYZA SATIVA; VEGETABLES; VEGETABLE CROPS; INDIGENOUS ORGANISMS; HIGHLANDS; ECOSYSTEMS; TERRACES; FARMING SYSTEMS; CROP YIELD; CROPS; PHILIPPINES

This couple started a farm to provide for their family that later became a successful aquaculture venture that sustains their community. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 12-14. 2022.*
https://agriculture.com.ph/2021/02/08/couple-started-a-farm-to-provide-for-their-family-later-became-a-successful-aquaculture-farm-that-sustains-their-community/

FRUIT TREES; VEGETABLE CROPS; ZEA MAYS; ORYZA SATIVA; FISHES; FISHERY PRODUCTION; AQUACULTURE; LIVESTOCK

Young chef couple started a farm to supply their own food and businesses. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (6) p. 46-48. 2021.*
https://agriculture.com.ph/2020/09/24/young-chef-couple-started-a-farm-to-supply-their-own-food-and-businesses1/
VEGETABLE CROPS; CULINARY HERBS; PLANTING; CROP MANAGEMENT; CROPS; SWINE; FARMING SYSTEMS

F30 - PLANT GENETICS AND BREEDING

Agro-morphological characterization and evaluation of heirloom rice in Tanudan, Kalinga [Philippines]. **Ganotice, F.L., Calagui, J.C.P., Loreto, J.B., Likigan, E.V. Kalinga State Univ., Bulanao, Tabuk City, Kalinga (Philippines).** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 28-38. 2019.*
https://researchextension.ksu.edu.ph/index.php/research-development/faculty-researches/2019-volume-1/8-2019/5-agro-morphological-characterization-and-evaluation-of-heirloom-rice-in-tanudan-kalinga

The study entitled Agro-Morphological Characterization and Evaluation of Heirloom Rice in Lubuagan, Kalinga [Philippines] from January to August 2019 at Lubo, Lubugan, Kalinga. It was undertaken to determine the characteristics of the two Heirloom Cultivars in Tanudan condition. Randomized Complete Block Design was used in a 450 square meter. The study used the International Rice Research Institute (IRRI) Descriptors for wild and cultivated Rice as Guide in the collection of heirloom rice agro-morphological characteristics of the traditional landraces. Variations of Distinct characteristics on the morphological traits of Intan and Guinannay varied on the following: anthocyanin coloration and intensity of green color of the leaf blades, collar color; ligule color, culm habit, culm underlying node color; lemma apiculus color; awn distribution, awn color; panicle branches attitude, panicle testability, lemma and palea color, and caryopsis color. Quantitative traits of the two varieties were recorded. Intan has greater plant height at maturity, number of culm per plant, culm length, greater number of tillers per plant, longer panicle length, longer leaf blade, and wider flag leaf. Though, Guinannay have longer grains, greater number of panicles, longer size of ligule, wider leaf blade, wider diameter of culm, longer awn, and wider width grains. Thus, plants that have greater number of tillers, longer panicle, longer and greater culm number, wider flag leaf produce greater yields and longer grains have greater grain weight.

ORYZA SATIVA; RICE; VARIETIES; GENOTYPES; EVALUATION; CROP YIELD; INDIGENOUS ORGANISMS; AGRONOMIC CHARACTERS; PLANT ANATOMY; PHILIPPINES

Evaluation of USM Biotech DNA extraction method for selected agricultural crops in comparison with existing methods. **Marimpoong, M., Sales, E.K. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Plant Breeding and Genetics. eksales@gmail.com.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 1 (1) p. 31-38. 2019.*

Different DNA extraction protocols have been used in plant DNA extraction. However, no comparative analysis has been done to determine their efficiency, cost effectiveness and time requirement for the extraction. Three established protocols and the USM Biotech modified protocols were used in this study. It aimed to evaluate the efficiency of the four DNA extraction protocols in terms of DNA yield, purity and processing time; to determine and compare the cost of sample analysis per protocol and to assess which protocol is universally applicable in extracting DNA of selected agricultural crops (banana, cacao, durian, mango and rubber). The experiment was carried out in 4X5 factorial arranged in Complete Randomized Design (CRD), Factor A as protocols and Factor B as crops used. Results of the study showed that among four protocols, the protocol developed by Ferdous et al. (2012) was the most cost effective. It was the least expensive and fastest method of extracting DNA resulting to high genomic DNA yield. Likewise, University of Southern

Mindanao (USM) Biotech modified protocol was found to be another efficient, economical and effective method of extracting DNA with sufficient amount of DNA yields. The protocol developed by Ray et al. (2016) produced the highest DNA yield; however, it was the most time-consuming method among the four (4) protocols. The Diversity Array Technology (DArT) protocol on the other hand, was the most expensive method among the four protocols because it required the use of expensive reagents and liquid nitrogen.

MUSA (BANANAS); THEOBROMA CACAO; DURIO ZIBETHINUS; MANGOES; RUBBER; DNA; EXTRACTION; EVALUATION

Research-based policy formulation for the sustainable utilization and promotion of indigenous food plants in Region 1, Philippines. **Antonio, M.A. menisaantonio@yahoo.com., Ultera, R.T., Agustin, E.O., Jamias, D.L., Badar, A.J. Mariano Marcos State Univ., Roosevelt Avenue Brgy. 12 San Blas, Paoay, 2902 Ilocos Norte (Philippines).** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). *SEARCA. 2020. p. 87-106.*

Many plant genetic resources (PGR), which include the indigenous and traditional edible species, are disappearing at alarming rates, posing a serious threat to food security. Authors documented the characterized indigenous edible species and their habitats in seven upland and remote municipalities in Ilocos Norte, with the goal of promoting near conservations and sustainable utilization. A total of 46 indigenous food plants (IFPs) [indigenous food plants] representing 27 plant families were identified. Majority of them are wild species; the others are landraces or native varieties of cultivated crops. Genomorphic and soil characteristics influenced the diversity of the identified IFPs especially since they can contribute to food sufficiency, nutrition and supplementation of household income. Some IFPs showed specific elevation and temperature and soil moisture requirements. Many of them, however, showed adaptability to a wide range of genomorphic and soil conditions. So far, there is known local government unit initiative in the province to promote and conserve the IFPs and their habitats. Hence various modalities were employed by the project implementer to promote the sustainable utilization and management of the IFPs. Additionally, the research results were utilized as input for research-based policy formulation stakeholders to actively participate in the conservation, promotion, and sustainable utilization of IFPs in the Ilocos Region.

CROPS; INDIGENOUS ORGANISMS; GENETIC RESOURCES; RESOURCE CONSERVATION; USES; POLICIES; PHILIPPINES

Rich biodiversity of Mindanao [Philippines]. **Zaragosa-Arcayos, E.b.** *PCAARRD Monitor (Philippines). 0116-3140. v. 5 (2) p. 26-27. 2020.*

HIGHLANDS; ECOSYSTEMS; FORESTS; BIODIVERSITY; BOTANICAL COMPOSITION; SPECIES; PHILIPPINES

Strong typhoon didn't prevent Jewel F1 tomato from 'shining'. **Anon.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p.15-16. 2021.*

LYCOPERSICON ESCULENTUM; F1 HYBRIDS; SEEDLINGS; FRUIT; CROP PERFORMANCE

Survey and characterization of indigenous food plants in Ilocos Norte, Philippines. **Antonio, M.A. Mariano Marcos State Univ., Roosevelt Avenue Brgy. 12 San Blas, Paoay, 2902 Ilocos Norte (Philippines). menisaantonio@yahoo.com., Utrera, R.T., Agustin, E.O., Jamias, D.L., Badar, A.J., Pascua, M.E.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2011-2. [2016].*
https://www.searca.org/pubs/discussion-papers?pid=130

Indigenous and traditional edible plant species, usually referred to as indigenous food plants (IFPs), are disappearing at an alarming rate, posing serious threats to food security and agricultural production especially in areas that depend on them for food and livelihood. This study was undertaken to document the indigenous food plants (IFPs) of seven upland and remote municipalities of Ilocos Norte province, Philippines. It generated information on the IFP's identity and taxonomic nomenclature, socioeconomic importance, ethnobotany, and geographic location. A total of 46 IFPs representing 27 plant families were identified. Most of them were wild species; the others were landraces or native varieties of cultivated crops. The identified IFPs are important plant genetic resources contributing to food sufficiency, nutrition, and household income supplements in the study sites. Ethnobotanical data indicate that the plants have become an integral part of the people's daily diet, adapting to a wide range of geomorphic and soil conditions. Recognizing the benefits of these IFPs, the upland communities conserve them through in situ1 conservation and conservation by use. Additionally, the Mariano Marcos State University (MMSU) collected available germplasm and maintains them as living plants and seeds. To prevent further genetic erosion and consequently protect the IFPs from extinction, collaborative efforts and interventions among various stakeholders should be instituted and strengthened.

INDIGENOUS ORGANISMS; PLANTS; FOOD SECURITY; SURVEYS; PHILIPPINES

Carbon sequestration by large leaf Mahogany (Swietenia macrophylla King.) plantation in Mount Makiling Forest Researve, Philippines: a decade after. **Racelis, E.L. Philippines Univ. Los Baños, College Laguna (Philippines). Training Center for Tropical Resources and Ecosystems Sustainability. elracelis@up.edu.ph., Racelis, D.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources. Luna, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Office of Coordinator for Research, Extension and Linkages.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 67-76. 2019.*

The study on monitoring carbon accumulation and sequestration potential of Large Leaf Mahogany (Swietenia macrophylla King.) plantation in Mount Makiling Forest Reserve was a continuation of the same study conducted in 2000. It aimed to look into the sequestration rate of the plantation after a 10-year period. The study measured the biomass, C and CO2 stored in the aboveground, ground and belowground biomass. It also quantified the rate of C captured with the 2000 study as baseline data. The latest study showed that the plantation has a total biomass production of 1,120 Mg/ha which is equivalent to 542 Mg ha-1 of C and 1,989 Mg/ha of CO2. Within a 10-year period, it registered a biomass buildup of 43 Mg/ha/yr and sequestered carbon at 22 Mg/ha/yr and 81 Mg/ha/yr of CO2. Its carbon storing capacity surpasses that of an old growth forest, natural stand and other types of vegetation. It can be concluded that the potential of forest plantation to sequester carbon can be maximized given a good-site condition, appropriate silvicultural practices applied, less human disturbances thus allowing the stand to attain its optimum growth as manifested by the plantation studied.

SWIETENIA MACROPHYLLA; CARBON; PLANTATIONS; BIOMASS; FOREST RESERVES; PHILIPPINES

Estimation of basic wood density and its uncertainty for Quercus species in South Korea. **Jung Kee Pyo. Korea Forestry Promotion Inst., Seoul 07570 (Korea). Center for Pine Wilt Disease Monitoring Div. leeyj@kongju.ac.kr., Lumbres, R.I.C. Benguet State Univ., La Trinidad Benguet 2601 (Philippines). Center for Geoinformatics and Coll. of Forestry. Yeong Mo Son. Southern Forest Research Inst., Jinju 52817 (Korea). Forest Biomaterials Research Center. Kyeong Hak Lee. Kokim Univ., Seoul, 02707 (Korea). Dept. of Forestry. Young Jin Lee. Kongju National Univ., Yesan, 32439 (Korea). Dept. of Forest Resources.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 13-18. 2020.*

Basic wood density is recommended by the Intergovernmental Panel on Climate Change as one of the parameters that can accurately estimate carbon stocks of trees. This study was conducted to estimate the basic wood density of Quercus acutissima, Quercus mongolica, Quercus serrata, and Quercus variabilis in South Korea and to determine their uncertainty. Water displacement method was used to determine the fresh volume of the cubic specimen without bark while the oven-dry weight was determined through oven-drying with a temperature of 85 deg C until it reached the constant weight. The basic wood density and uncertainty were 0.695 g cm-3 and 2.59% for Q. acutissima, 0.663 g cm-3 and 3.33% for Q. mongolica, 0.664 g cm-3 and 6.60% for Q. serrata and 0.721 g cm-3 and 1.66% for Q. variabilis, respectively. Analysis of variance showed that there is a significant difference in terms of the basic wood density of the four Quercus species ($p<0.001$). The results of this study on the basic wood density and uncertainty of the different Quercus species are essential in providing accurate information for estimating the biomass of Quercus forests.

QUERCUS ACUTISSIMA; QUERCUS MONGOLICA; QUERCUS SERRATA; DENSITY; WOOD; BIOMASS; KOREA REPUBLIC

Evaluation of plant reflectance response with elevation using multispectral images captured by an unmanned aerial vehicle (UAV). **Tidula, T.J.T. University of Southern Mindanao, Kabacan, Cotabato (Philippines). University of Southern Mindanao Agricultural Research Center. tjdidula@usm.edu.ph. Saliling, W.J., Alucilja, R. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Agricultural Biosystems Engineering.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 1 (2) p. 1-12. 2020.*
https://doi.org/10.5281/zenodo.8245557

The survival, development and productivity of plants can be affected by elevation. Remote sensing has been used to study altitudinal gradient and plant reflectance. Plant reflectance is an important factor for determining plant health and phenology. This study presents a technique to support a better understanding of how plant reflectance is associated with elevation. In particular, this study determined the effect of elevation on reflectance of pineapple. This study was conducted at Polomolok, South Cotabato, Philippines. The Unmanned Aerial Vehicle (UAV) platform, eBee Ag, onboard the Parrot Sequoia multispectral camera was used to capture multispectral images at 121 meters flight altitude with 80% image overlap on eight areas located at 400-500 meter-above-sea-level (masl) (Location 1) and 650-700 masl (Location 2) elevations. Image stitching was done through Pix4DMapper 3.1 using Ag Multispectral template. The root mean square error (RMSE) for the x-, y- and z- direction justified good and comparable accuracy for all images stitched. Multispectral images captured by an UAV could discriminate plant reflectance response in different elevations. Most of the data demonstrate a moderate positive correlation

between elevation and green, red, red-edge and near-infrared reflectance. The only exceptions were correlations between elevation and red-edge reflectance (no correlation), and between elevation and near-infrared reflectance (weak correlation) in Location 2.

PLANTS; REFLECTANCE; IMAGE PROCESSING; REMOTE SENSING; TECHNOLOGY TRANSFER; ALTITUDE; ANANAS COMOSUS

Ultrasound-microwave assisted extraction (UMAE) of andrographolide from sinta (Andrographis paniculata) with its bioactivity assessment. **Rubi, R.V.C. rugi.vicente.rubi@adamson.edu.ph., Olay, J.G., Calugay, P.E., Diaz, M.V., Dimayuga, K.F.L., Gagui, F.M.G., Tare, K.D. Adamson University 900 San Marcelino St. Ermita Manila (Philippines). Chemical Engineering Dept.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 1-7. 2020.*

Andrographolide (AG) is known to possess some pharmacological properties such as anti-inflammatory, antioxidant, anti-dengue, anti-tumor and anti-tuberculosis. Green extraction techniques such as ultrasound and microwave have shown the effectiveness in extracting high purity AG from Andrographis paniculata or Sinta. Ultrasound-assisted extraction (UAE), which operates at non-thermal conditions, prevents the thermal degradation of AG while microwave-assisted extraction (MAE) allows an increased extraction yield. This study aimed to determine the effect of sequential ultrasound- microwave-assisted extraction (UMAE) in the yield of AG and its bioactivity assessment. The UAE obtained its highest AG yield of 539.24 mg/L at 10 minutes sonication time and MAE with 781.65 mg/L at 5 minutes irradiation time with 420 W microwave power. The UMAE obtained the highest AG yield of 1,066.49 mg/L when sequentially exposed to 10 minutes sonication and 10 min irradiation with a microwave power of 280 W. Cytotoxic activity testing of Sinta extract containing AG from UMAE confirmed a lethal concentration (LC50) with value at 76.02 mg/L. Furthermore, it has an intermediate susceptibility to Escherichia coli but resistant to both Bacillus clausii and Klebsiella spp., highlighting the potential of its valuable medicinal applications.

DRUG PLANTS; MEDICINAL PROPERTIES; ANTIOXIDANTS; EXTRACTION; ANALYTICAL METHODS; ULTRASONICS

F62 - PLANT PHYSIOLOGY - GROWTH AND DEVELOPMENT

Growth performance and inorganic mercury uptake of Vetiver (Chrysopogon zizanoides Nash) inoculated with arbuscular mycorrhiza fungi(AMF): its implication to phytoremediation. **Bretaña, B.L. bryanlloydbretana@gmail.com., Salcedo, S., Casim, L. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Biological Sciences.** *Journal of Agricultural Research, Development, Extension and Technology*

(Philippines). v. 1 (1) p. 39-47. 2019.
https://doi.org/10.5281/zenodo.8245233

The study was conducted to assess the growth performance and inorganic mercury uptake of vetiver grass (Chrysopogon zizanoides Nash) inoculated with arbuscular mycorrhizal fungi (AMF). Important growth parameters such as number of leaves, plant height, fresh weight and dry weight as well as mercury uptake were determined for one month duration. The experimental plants were applied with varying concentrations (0 ppm, 2 ppm, 4 ppm and 6 ppm) of mercuric chloride (HgCl2). Different HgCl2 treatments showed no significant difference in terms of number of leaves, plant height and dry weight in C. zizanoides, while those inoculated with AMF showed significant difference in fresh weight and percentage root colonization. In terms of mercury uptake, the mean uptake ranges from 0.001 ppm to 0.98 ppm which correspond to 0.13% to 1.86% uptake. Further more, mercury uptake in inoculated plants and Glomus sp. and MykovamTMinoculated plants showed no significant difference at lower mercury concentrations but uptake significantly reduced in uninoculated plants at highest mercury concentration (6 ppm). It can be deduced that uptake rate of vetiver increased with AMF inoculation even at high mercury concentrations.

CHRYSOPOGON; SPECIES; GRASSES; GROWTH; MYCORRHIZAE; MERCURY; BIOREMEDIATION; INOCULATION

H - PLANT PROTECTION

H10 - PESTS OF PLANTS

Entomophagy practices in Kalinga [Philippines]. **Tombali, M.S., Banwa, T.P. Kalinga State Univ., Bulanao, Tabuk City, Kalinga (Philippines).** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 84-92. 2019.*
https://researchextension.ksu.edu.ph/index.php/research-development/faculty-researches/2019-volume-1/8-2019/11-entomophagy-practices-in-kalinga

Entomophagy is the process of eating edible insects. This study documented the wild edible insects and related practices in collecting and preparing these species in Lubo, Tanudan, Kalinga Province [Philippines]. A combination of an unstructured interview with key informants and field observations were adopted in this study. Results showed the presence of various edible insects at different habitats in the study site. The documented entomophagy practices included the use of indigenous implements and collection methods, preparation, and utilization of edible insects. This study shows that edible insects in their various stages of life cycles are food components in the study site. It further concludes that

edible insects are collected in the wild, and preparations vary depending on the life stages of edible insects.

ODONATA; COLEOPTERA; EPHEMEROPTERA; ACRIDIDAE; AUCHENORRHYNCHA; FORMICIDAE; APIDAE; VESPIDAE; USEFUL INSECTS; FOOD TECHNOLOGY; FOOD RESOURCES; PHILIPPINES

Fruit bats as natural foragers and potential pollinators in fruit orchard: a reproductive phenological study. **Bacordo, C.J. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Biological Sciences. cjdbarcado@usm.edu.ph. Marfil, R.M., Tabora, J.A. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Biological Sciences.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 1 (1) p. 1-9. 2019.*
https://doi.org/10.5281/zenodo.8238122

Family Pteropodidae could consume either fruit or flower parts to sustain their energy requirement. In some species of fruit bats, population growth is sometimes dependent on the food availability and in return bats could be pollinators of certain species of plants. In this study, 152 female bats captured from the Manilkara zapota orchard of the University of Southern Mindanao were examined for their reproductive stages. Lactation of fruit bat species Ptenochirus jagori and Ptenochirus minor were positively correlated with the fruiting of M. zapota. While the lactation of Cynopterus brachyotis, Eonycteris spelaea and Rousettus amplexicaudatus were positively associated with the flowering of M. zapota. Together, thirty M. zapota trees were observed for their generative stage (fruiting or flowering) in 6 months. Based on the canonical correspondence analysis, only P. jagori was considered as the natural forager as its lactating stage coincides with the fruiting peaks and only C. brachyotis and E. spelaea were the potential pollinators since its lactating stage coincides with the flowering peaks of M. zapota tree. The method in this study can be used to identify potential pollinators and foragers in other fruit trees.

CHIROPTERA; SPECIES; MANILKARA ZAPOTA; NOXIOUS ANIMALS; LACTATION; FORAGING; FRUIT CROPS; PHENOLOGY; AGROFORESTRY

What are aphids and how can you prevent them? **Barcelona, J.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 62-63. 2022.*
https://agriculture.com.ph/2022/03/04/what-are-aphids-and-how-can-you-prevent-them/

APHIDOIDEA; CROP LOSSES; PEST CONTROL; CULTURAL CONTROL; PHYSICAL CONTROL

What are fruit flies and how can you prevent them? **Barcelona, J.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 54-55. 2022.*
https://agriculture.com.ph/2022/03/11/what-are-fruit-flies-and-how-can-you-prevent-them/
TEPHRITIDAE; FRUIT DAMAGING INSECTS; PEST CONTROL; PESTICIDES; BIOLOGICAL CONTROL; CULTURAL METHODS

H20 - PLANT DISEASES

Control of Fusarium oxysporum f. sp. cubense (E.F. Sm.) Snyder and Hansen tropical race 4 causing Fusarium wilt in banana cv. 'Lakatan'. **Solpot, T. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Plant Pathology. tcsolpot@usm.edu.ph. Cumagun, C.J. Philippines Univ. Los Baños, College, Laguna (Philippines).** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 1 (1) p. 21-30. 2019.*
https://doi.org/10.5281/zenodo.8245166

This study was conducted to evaluate control strategies using chemical and organic based formulations against Fusarium oxysporum f. sp. cubense Tropical Race 4 (Foc TR4) causing Fusarium wilt in banana cv. 'lakatan'. Fungicides such as Dibromo-3-nitropropionamide (10 ml/liter of water) and Tebuconazole +Trifloxystrobin (1 g/liter ofwater) were effective against Foc TR4 in Lakatan both in vitro and in nursery conditions. These fungicides can be used as effective disinfectants or soil drench that can be included in the implementation of integrated disease management against Foc TR4. Meanwhile, organic-based formulations were found ineffective in the control of the Foc TR4 pathogen.

MUSA (BANANAS); VARIETIES; FUSARIUM OXYSPORUM; WILTS; PATHOGENS; PEST CONTROL; PESTS OF PLANTS; FUNGICIDES

Detection of downy mildew [Peronosclerospora philippinensis (W. Weston) C.G. Shaw] resistance in sugarcane (Saccharum officinarum L.) based on chlorophyll content and biomass. **Sumael, M.I. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Agronomy. misumael@usm.edu.ph. Lalusin, A.G., Ocampo, E.T.M., Hernandez, J. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 2 (1) p. 13-22. 2020.*
https://doi.org/10.5281/zenodo.8245620

Peronosclerospora philippinensis (Weston) C.G. Shaw is the most virulent downy mildew in the Philippines and one of the major diseases that reduce the yield of sugarcane. Sixty

sugarcane genotypes consisting of 49 hybrids and 11 varieties were screened in the greenhouse for downy mildew resistance. Chlorophyll reading and visual rating of the incidence of disease were performed for ten weeks, commencing one month after planting. T10-535 showed the lowest disease incidence among the hybrids and VMC-87599 showed the lowest disease incidence among the varieties. Other hybrids which showed the lowest disease incidence were E5-531 F, A50-530 M, and 150-530. Results of chlorophyll reading shows that VMC-87599 had the highest soil-plant analysis development (SPAD) value over the ten-week period. There was a significant correlation between disease rating and disease incidence, and a moderate correlation between chlorophyll content and disease incidence. No correlation was observed between disease incidence and roots, stalk and leaf biomass. The correlation in disease incidence and severity to roots, stalk and leaf biomass could be further checked throughout the growth phase of sugarcane to evaluate physiological parameters such as chlorophyll content and biomass partitioning.

SACCHARUM OFFICINARUM; SUGARCANE; PERONOSCLEROSPORA; SPECIES; MILDEWS; CHLOROPHYLLS; BIOMASS; DISEASE CONTROL; DISEASE RESISTANCE; CHLOROPHYLLS; MORBIDITY

J - POSTHARVEST TECHNOLOGY

J11 - HANDLING, TRANSPORT, STORAGE AND PROTECTION OF PLANT PRODUCTS

Field testing of a rice crop postharvest management protocol for reduced postproduction losses and improved product quality. **Regalado, M.J.C. mjc.regalado@philrice.gov.ph., Ramos, P.S. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija 3119 (Philippines). Rice Engineering and Mechanization Div.** *Rice-Based Biosystems Journal (Philippines). v. 4 p. 31-40. 2018.*

An integrated rice crop postharvest management protocol can guide farmers and processors to reduce postproduction losses and achieve better product quality. Through inter-agency workshops, a protocol on critical operational checks and corresponding best management practices was drafted. Field experiments were conducted from 2014-2015 at PhilRice field experiment station to test protocol. Three rice cultivars were grown in a two hectare paddy yield. Crops were harvested a three different maturity stages using four harvest methods. Harvest losses were determined. Sun-drying on concrete pavement and mechanical flatbed drying were used. Storage methods included piling of dried paddy in 50-kg plastic sacks at ambient conditions on concrete floor (with and without plastic pallet underlay) and using hermetic cocoon or PhilRice SACLOB. Germination rates and storage losses were evaluated while laboratory test milling was done after six months. Results showed that harvest losses were less than 20% of yield crop when crops were harvested at

physiological maturity using a combine harvester or by manual cutting and mechanical threshing on the same day. Highest germination rates, least storage losses, and higher milling recovery were attained with samples that were combine-harvested, flatbed-dried, and stored hermetically. The protocol is now ready for pilot-testing in farmer's fields and commercial rice mills.

RICE; ORYZA SATIVA; VARIETIES; POSTHARVEST TECHNOLOGY; CROP YIELD; CROP LOSSES; NATURAL DRYING; STORAGE; STORAGE LOSSES

Solid waste management and reduction of agricultural post-harvest losses using cold-storage: perceptions of farmers in Benguet, Philippines. **Sanchez, P.A.J. pjsanchez@up.edu.ph., Cruz, M.L., Manansala, J.V.H., Espaldon, M.V.O. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Seroje, K.K. Clever Heat, 1114 Cityland Herrera Tower Salcedo Village, Makati City 1227 (Philippines). Calora, J.F.G. Jr., Malamug, J., Molintas, E. Benguet State Univ., La Trinidad, Benguet (Philippines).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 99-109. 2019.*

Vegetable harvest in the Philippines are wasted due to spoilage (approx 42%) posing a challenge to the country's food security and solid waste management. The study aims to determine current vegetable farming practices and farmer perceptions on the use of cold storage facilities in Benguet Philippines for reducing vegetable waste in the post-handling process system. Specifically, this aims to: identify common high-value crops available and acceptable to farmers for storing in cold storage facilities by developing the actual cropping calendars (planting and harvest schedules) of these high-value crops; quantify waste generated on-farm and during marketing and identify current farmer practices and perceptions on post-harvest handling. Common high value crops for possible cold-storing are green-leafy vegetables since these command high prices when they are available off-season. Waste generated is 7.5% of total produce during harvest while 20-50% is further lost during the marketing. The three main issues of farmers are price, market and the harvesting process. Timely information dissemination on market demands and prevailing vegetable prices, availability and access to storage and cold-storage facilities are necessary to encourage farmers to minimize vegetable waste generated and optimize farmer income.

VEGETABLES; POSTHARVEST LOSSES; POSTHARVEST TECHNOLOGY; COLD STORAGE; AGRICULTURAL WASTES; WASTE MANAGEMENT; FARMERS; PHILIPPINES

K - FORESTRY

K01 - FORESTRY - GENERAL ASPECTS

Aboveground biomass and carbon stock of Buho (Schizostachyum lumampao (Blanco) Merrill) in Cuyambay, Tanay, Rizal [Philippines]. **De Guzman, H.A. Department of Transportation, Clark Freeport, Mabalacat, Pampanga (Philippines). Vallesteros, S. sfvallesteros@gmail.com., Vallesteros, A.P., Caranza, J.Q., Castaneto, Y.Q. Nueva Viscaya State Univ., Bayombong, Nueva Viscaya (Philippines). Coll. of Forestry.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 3 (1) p. 60-70. 2021.*
https://doi.org/10.5281/zenodo.8296484

This study aimed to quantify the aboveground biomass and carbon stock of Buho (Schizostachyum lumampao) in Cuyambay, Tanay, Rizal, Philippines, and develop allometric equations for predicting aboveground biomass. Ten plots (5 m x 5 m) in an elevation ranging from 419-460 meters above sea level (masl) that contained one group of clumping bamboos were randomly established. Three culms were harvested from each clump for a total of thirty culms. The Buho in Sitio Tablon had a mean height (H) of 8.37 m, diameter at breast height (DBH) of 6.46 cm and thickness at breast height (TBH) of 6.05 mm. The mean aboveground biomass and carbon stock densities were 74.19 ton/ha and 31.35 ton/ha, respectively. The culm had the highest contribution to aboveground biomass and carbon stock density, followed by the branches, then the leaves. These results demonstrate the potential of Buho to store atmospheric carbon at a level comparable to that of other tree plantation species. Allometric regression revealed that 70.0% of the variance in culm biomass can be explained by DBH2H.

BAMBOOS; SPECIES; PLANTATIONS; BIOMASS; CARBON; GREENHOUSE GASES; PHILIPPINES

Carbon sequestration by large leaf Mahogany (Swietenia macrophylla King.) plantation in Mount Makiling Forest Researve, Philippines: a decade after. **Racelis, E.L. Philippines Univ. Los Baños, College Laguna (Philippines). Training Center for Tropical Resources and Ecosystems Sustainability. elracelis@up.edu.ph., Racelis, D.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources. Luna, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Office of Coordinator for Research, Extension and Linkages.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 67-76. 2019.*

The study on monitoring carbon accumulation and sequestration potential of Large Leaf Mahogany (Swietenia macrophylla King.) plantation in Mount Makiling Forest Reserve was a

continuation of the same study conducted in 2000. It aimed to look into the sequestration rate of the plantation after a 10-year period. The study measured the biomass, C and CO2 stored in the aboveground, ground and belowground biomass. It also quantified the rate of C captured with the 2000 study as baseline data. The latest study showed that the plantation has a total biomass production of 1,120 Mg/ha which is equivalent to 542 Mg ha-1 of C and 1,989 Mg/ha of CO2. Within a 10-year period, it registered a biomass buildup of 43 Mg/ha/yr and sequestered carbon at 22 Mg/ha/yr and 81 Mg/ha/yr of CO2. Its carbon storing capacity surpasses that of an old growth forest, natural stand and other types of vegetation. It can be concluded that the potential of forest plantation to sequester carbon can be maximized given a good-site condition, appropriate silvicultural practices applied, less human disturbances thus allowing the stand to attain its optimum growth as manifested by the plantation studied.

SWIETENIA MACROPHYLLA; CARBON; PLANTATIONS; BIOMASS; FOREST RESERVES; PHILIPPINES

Conservation under regional industrialization: fragmentation and cover change in forest reserve. **Vergara, D.G.K. dkvergara@up.edu.ph., Coladilla, J.O., Alcantara, E.L., Mapacpac, J.C.V., Leyte, J.E.D., Padilla, C.S. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Ruzol, C.D. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Forestry and Forest Governance. Siagian, D.R. Ministry of Agriculturea (Indonesia). Indonesian Agency for Agricultural Research and Development.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 36-53. 2019.*

Buffer zones are established along the perimeters of reserves for their protection. The literature is replete with examples of development in buffer zones that have been detrimental to the conservation efforts of the reserve. Barangay [village] Puting Lupa in Calamba City, Philippines is adjacent to Zone 3 of the Mount Makiling Forest Reserve (MMFR). Despite industrial and settlement development in the periphery, the forest recovered, as evidenced by satellite imagery, with reduced fragmentation, between 1993 and 2014. Although the conservation strategy for MMFR changed from settler antagonism to a participative approach, other factors were involved that brought about the regrowth. Low density settlement development with corporate social responsibility committed to wildlife conservation; high demand for skilled labor due to rapid regional industrialization and urbanization; an aging corps of original farmers; the high regard of Filipino families for their children's education for better opportunities in life; and the livelihood preference of family members other than farming in lands with no security of tenure; all combined in an auspicious mix of factors to bring about apparent partial abandonment of farming within Zone 3 of the MMFR and conservation in the buffer zone. The forest recovered, and with

decreased fragmentation, indicative of enhanced forest integrity.

FOREST RESERVES; FOREST DECLINE; NATURE CONSERVATION; NATURE RESERVES; INDUSTRIALIZATION

Ecological valuation of the structure and dynamics of the forest biomass at the tropical evergreen Aglaia-Streblus forest of Meru Betiri National Park, Indonesia. **Sulistiyowati, H. Jember Univ., (Indonesia). Biology Dept. sulistiyowati.fmipa@unej.ac.id., Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 126-164*.

Authors conducted a study to determine the ecological value (ecoval, symbolized as I Epsilon) of the structure and dynamics of forest biomass at the tropical evergreen Alaia-Streblus forest of Meru Beteri National Park (MBNP), East Java, Indonesia. This study focused on investigating the structure of plan communities, ecoval of forest biomass, and carbon stocks, and appraising the ecoval of forest biomass. There were 43 families, 67 genera, and 78 species of plants found in the MBNP. The diversity index of plant species in height : greater or equal to 1 m was moderate (2.7), while others were low. Aglaia argentea and Streblus spinosus were dominant plant species of level greater or equal to 1 m height; seedlings of Tractera scandens, Donax canniformis and Panuicum repens of were dominant species of the understory, while Schizostachyum zollinge-Caryota mitis were the dominant species of tree-like plant communities. The plant species (greater or equal to 1 m height) of the MBNP contributed the highest forest biomass ecoval (+- 3, 500 Mg/ha), which resulted in high ecoval of carbon content (1.74 Mg/ha). Using the cost approach, the ecoval of Agiaia-Streblus forest biomass accounted for about USD 601,361 to USD 1,081,495 (IDR 7,705,244,167 to IDR 13,857,197, 433) per hectare. These high I Epsilon reflect the potential value of forest structure and biomass in the MBNP, especially as a carbon sink in Java Island, in particular, and Indonesia in general. The I Epsilon can inform the valuation of natural resources so that the government or management in charge can use this information to conserve the existence of forest structures and functions; and to generate plans, actions and policies to sustain this forest ecosystem.

FORESTS; NATIONAL PARKS; BIOMASS; TREES; STAND CHARACTERISTICS; EVALUATION; RESOURCE MANAGEMENT; INDONESIA

Estimation of basic wood density and its uncertainty for Quercus species in South Korea. **Jung Kee Pyo. Korea Forestry Promotion Inst., Seoul 07570 (Korea). Center for Pine Wilt**

Disease Monitoring Div. leeyj@kongju.ac.kr., Lumbres, R.I.C. Benguet State Univ., La Trinidad Benguet 2601 (Philippines). Center for Geoinformatics and Coll. of Forestry. Yeong Mo Son. Southern Forest Research Inst., Jinju 52817 (Korea). Forest Biomaterials Research Center. Kyeong Hak Lee. Kokim Univ., Seoul, 02707 (Korea). Dept. of Forestry. Young Jin Lee. Kongju National Univ., Yesan, 32439 (Korea). Dept. of Forest Resources. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 13-18. 2020.*

Basic wood density is recommended by the Intergovernmental Panel on Climate Change as one of the parameters that can accurately estimate carbon stocks of trees. This study was conducted to estimate the basic wood density of Quercus acutissima, Quercus mongolica, Quercus serrata, and Quercus variabilis in South Korea and to determine their uncertainty. Water displacement method was used to determine the fresh volume of the cubic specimen without bark while the oven-dry weight was determined through oven-drying with a temperature of 85 deg C until it reached the constant weight. The basic wood density and uncertainty were 0.695 g cm-3 and 2.59% for Q. acutissima, 0.663 g cm-3 and 3.33% for Q. mongolica, 0.664 g cm-3 and 6.60% for Q. serrata and 0.721 g cm-3 and 1.66% for Q. variabilis, respectively. Analysis of variance showed that there is a significant difference in terms of the basic wood density of the four Quercus species ($p<0.001$). The results of this study on the basic wood density and uncertainty of the different Quercus species are essential in providing accurate information for estimating the biomass of Quercus forests.

QUERCUS ACUTISSIMA; QUERCUS MONGOLICA; QUERCUS SERRATA; DENSITY; WOOD; BIOMASS; KOREA REPUBLIC

Evaluation of anticipated performance index of tree species for air pollution mitigation in Islamabad, Pakistan. **Irshad, M.A., Nawaz, R. The University of Lahore, Lahore (Pakistan). Dept. of Environmental Sciences. rab.nawaz@envs.uol.edu.pk., Ahmad, S. COMSATS Univ. Islamabad, Vehari Campus (Pakistan). Dept. of Environmental Sciences. Arshad, M. Karakoman International Univ., Gilgit (Pakistan). Rizwan, M. University Faisalabad, Faisalabad (Pakistan). Dept. of Environmental Science and Engineering. Ahmad, N. COMSATS Univ. Islamabad, Vehari Campus (Pakistan). Dept. of Environmental Sciences. Nizami, M. Karakoram International Univ., Gilgit (Pakistan). Dept. of Forestry. Ahmed, T. National Coll. of Business Administration and Economics Lahore (Pakistan).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 50-59. 2020.*

There is ever increasing problem of air pollution in cities due to urbanization, industrialization, population growth and increased number of vehicles. Plants can play a vital role in mitigation of air pollution in urban areas. The present study was conducted to estimate the Air Pollution Tolerance Index (APTI) and Anticipated Performance Index

(API) for 21 different plant species used for green belt development along the roadsides in Islamabad, the capital city of Pakistan. For APTI and API estimation, ascorbic acid, total chlorophyll content, relative water content and pH of leaf extract of selected plant species were measured using standard methods. The results showed that Syzygium cumini L. (jaman), Pterospermum acerifolium (kanak champa) and Alstonia scholaris (devil tree) were the excellent performers. According to API and APTI values, these species were found effective in reducing air pollution and could be effective for green belt development in urban areas. Albezia lebbeck, Melia azedarach, Eucliptus camaldulensis, Dalbergia sissoo, Tamarindus indica, Acacia nilotica L., Callistemon viminalis and Leucaena leucocephala are very poor performers regarding air and noise abatement. These plants are very poor performers and are very sensitive plants to air pollution. These plants can be used as bio-indicators of poor urban air quality.

TREES; SPECIES; URBAN FORESTRY; AIR POLLUTION; ENVIRONMENTAL MANAGEMENT; ECOSYSTEMS; PAKISTAN

Future adaptability of urban trees due to the effects of climate change: the case of Artvin, Turkey. **Sari, D., Karasah, B. Artvin Coruh Univ., 08000 Arhavi, Artvin (Turkey). Dept. of Landscape Architecture. deryasari@artvin.edu.tr.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 60-70. 2020.*

Global climate change began to affect urban and rural landscape planning decisions. The accurate and efficient use of plants that support urban green infrastructure would play an important role in these decisions. The present study aimed to determine the tolerance of domestic and exotic woody plant species planted in public spaces in Artvin province, Turkey to the effects of climate change. Thus, the tolerance of 59 most prevalent trees and shrubs identified in public spaces and natural fields in 12 sampling areas in Artvin province center, Hopa and Ardanuc district centers were surveyed. Findings of the regression model demonstrated that drought, cold hardiness and precipitation had an impact on the adaptability scores of the plants. The differences between the climate conditions in sample areas had an impact on the future adaptation and tolerance of the plants to climate change. This demonstrated that plant species in urban green areas will be affected not only by the global climate change but also by local climate conditions in the short and long term.

STREET TREES; CLIMATIC CHANGE; TOLERANCE; URBAN FORESTRY; ADAPTATION; ADAPTABILITY; TURKEY

GIS [Geographic Information System]-assisted carbon stock assessment of Loboc-Bilar Mahogany Plantation, Bohol, Philippines. **Reyes, T.D. Jr. Bohol Island State Univ., Bilar Campus, Zamora, Bilar, Bohol (Philippines). tomseyer@gmail.com.** *Journal of*

Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 77-86. 2019.

The study determined the carbon budget of the Loboc-Bilar Mahogany (Swietenia macrophylla King.) Plantation in the province of Bohol, Philippines within the months of June to October 2018. The plantation straddles two municipalities, Loboc and Bilar. It is a popular destination for local and international tourists due to its compelling tunnel-like vegetative scenery. Delineation of the plantation boundary was fine-tuned using both image digitization and ground survey. A random sampling method was applied in conjunction with Geographic Information System (GIS) software to spatially distribute sampling plots in the research area. Several carbon pools were assessed, namely: aboveground biomass, necromass or ground biomass, and belowground biomass. Allometric and other mathematical equations were used in the calculation of biomass density, stored carbon, and carbon dioxide equivalents. The plantation had 29,428.03 Mg of stored carbon in the biomass distributed over a total land area of 115.21 ha, yielding an estimated stored carbon density of 255.43 Mg/ha. The monetized value of stored carbon in the whole plantation amounted to US$486,003.96.

SWIETENIA MACROPHYLLA; PLANTATIONS; CARBON; GEOGRAPHICAL INFORMATION SYSTEMS; GROWTH; MEASUREMENT; PHILIPPINES

Leaching of dissolved organic carbon and cations and the buffering capacity of litters from forest stands in Southwestern China. **Nan Liu. Taiyuan Univ. of Technology, 030024, Taiyuan, P.R. (China). Coll. of Water Resources Science and Engineering. liunan@tyut.edu.cn., Yujie Wang, Yunqi Wang. Beijing Forestry Univ., Beijing, 100083, P.R. (China). Coll. of Soil and Water Conservation. Zhanjun Zhao. Jilin Agricultural Univ., Changchun, 130118, P.R. (China). Coll. of Resources and Environment.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 72-79. 2020.*

Forest soil can buffer acidification and neutralize acidic airborne pollutants, but for acid rainwater, it makes contact with forest litter in the forest ecosystem first before reaching the soil. However, leachate chemistry of forest litter treated with different acid load rates is rarely studied. A leaching experiment was performed on forest litter from mixed conifer-broadleaf (MCB) and evergreen broadleaf (EB) forests in Jinyun Mountain, Three Gorges area, Southwestern China with simulated acid rain (SAR) of pH=2.7, 3.5 and 4.5. Dissolved organic carbon (DOC) and cations were exported from MCB and EB when treated with various acid load rates. The rainwater deacidification of forest litter was enhanced by considerable leachate concentrations of DOC, Ca2+ and Mg2+. The acid buffering capacity of EB was stronger than MCB with different composition of forest litter. Leaching of cations increased with decreasing pH of SAR. Although more easily decomposed, EB released greater Al3+ than MCB, leachate Ca/Al ratios of EB did not reach the critical value of 1.0.

Thus, in the study area, EB forest may be a better choice for afforestation and reforestation with better forest litter, showing good buffering capacity, keeping soil from acidification and being a greater nutrient pool for soil under it.

FORESTS; FOREST STANDS; FOREST LITTER; FOREST SOILS; CATIONS; ACID DEPOSITION; BUFFERING CAPACITY

Predicting sustainability of agroforestry in a customary forest (Hutan Marga) in Lampung Province, Indonesia. **Wulandari, C. Lampung Univ. Bandarlampung (Indonesia). Dept. of Forestry. chs.wulandari@gmail.com.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2015-1. [2015].*
https://www.searca.org/pubs/discussion-papers?pid=295

Lampung Province has a critical forest encroachment problem that has to be solved immediately. One way to solve this problem is to ensure the sustainability of the hutan marga or customary forest as one kind of private forest which can provide farmers their daily needs. It belongs communally to the indigenous people of Buay Belunguh in West Lampung District. The community manages the hutan marga in West Lampung by agroforestry. To be able to meet the needs of the community, it should be managed in a sustainable manner. Unfortunately, the factors that affect the sustainability of agroforestry in the customary forest and priority ranking on the factors that significantly affect the sustainability have not been recognized until now. This research was conducted in three villages (Bakhu, Bedudu, and Sukarame) where the communities manage the forest communally. The result of the logit analysis showed that the most influential variables on hutan marga sustainability are the availability of labor and the soil condition. From the analysis results, the level of farming index is moderate with a score of 65.6. This means that on average, there are three types of agricultural activities in the customary forest because the communities practice intercropping vegetables, trees, coffee, and cacao. In addition, they also raise chickens and goats as well as maintain fish ponds. Thus, it is not surprising that 72.33 percent of the respondents have incomes above IDR 3,600,000 per month. With so many kinds of agricultural activities that are carried out in the hutan marga, such require a sufficient number of laborers. The analysis showed that the number of laborers is an influential variable to the sustainability of the customary forest. The soil condition (i.e., soil nitrogen and soil texture) also have an effect on sustainability. The soil fertility condition is from fair to good. Also based on the analysis results, the level of the communities' social acceptability index in the three research sites is high with a score of 74.92. Thus, SAI is considered an influential variable in the sustainability of the customary forest. The length of residence in the three villages is also a significant variable such that a person's skills, knowledge, and attitude are affected as he or she resides longer in the community.

AGROFORESTRY; FORESTS; SUSTAINABILITY; FORESTMANAGEMENT; FOREST PROTECTION; FOREST RESERVES; FOREST RESOURCES; INDONESIA

Review and evaluation of the status of forest allocation policies to produce recommendations to policy makers. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. *p. 63-67. 2020.*

FORESTS; FORESTRY POLICIES; EVALUATION; FORESTRY DEVELOPMENT; FOREST MANAGEMENT; VIET NAM

Setting localized conservation priorities of plant species for sustainable forest use. **VIllanueva, E.L.C. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. ecvillanueva4@up.edu.ph., Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 165-179.*

Sustainable use of terrestrial ecosystems is one of the targets of the 2015-2030 UN Sustainable Development Goals (SDGs). This chapter highlights the use of conservation priority setting of plant species at local level as a tool to help attain this goal. Using a point scoring procedure, a localized conservation priority index (CPI) composed of four criteria was developed and utilized on secondary data on plant uses and vegetation data at Mt. Mayon, Albay, Philippines. Among the 44 woody species assessed, 43 were classified as medium priority species and one as low priority species. Furthermore, non-linear principal component analysis (NLPCA) was used to investigate the interaction of the species in a multidimensional setting. This chapter also explains the strengths and limitations of the study, as well as the advantages of the application of NLPCA in conservation priority setting. Moreover, the priority levels of the plant species are compared with their respective available conservation statuses in the national and global levels, showing the current gaps of the higher scale of analysis (national and global) in conservation that can be addressed by the localized CPI. It recommends validating the results of the CPI in the local community and integrate in the local policies to maximize the full potential of the index.

VEGETATION; PLANTS; SPECIES; FORESTS; RESOURCE CONSERVATION; USES; USE VALUE

K10 - FORESTRY PRODUCTION

Assessing the biodiversity and utilization of non-timber forest products in a community forestry in Thailand for rural livelihood and conservation. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. *2020. p. 51-55.*

COMMUNAL FORESTS; FORESTRY; NONWOOD FOREST PRODUCTS; BIODIVERSITY; USES; RESOURCE CONSERVATION; SOCIAL PARTICIPATION; THAILAND

Assessing the potential on non-timber forest products for the development of value chain and community forestry enterprises in Northerland Thailand. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. *2020. p. 45-50.*

COMMUNAL FORESTS; FORESTRY; NONWOOD FOREST PRODUCTS; MARKETING; ENTERPRISES; COMMUNITY DEVELOPMENT; THAILAND

Assessment of non-timber forest products in the mountainous regions in Myanmar toward community forestry development. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. *2020. p. 39-43.*

COMMUNAL FORESTS; FORESTRY; NONWOOD FOREST PRODUCTS; MARKETING; COMMUNITY DEVELOPMENT; MYANMAR

Benefit-sharing mechanisms in community-based forest management in the Philippines. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. *2020. p. 16-23.*

FOREST MANAGEMENT; COMMUNAL FORESTS; FORESTRY; SUSTAINABILITY; PHILIPPINES

Community forestry in Cambodia: a review of the contribution of community forestry to livelihoods after 25 years of development. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic

responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. *2020. p. 9-16.*

FOREST LAND; FOREST MANAGEMENT; COMMUNAL FORESTS; FORESTRY; CAMBODIA

Crown fuel characteristics and allometric equations of Pinus densiflora in Gyeongbuk Province, Korea. **Sung Yong Kim. National Inst. of Forest Science, Seoul, 02455 (Korea). Div. of Forest Disaster Management. Lumbres, R.I.C. Benguet State Univ., La Trinidad Benguet 2601 (Philippines). Center for Geoinformatics and Coll. of Forestry. Yeon, Ok Seo. National Inst. of Forest Science, Seogwipo, Jeju 63582 (Korea). Warm Temperature and Subtropical Forest Research Center. Mina Jang. Korea Forest Fire Management Service Association, Daejeon, 56420 (Korea). Sun Joo Lee. Byungdoo Lee. National Inst. of Forest Science, Seoul, 02455 (Korea). Div. of Forest Disaster Management. Young Jin Lee. Kongju National Univ., Yesan, Chungnam, 32439 (Korea). Dept. of Forest Resources. leeyj@kongju.ac.kr.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 19-28. 2020.*

Crown fuel characteristics of the most dominant coniferous species in Korea, Pinus densiflora, were investigated in Gyeongbuk province, Korea. Allometric equations using DBH as independent variable were also developed for the estimation of crown fuel load (needles, branches: <0.5 cm, 0.5-1 cm, 1-2 cm, and 2-4 cm in diameter), crown volume, and aboveground biomass. The average crown bulk density in Youngju and Bonghwa was 0.47 kg m-3, while in Daegu, it was 0.29 kg m-3. The crown bulk density of needles and branches with a diameter of <1 cm was 0.21 kg m-3 in Youngju, 0.27 kg m-3 in Bonghwa, and 0.13 kg m-3 in Daegu. The average crown base height was 5.10 m in Youngju, 5.20 m in Daegu, and 3.60 m in Bonghwa. Overall, the Pinus densiflora stand in Bonghwa is more hazardous if crown fire occurs compared to the other study sites based on different crown fuel characteristics. The allometric models developed were able to explain at least 79% of the observed variation in the biomass and crown volume. For the aboveground biomass, Daegu had the highest mean tree biomass with 103.54 kg, followed by Youngju (67.35 kg) and then Bonghwa (37.72 kg).

PINUS DENSIFLORA; CANOPY; FUELS; GROWTH; MEASUREMENT; MOISTURE CONTENT; BIOMASS; KOREA REPUBLIC

Determinants of households' participation in tree planting activities at the REDD+ project sites in Southern Leyte, Philippines. **Castillo, G.C. glorybethcastillo@gmail.com., Armenia, P.T. Visayas State Univ., Baybay, Lete (Philippines). Dept. of Economics.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 2 (1) p. 1-23. 2015.*

https://jpad.cpaf.uplb.edu.ph/articles/determinants-of-households-participation-in-tree-planting-activities-at-the-redd-project-sites-in-southern-leyte-philippines/

This paper aims to identify the determinants of households' participation in tree planting activities using available survey data, which included 797 randomly selected smallholder households from five REDD+ pilot project sites in Southern Leyte, Philippines. Binary logit regression model was employed to identify the factors that affected household-respondents' decisions to participate in tree planting or tree farming activities. The model was also employed to predict the probability of participation for given socio-economic and other characteristics of smallholder households. Results of the analysis show that REDD+ project site, membership in an organization, experience in environmental risks, access to natural resources, household size, and the total on-farm income of households were positively associated with tree planting. On the other hand, non-farm income, age of spouse, and decisions on production and livelihood activities that were made solely by household heads were negatively associated with participation. These determinant factors, in conjunction with their associative influence on participation, may be used as inputs for instituting or redesigning a roadmap aimed at enhancing smallholders' participation in tree planting activities and ventures.

FOREST TREES; PLANTING; REFORESTATION; HOUSEHOLDS; SOCIAL PARTICIPATION; PHILIPPINES

Enhancing the adaptive capacity of indigenous peoples by promoting sustainable resin tapping of almaciga (Agathis philippinensis) in Palawan and Sierra Madre, Philippines. **Ella, A.B., Samiano, F.B. Forest Products Research and Development Inst., Los Baños, Laguna (Philippines). flor_samiano@yahoo.com., flor.samiano@gmail.com.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2015-3. [2015].* https://www.searca.org/pubs/discussion-papers?pid=306

Almaciga (Agathis philippinensis Warb.), found mostly in natural forests of ancestral domains in Palawan and Sierra Madre, yields high-quality resin known as Manila copal, which is used as raw material for varnish, paint driers, and other industrial substances. Manila copal is considered an important dollar earner among the country's non-timber forest products. From 2000 to 2011, an average of 390,400 kg of Manila copal valued at USD 504,900 was exported to different countries. Resin collection is an important source of income for indigenous peoples (IPs), however, most of them practice unsustainable tapping methods leading to resin yield decline and worse, the death of their trees. Furthermore, with climate change as a global concern, the recurrence of natural calamities will have impacts on forest ecosystems, particularly on vulnerable and threatened species like the almaciga. Owing to these, training interventions we re conducted to capacitate the IPs and

partners from government agencies on sustainable methods of tapping resins and to provide basic knowledge on climate change-related issues. Training sessions with a total of 144 participants were conducted in Brooke's Point and Aborlan in Palawan and in Dinapigue, Isabela and in San Luis, Aurora in the Sierra Madre mountains. The training covered three major topics: (1) classroom lecture on almaciga; (2) lecture on climate change; and (3) actual demonstration on proper method of tapping almaciga resin. The series of training successfully educated and capacitated the IPs who participated actively in the discussions and in the practicum. Through the project, the participants learned about the scientific process of resin production in trees and appreciated the importance of applying the tapping technology developed by the Forest Products Research and Development Institute (FPRDI) [College, Laguna, Philippines] to sustain the benefits they derive from the almaciga trees. A strong desire to safeguard the untapped trees growing in the area was successfully conveyed to them.

AGATHIS; SPECIES; RESINS; FOREST PRODUCTS; ETHNIC GROUPS; CLIMATIC CHANGE; TAPPING; TECHNOLOGY TRANSFER; PHILIPPINES

Towards simplified and better informed regulatory system for the bamboo industry. **Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research Development, Los Baños, Laguna (Philippines).** *Policy Brief (Philippines). 2799-1105. v. 1 (4) p. 1-8. 2021.*

BAMBUSA; BAMBOOS; INDUSTRY; HARVESTING; POLICIES; TRANSPORT; CERTIFICATION

K11 - FOREST ENGINEERING

Forest road network design based on multipurpose forestry management in Hyrcanian forest. **Hosseini, S.A.O. University of Tehran, Karadji (Iran). Forestry and Forest Economics Dept. Moghadasi, P., Fallah, A. Sari Agriculture and Natural Resource Univ., Sari (Iran).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (2) p. 13-20. 2019.*

Traditionally, the main focus of forestry management has been based on wood production but more recently it is directed at multifunctional forest management. Multifunctional forestry management includes many considerations such as ecotourism, ecology, economic and social issues of forest dwellers as well as wood production. This study aims to design forest roads using GIS and satellite data of SPOT-HRG in the Darabkla forest based on Multipurpose Forestry. The study used the multi-criteria evaluation method based on fuzzy logic to assess the potential of land area for a road network. Opinions of experts and scholars were used to select four criteria and 18 sub- criteria for road design. Analytical

Hierarchy Process (AHP) was used for weighting factors. Layers were combined using a weighted linear combination (WLC) operator and the map of crossing the road potential was identified and zoned. The road was designed using the PEGGER program. Geographic Information System (GIS) and satellite data of SPOT-HRG were effective tools for improving outcomes. Weighted Linear Combination (WLC) Model for combination layers was used in this study and recommended the multi object operation (MOLA) in future studies.

FORESTS; ROADS; DESIGN; FOREST MANAGEMENT; GEOGRAPHICAL INFORMATION SYSTEMS; CARTOGRAPHY

L - ANIMAL SCIENCE, PRODUCTION AND PROTECTION

L01 - ANIMAL HUSBANDRY

Apiary in the city: bee farm in the middle of Iloilo City [Philippines] consistently produces sold-out premium honey. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 33-36. 2022.*
https://agriculture.com.ph/2021/04/11/apiary-in-the-city-bee-farm-in-the-middle-of-iloilo-city-consistently-produces-sold-out-premium-honey/

APIDAE; APICULTURE; HIVES; FARMS; HONEY; ANIMAL FEEDING; ANIMAL BREEDING; ARTIFICIAL INSEMINATION; PHILIPPINES

Batangas [Philippines] beekeeper who rents land for his apiary earns a sustainable income from offering products and training. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 40-42. 2022.*
https://agriculture.com.ph/2021/09/21/batangas-beekeeper-who-rents-land-for-his-apiary-earns-a-sustainable-income-from-offering-products-and-training/

APIS MELLIFERA; TRIGONA; APICULTURE; FARMS; HONEY; HONEY PRODUCTION; PROCESSING; HIVE PRODUCTS; PHILIPPINES

Beekeeping venture also benefits local farmers. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p.18-19. 2021.*
https://agriculture.com.ph/2020/08/05/beekeeping-venture-also-benefits-local-farmers/

APIDAE; APIS MELLIFERA; POLLINATION; HONEY; FARMERS

Community-based approach to sustainable stingless beekeeping in Sorsogon, Philippines. **Jovillano-Mostoles, M.D. Central Bicol State Univ. of Agriculture, Pili, Camarines Sur**

(Philippines). mdjmostoles@yahoo.com. *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2018-4. 2019.*
https://www.searca.org/pubs/discussion-papers?pid=436

Stingless beekeeping technology as an alternative livelihood in the Bicol region involves hunters, beekeepers, and assemblers of bee products. However, development and adoption of the technology could lead to overexploitation of feral colonies by hunters, imperiling the population of this endemic species. This project mainly aimed to help communities in Sorsogon province to adopt beekeeping as a livelihood using a sustainable utilization, management, and development approach for the conservation of the species. The specific objectives were to: (1) document ethnological/meliponicultural practices in Sorsogon, (2) determine the diversity and abundance of the stingless bee population in two municipalities in Sorsogon, (3) facilitate knowledge transfer of stingless beekeeping technology, (4) facilitate meliponary establishment at the community level, and (5) develop a policy on conserving wild populations of stingless bees. The project was carried out in the municipalities of Casiguran and Bulusan in Sorsogon province from February 2013 to January 2016.

APIDAE; APICULTURE; PRODUCTS; INFORMATION TRANSFER; BIODIVERSITY; INDIGENOUS ORGANISMS; TECHNOLOGY; PHILIPPINES

Family farm practices natural farming to provide safe, healthy produce. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 51-53. 2021.*
https://agriculture.com.ph/2020/08/28/family-farm-practices-natural-farming-to-provide-safe-healthy-produce-part-1/

ORGANIC AGRICULTURE; CROPS; FRUIT TREES; CHICKENS; FARMING SYSTEMS; COMPOSTING

Farming practices in smallholder pig production in Vietnam: implications for food safety. **Nguyen Thi Thu Huyen. huyenquyet2002@gmail.com., Nguyen Thi Duong Nga. ngantd@gmail.com., Pham Van Hung. Vietnam National Univ. of Agriculture (Vietnam). Faculty of Economic and Rural Development. pvhung@vnu.edu.vn., Lapar, Ma.L.A. International Rice Research Inst., College, Laguna (Philippines). L.Lapar@cgiar.org., Ninh Xuan Trung. Vietnam National Univ. of Agriculture (Vietnam). Faculty of Economic and Rural Development. xuanthrunghua@gmail.com., Unger, F. International Rice Research Inst., College, Laguna (Philippines). F.Unger@cgiar.org., Nguyen Van Pho. Vietnam National Univ. of Agriculture (Vietnam). Dept. of Academic Affairs. nvphoph@gmail.com.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 4 (2) p. 1-14. 2018.*

https://jemad.cem.uplb.edu.ph/articles/farming-practices-in-smallholder-pig-production-in-vietnam-implications-for-food-safety/

This paper aims to examine changes in pig farming practices that can improve food safety of pig products in Vietnamese smallholder pig production. The study covered 615 pig households, which were analyzed using descriptive statistical analysis. Results show that there is an increased trend of using own-produced piglets because farmers can apply strict vaccine scheme for their piglets. The percentage of farmers applying vaccine in pig production varies much depending on the type of diseases and location. Besides vaccine, farmers follow good farming practices such as applying 'all-in all-out' rule, isolating new pigs, spraying disinfectant and cleaning pig barn regularly, and restricting visitors away from the pig pens. T-test results show that there are significant differences in some farming practices between the two provinces considered in the study. In general, farmers in Hung Yen adopt better production practices than farmers in Nghe An in terms of preventing pig diseases and dealing with sick and dead pigs. However, some farmers are also engaged in risky practices such as slaughtering sick pigs for home consumption, selling sick pigs to slaughterhouses at lower price, and throwing away dead pigs instead of properly disposing them. Increasing awareness of farmers about the importance of adopting good farming practices through training and use of mass media could mitigate food safety and animal health risks from pig production.

SWINE; ANIMAL PRODUCTION; SMALL FARMS; FARMING SYSTEMS; FOOD SAFETY; VIET NAM

Former employee now farms full time in his integrated Parañaque [Philippines] farm and apiary. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 47-49. 2022.* https://agriculture.com.ph/2021/06/14/former-employee-now-farms-full-time-in-his-integrated-paranaque-farm-and-apiary/

APICULTURE; HIVES; VEGETABLE CROPS; LIVESTOCK; CHICKENS; FARMING SYSTEMS; SMALL FARMS; PHILIPPINES

Lipa City [Batangas, Philippines] restaurant serves fresh honey-infused dishes from their bee farm. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 43-44. 2022.* https://agriculture.com.ph/2021/08/30/lipa-city-restaurant-serves-fresh-honey-infused-dishes-from-their-bee-farm/

HONEY; FOODS; FOOD TECHNOLOGY; APIDAE; APICULTURE; PHILIPPINES

Lucena [Philippines] farm engages in froe-range poultry and livestock raising to produce quality meat at a low cost. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (9) p. 16-18. 2022.*
https://agriculture.com.ph/2021/02/01/lucena-farm-engages-in-free-range-poultry-and-livestock-raising-to-produce-quality-meat-at-a-low-cost/

SMALL FARMS; FREE RANGE HUSBANDRY; POULTRY; LIVESTOCK; FARMS; INDIGENOUS ORGANISMS; PHILIPPINES

Market composition and performance of firms in broiler, chicken egg, and swine production: implications to the Philippine Competition Act. **Curibot, J.P. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Socioeconomics Div. jpcuribot@up.edu.ph., Elca, C.D. cdelca@up.edu.ph., Neric, C.M.T. catolentino2@up.edu.ph., Gordoncillo, P.U. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Dept. of Agricultural and Applied Economics. pugordoncillo@up.edu.ph.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 5(2) p. 1-16. 2019.*
https://jemad.cem.uplb.edu.ph/articles/market-composition-and-performance-of-firms-in-broiler-chicken-egg-and-swine-production-implications-to-the-philippine-competition-act/

The Philippine Competition Act promotes free and fair market competition to improve market efficiency and protect consumer welfare. Thus, it is necessary to examine and assess the nature of competition in any industry. This was done by conducting the study of broiler, chicken egg, and swine industries using the market structure-conduct performance approach. The degree of firm concentration, barriers to entry, profitability of production, return on investment, and share in every peso spent by the consumers were determined. Based on the analysis, markets for chicken egg and pork were fairly competitive while that of chicken meat was oligopolistic. Huge capital investment also showed to be a hindrance for greater competition in all the industries. Large share in consumer's peso was more likely an issue in the chicken meat market than in chicken egg and swine. Monitoring the behavior of large firms, reducing structural barriers, and increasing production efficiencies are necessary to improve markets of these industries thus ensuring a vibrant competition.

BROILER CHICKENS; ENTERPRISES; MARKETING; ECONOMIC COMPETITION; PROFITABILITY

Native chicken production and management practices in the Philippines. **Lambio, A.L. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Animal Science.** *College, Laguna (Philippines). UPLB-CAFS; BA-BAR; UPLBFI. 2021.*
http://koha-intra.uplb.edu.ph/cgi-bin/koha/catalogue/detail.pl?biblionumber=188

This publication is primarily focused on the backyard or small hold production system which is predominant under Philippines conditions. The author has incorporated in this book the vast array of technical knowledge he had acquired through his long experience in research and extension along this line. This publication not only discusses the potentials and prospects of engaging in native chicken production enterprises, but also provides easy to follow guides on the management of breeder stocks and their progenies starting from brooding until they reach market age.

CHICKENS; INDIGENOUS ORGANISMS; ANIMAL PRODUCTION; ANIMAL BREEDING; EGG INCUBATION; HATCHING; PHILIPPINES

Organic livestock farming and breeding toward food security of smallholder farmers in the tropics. **Bondoc, O.L. Philippines Univ. Los Baños, College, Laguna (Philippines). Animal and Dairy Science Cluster. orville_bondoc@yahoo.com.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2015-2. [2015].* https://www.searca.org/pubs/discussion-papers?pid=305

Organic livestock farming, while not the only solution to food security challenges, offers great potential in addressing many specific concerns in food production through a more sustainable farming system that may support the rural economy with special relevance to smallholder farmers. Organic livestock farming involves innovations that will improve farm productivity, household incomes, and food security. For instance, the use of adapted local (indigenous) breeds in smallholder organic livestock production is expected to enhance consumer interest in organic animal food, and consequently lead to an increased market share of organic products. Local breeds are thus sought to provide the adapted livestock requirements of the slowly but steadily growing global organic sector. However, as most of the current research on organic livestock is being undertaken in temperate areas, more research on organically-raised livestock in smallholder farms should be conducted in the tropics, particularly in Southeast Asia. In this paper, the origins and principles and standards of organic agriculture (livestock production) are initially presented. The regulations and standards for organic livestock farming are then reviewed including the design and management of free-range/outdoor systems, source/origin of adapted breeds and breeding methods, feeds and feeding strategies, animal health and welfare concerns, and organic certification issues. As organic livestock farming is still evolving, some research and development (R and D) topics in the context of sustainable smallholder livestock farming in the tropics are suggested for each of the foregoing issues or concerns. While breeding in organic livestock farming should be in line with the intensions of organic farming, smallholder farmers also need adapted animals that fit to their multifunctional farming system. In this regard, organic livestock breeding strategies for smallholder farms are discussed in relation to the use of animal genetic resources (i.e., imported high-yielding

livestock breeds and hybrid lines, adapted local/indigenous or traditional livestock breeds), conservation of adapted local breeds, and design of genetic improvement (i.e., selection and crossbreeding) programs. The prospects of organic livestock farming contributing to food security (i.e., food availability, access, stability, and utilization) of smallholder farmers in the Philippines and other countries in Southeast Asia are also presented. The goal here is to help smallholder farmers to produce organic livestock food products that not only appeal to the consumer, adhere to local regulations and retain product quality, but make organic food products widely available in different regions at a fair (reduced) price. Specific recommendations are thus provided to promote education, and R and D activities on organic livestock farming by smallholder farmers; to develop niche markets for smallholder farmers and add value to organic livestock products; to provide support for smallholder farmers through joint industry-government-academe initiatives; to organize improvement and conservation programs for adapted local breeds; and to reduce the cost of organic certification for smallholder farmers. Nonetheless, producing organic animal-derived food requires considerable attention, care, and skill and, above all, a strong connection to the market. Future research should thus be able to address questions on the costs of organic livestock farming and practical approaches to transform traditional or conventional production systems into organic livestock farming. They should also promote choice, so that smallholder farmers, consumers, and other end-users can make informed decisions that reflect their best interest.

ORGANIC AGRICULTURE; LIVESTOCK; PRODUCTION; BREEDING METHODS; SMALL FARMS; FOOD SECURITY; TROPICAL ZONES

Why Philippine beekeepers want to nurture stingless bees. **Hatta, E.O.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 37-39. 2022.*
https://agriculture.com.ph/2022/01/28/why-philippine-beekeepers-want-to-nurture-stingless-bees/

APIDAE; HIVES; HONEY; HONEY PRODUCTION; PROPOLIS; APICULTURE

Yookah native pig breed production and management protocols. **Codiam, S.D.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 30-43. 2020.*

This study used foundation stock at 25 females and five male Kalinga native pigs randomly selected from the different far-flung villages in Kalinga [Philippines]. It was conducted in the KSU Native Pig R and D Farm with a land area of 2 hectares with a portion of 6,000 sq.m area with perimeter fence, various fruit trees and forages, and established pig pens. It used feedstuffs locally available in the community. The study looked into the development establishment of Yookah Native Pig Breed Production and Management Protocols.

Specifically, it aimed to: a)develop a practical and cost-efficient native pig range management, feeding and health care capacity and capability of rural farmers in Kalinga; b)developed customized feeding strategy using locally available feedstuff; c)establish healthcare management procedures (i.e., medication deworming) that promote health and welfare of free ranged native pigs. As one of the establish unique and specific characteristics of the Kalinga native pigs. As one of the implementers of the DOST-PCAARRD funded multi-agency Native Pig R and D Program 'Conservation, Improvement and Profitable Utilization of the Philippine Native Pigs. 'the Kalinga State University developed and purified a Yookah native pig breed as a Trademark. The development and establishment of the Production and Management Protocols are: a)cost of feed was reduced to 12.10 per kilo compared to the prevailing market price of commercial feeds which in an average of P25.00 per kilo; b)developed an efficient feeding strategy using locally available feedstuff; c)developed and established practical housing and range area that is suited for Kalinga native pigs; d)established an efficient and effective health care and management and farm biosecurity; and lastly; e)developed and established a unique and specific characteristics of the Kalinga native pigs which is the Yookah and it is already a registered Trademark for KSU produced native pigs.

SWINE; INDIGENOUS ORGANISMS; ANIMAL PRODUCTION; LIVESTOCK MANAGEMENT; REGULATIONS

L02 - ANIMAL FEEDING

Former BPO [business process outsourcing] gemployee finds success in farming insects for pest control. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 16-18. 2022.* https://agriculture.com.ph/2021/09/12/former-bpo-employee-finds-success-in-farming-insects-for-pet-food/

INSECTA; FARMS; FEEDS; PET FOODS; PET ANIMALS; FISHES; REPTILES

Growth response of broilers given varying levels of bamboo-derived wood vinegar via drinking water. **Vistal, P. P. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Animal Science. Macasait, D.R. Jr. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Agricultural Sciences. dionesia.macasait@vsu.edu.ph., Espina, D.M. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Animal Science.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 3 (1) p. 1-9. 2021.*
https://doi.org/10.5281/zenodo.8296117

Wood vinegar has been used as a feed supplement and antibiotic alternative in livestock. This study assessed the growth response and profitability of wood vinegar in broilers given varying levels of wood vinegar via drinking water. A total of 100 broilers were randomly assigned to four treatments: T0: 0% wood vinegar (control), T1: 2% wood vinegar, T2: 3% wood vinegar, and T3: 4% wood vinegar, replicated five times with five birds per replication laid out in a Completely Randomized Design. The results revealed that the weekly feed intake (WFI) in Days 9-15 was significantly different across the four treatments, and the lowest WFI was observed in T0 and T3. No significant difference was noted on cumulative weight gain (CWG), average daily weight gain (ADWG), and feed conversion ratio (FCR). Cost analysis revealed that T3 resulted in return above feed and wood vinegar and animal cost (RAFWVAC), net income (NI), and return on investment (ROI) of PhP36.10 (USD 0.75), PhP12.52 (USD 0.26) and 9.56%, per bird. Further studies can investigate treatments with higher or lower wood vinegar concentration, and analyze the organic components, anti-microbial property, bioactive compounds, and toxicity of wood vinegar to provide a clearer explanation of the findings.

WOOD; VINEGAR; BROILER CHICKENS; GROWTH; DRINKING WATER; PROFITABILITY; SUPPLEMENTS; ANTIBIOTIC PROPERTIES

L70 - VETERINARY SCIENCE AND HYGIENE - GENERAL ASPECTS

Applications of acupuncture in ruminant health and production. **Acorda, J.A. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Veterinary Medicine. jaacol32@gmail.com.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2017-2. 2018.*
https://www.searca.org/pubs/discussion-papers?pid=394

Current management procedures for treatment of diseases and disorders in ruminants involve the use of conventional drugs and chemicals. However, with the increasing trend towards a more natural system of production, complementary and alternative therapies are being explored. Acupuncture is an ancient Chinese method of medicine which involves stimulation of different acupuncture points in the body to produce effects on different parts. It has been used for diagnosis, production of analgesia, and as therapy for various disorders. Several theories have been brought to fore to explain acupuncture including yin-yang, five elements, meridian system and circadian body clock, among others. Acupuncture has been extensively used in other ruminants, particularly in dairy cattle, beef cattle and sheep. These include the production of surgical analgesia, enhancing reproduction, improvement of lactation, adjunct in surgery, facilitating wound healing, production of immunity, increasing hematological and biochemical values, increasing ruminal motility, and correction of musculo-skeletal disorders. However, limited studies have been

conducted on the use of acupuncture in water buffaloes and native goats. These include the production of analgesia for surgical procedures, therapy of reproductive, musculo-skeletal and digestive disorders, and effect on hematological parameters. Potential applications of acupuncture consist of the widespread use of non conventional methods such as hypodermic needle acupuncture and use of herbal solutions for aquapuncture, prevention of diseases and disorders particularly respiratory and digestive diseases, and integrative medicine where it can be used to complement conventional medical procedures. As there is a demand for a more natural system of production, acupuncture, being relatively cheap, has a great potential for increasing the productive and reproductive performances of ruminants, especially in water buffaloes and native goats. It is, therefore, recommended that extensive research on the use of acupuncture for production of surgical analgesia, treatment of various diseases and disorders, and increasing production and reproduction in ruminants be conducted.

ACUPUNCTURE; THERAPY; DISORDERS; GOATS; WATER BUFFALOES; DAIRY CATTLE; BEEF CATTLE; SHEEP; HEALTH; PRODUCTION

L72 - PESTS OF ANIMALS

Anthelmintic resistance of gastro-intestinal nematodes to albendazole, levamisole and ivermectin in Murrah buffaloes. **Junatas, K.L., Molina, E.C. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Coll. of Veterinary Medicine. emolina@usm.edu.ph.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 3 (1) p. 55-59. 2021.*
https://doi.org/10.5281/zenodo.8296452

Resistance in buffaloes to anthelmintic treatment has already been reported. However, there is paucity of information about anthelmintic resistance in Murrah buffaloes in the Philippines. In the present study, 36 Murrah buffaloes (24 aged >1 to 2 years and 12 aged >2 to 3 years) naturally-infected with gastrointestinal nematodes were observed to determine the efficacy of albendazole (ABZ), levamisole (LEV) and ivermectin (IVM). The efficacy of the drugs was determined through the fecal egg count reduction test (FECRT). The presence of anthelmintic resistance was confirmed if the fecal egg count reduction (FECR) is lower than 95% and if the lower limit of the 95% confidence interval is lower than 90%. Resistance to the anthelmintics albendazole and levamisole was exhibited by gastro-intestinal nematodes infecting Murrah buffaloes in this study. On the other hand, Ivermectin still showed efficacy against gastro-intestinal nematodes but only in buffaloes less than two years old. Resistance to ivermectin was already demonstrated in buffaloes >2 to 3 years of age. The observed resistance in albendazole and levamisole may be explained by the regular use of these two drugs in the farm's parasite control program. The study

suggests that better strategies may be considered by the farm for a more sustainable control against helminthiasis.

WATER BUFFALOES; SPECIES; ANTHELMINTICS; DIGESTIVE SYSTEM DISEASES; DIGESTIVE SYSTEM; PARASITES; NEMATODA; BENZIMIDAZOLES

L73 - ANIMAL DISEASES

Lipa City [Philippines] managed to eradicate ASF [African swine fever], here's how they did it. **Tan, Y.** *Agriculture (Philippines). 0118-857-7. v. 26 (1) p. 18-19. 2022.* https://agriculture.com.ph/2021/09/26/lipa-city-managed-to-eradicate-asf-heres-how-they-did-it/
SWINE; AFRICAN SWINE FEVER; DISEASE CONTROL; FARMERS; DIFFUSION OF INFORMATION; PHILIPPINES

M - FISHERIES AND AQUACULTURE

M01 - FISHERIES AND AQUACULTURE - GENERAL ASPECTS

Estimating the recreational benefits of coral restoration in Northwestern, Philippines. **Abrina, T.A.S. Marine Environment and Resources Foundation, Inc., M329+7JF, UPMSI Building, P. Velasquez Street, U.P. Diliman, Quezon City (Philippines). taraabrina@gmail.com., Bennett, J.W. Australian National Univ., Canberra ACT 0200 (Australia). Crawford School of Public Policy.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 94-101. 2018.*

In this study, the recreational value of restoring corals reefs was estimated in the context of a site in Northwestern Philippines. This study applied the travel cost method with a variation that integrates a contingent behavior question. This allowed for the estimation of marginal benefits in the context of a change in recreational asset quality. The recreational study site, including the reef in its damaged state, gave rise to average per visit benefits of around US$63.00. With a restored reef, that average value increased to approximately US$113.00 per visit. Hence, the average marginal benefits associated with an investment in reef restoration for this case study site is in the order of US$50 per visit, with a 95% confidence interval of US$0.72 million to US$3.34 M/yr.

CORAL REEFS; LARVAE; MARGINAL COSTS; RESOURCE MANAGEMENT; PHILIPPINES

Melanomacrophage centers in Nile tilapia (Oreochromis niloticus L.) as biomarker for carbamate exposure. **Marteja, J.C., Modina, R.M.R. Visayas State Univ., Visca, Baybay**

City, 6521-A Leyte (Philippines). Dept. of Biological Sciences. rismenoel.modina@vsu.edu.ph. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 24 (1) p. 25-35. 2021.*

Melanomacrophage centers are aggregates of pigment-containing cells found in the animal's hematopoietic tissues. Changes in its characteristics have been used to assess the influence of pesticide exposure, and as tools for potential monitoring for fish and environmental health. This study aimed to evaluate the pesticide-induced hepatic and splenic melanomacrophage center responses in Nile tilapia (Oreochromis niloticus L.) following exposure to fenobucarb in varying lengths of exposure. Five test groups were exposed to constant dose of fenobucarb at 0.08 mg L-1at different periods (0, 7, 14, 21, and 28 days). Fenobucarb only induced significant changes in the splenic melanomacrophage centers. Splenic melanomacrophage centers significantly increased in number in response to the increasing lengths of exposure. Increasing trend of size and cover was also observed, however, significant difference was only detected at 28 days exposure period. Significant difference in hemosiderin and lipofuscin pigments was also detected at 28 days exposure which suggests tissue destruction after prolonged exposure. This study confirms the potential of melanomacrophage centers as a sensitive biomarker for fenobucarb exposure indicated by the changes in its characteristics, particularly in the spleen.

TILAPIA; OREOCHROMIS NILOTICUS; MACROPHAGES; SPLEEN; CARBONATES; CONTAMINATION; TOXICITY

Opportunities and challenges to fisheries policy in the Philippines today. **Malayang, B.S. III. Siliman Univ., 1 Hibbard Ave, Dumaguete, 6200 Negros Oriental (Philippines). Inst. of Environmental and Marine Sciences. beniiim@icloud.com., Oracion, E.G. Siliman Univ., 1 Hibbard Ave, Dumaguete, 6200 Negros Oriental (Philippines). Dept. of Anthropology and Sociology. Bomediano, M.R. Siliman Univ., 1 Hibbard Ave, Dumaguete, 6200 Negros Oriental (Philippines). Coll. of Business Administration. Calumpong, H.P. Siliman Univ., 1 Hibbard Ave, Dumaguete, 6200 Negros Oriental (Philippines). Abesamis, R.A. Siliman Univ., 1 Hibbard Ave, Dumaguete, 6200 Negros Oriental (Philippines). Angelo King Center for Research in Environmental Management. Montebon, R.D. South Negros USAID Fish Right Program (Philippines).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 111-126. 2020.*

A framework on the structure and dynamics of fisheries management is described. It is used to identify four opportunities and two challenges for fisheries policy in the Philippines if it were to rationally harness fisheries as fulcrum for sustainable food and protein security in the country in the next 10-30 years. This is, when climate conditions in the country (and in the world) may reach irreversible changes per some reports. Four specific

recommendations on the focusing policies are presented if the Philippines were to achieve a more environmentally-anchored ('greener') management of fisheries: reconciling and balancing public and private sector interests over fisheries; providing incentives for 'green investments' on fisheries; ensuring the economic and ecological sustainability of culture fisheries as a pressure-easing complement to capture fisheries, and rationalizing land use to improve the viability of culture fisheries.

FISHES; AQUACULTURE; FISHERY POLICIES; FISHERY PRODUCTION; FISHERY MANAGEMENT; FISHERIES; PHILIPPINES

M11 - FISHERIES PRODUCTION

Enhancing tilapia production through Zeolite-silica nanocomposite (ZNC) technology for tilapia aquaculture. **Monserate, J.J., Gahon, S.T.** *PCAARRD Monitor (Philippines). 0116-3140. v. 5 (2) p. 23. 2020.*

TILAPIA; AQUACULTURE; TECHNOLOGY; WATER USE; WATER POLLUTION

Fish aggregating devices and the role of socio-economic factors in driving spatial effort allocation of fishers. **Macusi, E.R. Davao Oriental State Coll. of Science and Technology, Mati City, Davao Oriental (Philippines). Regional Integrated Coastal Resource Management Center. edmacusi@gmail.com.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2016-4. [2016].*

Although fish aggregating devices (FADs) efficiently gather fish, save time and fuel, and alleviate food insecurity, their widespread use has become contentious because of the destructive impact on juvenile oceanic tuna. The call to regulate the number of deployed FADs has been continuous to reduce the unintended catching of non-target juvenile species of tuna. Improving the practice of using FADs could also benefit from studying fishers' spatial behavior, FAD distribution, and decision making. This research thus examined how fishers use their FADs and how their characteristics and socio-economic factors influence their decision making and catch productivity. Semi-structured interview was administered to a total of 229 respondents in four study sites—Mati City, Lupon, Governor Generoso, and General Santos City, all in Southern Philippines. On the other hand, focus group discussions (FGDs) clarified information on catch data and on factors essential to understand where fishers fish and where they deploy their FADs. Potential catch data estimates from logbooks of fishers provided information on probability of catch on FADs and influence of monsoon. Results showed that fishers decided where to fish based on weather and sea conditions, socio-economic factors such as price of fuel and fish, information from other fishers and their other activities, and the imposition of sea regulations. On the other hand, decision on

where to deploy FADs were influenced by the availability of the area, information on the pathway of fish and sea current, information from other fishers on good locations, and previous catches from a particular area. The study also revealed that while FAD deployment might be a long-term strategy to keep fishing grounds, the high probability that a potential catch exists on FADs (>70%) has increased the deployment of FADs in nearshore areas. Excessive deployment of FADs has resulted to overfishing. To conserve fish resources, a moratorium on the number of boats and FADs should be implemented. Issuance of licenses for boats, gears, and FADs should also be controlled and limited.

FISHERIES; FISHING GEAR; FISHING GROUNDS; FISHING METHODS; FISHING OPERATIONS; SOCIOECONOMIC ENVIRONMENT

Perceived benefits of marine protected areas by fishers in Batangas, Philippines. **Samaniego, B.R. badisamaniego@yahoo.com., Rebancos, C.M. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 1-12. 2019.*

The study investigated the relationships between catch, fish sizes and the attitudes of fishers towards marine protected areas (MPA) along the coasts of San Luis, Bauan, Mabini, Lobo, San Juan, Batangas [Philippines], their benefits to fisheries, and the attitudes of local fishers towards MPAs. Data and information from a select group of 209 fisher respondents who represented young, moderate and old MPAs. The catches and fish sizes reportedly dropped after MPA establishment at locations with young, moderate and old MPAs. Nevertheless, attitudes of fishers towards MPAs were positive especially at locations with long-established MPAs. Tourism-based livelihoods accounted for the positive attitude of fishers towards MPAs at the young and old MPA sites where tourism was better developed. At least 65% of the respondents from the young MPA and 35% of the respondents from the old MPA sites were engaged in tourism-related activities.

FISHES; PROTECTED AREAS; FISHERIES; HUMAN BEHAVIOUR; BIODIVERSITY; ENVIRONMENTAL PROTECTION; TOURISM

M12 - AQUACULTURE PRODUCTION

Contribution of gleaning fisheries to food security and nutrition of poor coastal communities in the Philippines. **De Guzman, A.B. Mindanao State Univ. Naawan Foundation for Science and Technology Development, Inc., MSU Naawan Campus, Naawan, Misamis Occidental (Philippines). Sumalde, Z.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Economics and Management. Rance, G.M.S.**

University of San Carlos, Cebu City (Philippines). Colance, M.D.B. Kapatagan, Lanao del Norte (Philippines). Ponce, M.F.B. Oroquieta City (Philippines). *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 58-71. 2019.*

Gleaning for edible invertebrates on shallow reef flats is a chronic activity in the Philippines mainly for subsistence but also for supplemental family income. A case study carried out in five gleaning sites in the Visayas and Mindanao islands evaluated the contribution of reef gleaning to food security and nutrient adequacy of artisanal fishing households, among the poorest sectors in Philippine society. With a high proportion (38-75%) living in extreme poverty, dependence on gleaning as a source of energy and vital nutrients is very high. The typical diet of coastal households in the surveyed sites is mainly composed of rice (49%), fresh fish (10%) and gleaned invertebrates (14%). Individual members of coastal households consume an average of 930g of food daily, equivalent to energy (1891 kcal./day) and protein (62.7 g./day) intakes, exceeding national averages. Coastal communities have higher adequacy in protein (mean = 68%) than energy (mean= 43%), calcium (44%) and iron (29%) indicating diet of many households do not meet the daily recommended energy and nutrient intake (RENI). Significant contribution of gleaned seafood to protein intake of coastal families and highlight the need to formulate sound management policies to sustain the nutritional benefits from reef gleaning for marginal fishing communities.

ARTISANAL FISHERIES; FOOD CONSUMPTION; FOOD SECURITY; HUMAN NUTRITION; COASTS; RURAL COMMUNITIES; HOUSEHOLDS; PHILIPPINES

Efficiency of biofloc system on the growth and survival of African catfish (Clarias gariepinus) fingerlings. **Alinsangao, A.M., Igano, L., Flores, P.A. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Fisheries. phiflores@gmail.com.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 1 (1) p. 10-20. 2019.*
https://doi.org/10.5281/zenodo.8245089

Scarcity of water remains a major restriction to fish culture operations in inland aquaculture. The present stud y reduced water usage in the larval rearing of African catfish (Clarias gariepinus) by application of biofloc technology (BFT). A 60-day growth trial was conducted to evaluate the growth and survival of African catfish (C. gariepinus) fingerlings in biofloc culture system supplemented with different carbohydrates (molasses, rice bran, cornstarch). Complete randomized design was used with four treatments replicated four times. BFT-based culture significantly increased survival (96-98%), weight gain (1101-1156%), specific growth rate (1.81- 1.83) of C. gariepinus, compared to the control or conventional culture system: 77%, 551%, 1.33 respectively ($p<0.05$). Lower feed conversion ratio was observed in BFT treated fish (1.25- 1.30) compared to control (1.36). BFT

significantly reduced total ammonia nitrogen (TAN) while increasing total suspended solids (TSS). Biofloc culture supplemented with rice bran, molasses and cornstarch enhanced the growth and survival of C. gariepinus fingerlings while lowering TAN (0.13 -0.15 ppm) and increasing TSS (146- 506 ppm). Results suggest that biofloc system improved nutritional composition contributing to enhanced growth and survival rate of African catfish (C. gariepinus) fingerlings.

CLARIAS GARIEPINUS; FINGERLINGS; GROWTH; SURVIVAL; CARBOHYDRATES; AMMONIUM NITROGEN

Impact of climate change on aquaculture in Phu Vang District, Thua Thien Hue Province, Vietnam. **Binh, M.N. Hue Univ. of Agriculture and Forestry, 102 Phung Hung Street, Hue City (Vietnam). macnhubinh@huaf.edu.vn., hubinh2510@gmail.com., An, L.V., Thuy, N.T.T., Giang, N.T.H., Hoai, H.T.T., Dan, T.V.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2016-3. [2016].*
https://www.searca.org/pubs/discussion-papers?pid=366

Climate change is a major global concern that greatly affects people, including their source of living. In 2010, the Asian Development Bank reported that Vietnam is one of the five countries most severely affected by climate change. About 70 percent of the country's total population lives along coastal areas and in islands. This study aimed to (1) evaluate the impacts of climate change on aquaculture in Phu Vang district (Thua Thien Hue province, Vietnam), and (2) develop a climate change adaptation model for aquaculture. Data on impact of climate change to aquaculture production were gathered through participatory rural appraisal tools, while spatial changes in water quality were determined through Geographic Information System (GIS). Experimental polyculture models were set up in the five study-site communes to determine the aquaculture practices that could be disseminated to small farmers. It was found out that Phu Vang had suffered heavy losses from climate change brought about by a combination of droughts and prolonged heat waves, and cold weather that lasted longer. Floods and typhoons have likewise occurred with stronger intensities, and tide amplitude has changed drastically. All these affected agricultural activities, especially aquaculture, which is considered as one of the most vulnerable sectors to climate change impacts. As a result, many households shifted from intensive to extensive culture, and some even left their ponds for other jobs. The limited understanding and capacity of people on climate change aggravated the situation, affecting their ability to respond and mitigate negative impacts. Water quality, specifically for aquaculture, was also affected as a result of rising temperature, prolonged droughts, rainfall, flooding, and salinization, which in turn reduced productivity and yield. Meanwhile, polyculture models of aquaculture implemented for this study brought high economic returns, and could be promising to replicate in various communes of Phu Vang district. The

following are the primary recommendations to mitigate climate change impact in aquaculture and to facilitate sustainable livelihood for coastal people: capacitate communities and government in climate change adaptation and mitigation; expand promising aquaculture practices, area, infrastructure, and marketing of produce; and implement policies to mitigate damages of climate change to aquaculture and the community as a whole.

CLIMATIC CHANGE; AQUACULTURE; WATER QUALITY; GEOGRAPHICAL INFORMATION SYSTEMS; VIET NAM

Philippine recommends for mangrove crab. **The Mangrove Crab Technical Committe 2018. Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research Development, Los Baños, Laguna (Philippines).** *PCAARRD Philippine Recommend Series (Philippines). 0115-7833. No. 100/2021. 2021.*

MANGROVES; CRABS; ZOOLOGY; GENETICS; SHELLFISH CULTURE; POSTHARVEST TECHNOLOGY; TRANSPORT

Philippine recommends for mussel. **The Mussel Technical Committee 2018. Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research Development, Los Baños, Laguna (Philippines).** *PCAARRD Philippine Recommend Series (Philippines). 0115-7833. No. 99/2019. 2019.*

MUSSELS; GENETICS; SHELLFISH; SHELLFISH CULTURE; POSTHARVEST TECHNOLOGY; PROCESSING; MARKETING

Retired OFW [overseas Filipino worker] operates a huge fish farm in Pampanga and Bataan [Philippines]. **Papa, A.G.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 10, 12-13. 2022.* https://agriculture.com.ph/2022/01/21/retired-ofw-operates-a-huge-fish-farm-in-pampanga-and-bataan/

CHANOS; MILKFISH; PRAWNS AND SHRIMPS; CRABS; FISH FARMS; FISH; AQUACULTURE; HARVESTING; PHILIPPINES

Use of GIS to visualize spatial distribution of zooplankton in Teluk Bahang Reservoir, Penang, Malaysia. **Ismael, A.H. Universiti Sains Malaysia, Penang 11800 (Malaysia). School of Biological Sciences. azma_hanim@yahoo.com., Rahman, A.A. Universiti Sains Malaysia, Penang 11800 (Malaysia). School of Humanities. Chin, L.S. Universiti Sains Malaysia, Penang 11800 (Malaysia). School of Biological Sciences.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 60-71. 2020.*

The Teluk Bahang Reservoir is the largest in Penang, Malaysia and supplies drinking water to the inhabitants of the Northwest of Penang Island. A monthly testing of water quality and study of zooplankton species abundance was conducted at four different sampling locations and three different water depths. The water quality parameters measured include water temperature, dissolved oxygen, conductivity, pH, orthophosphate (PO4-P), ammonium-nitrogen (NH4-N), nitrite-nitrogen (NO2-N) and nitrate-nitrogen (NO3-N). In this study, multiple techniques in ArcMap software, namely, Inverse Distance Weighted (IDW) and Kernel Density, were used to identify the relationship among water quality parameters and species abundance of zooplankton in the sampling stations. In GIS spatial analysis, high abundance areas or hotspot areas of zooplankton were presented in a visual map. The distribution pattern of zooplankton species and the geographic distribution of water quality parameters were clearly identified based on inspection of the map. The data generated from GIS mapping in this study is important for ecological research, particularly on zooplankton distribution in a drinking water reservoir.

ZOOPLANKTON; GEOGRAPHICAL INFORMATION SYSTEMS; SPATIAL DISTRIBUTION; WATER QUALITY; MALAYSIA

M40 - AQUATIC ECOLOGY

Allelopathic effects of three intertidal marine macrophytes on the growth of Nanochlorum sp. **Belleza, D.F.C. bb53118027@ms.nagasaki-u.ac.jp., Wagas, E.C. University of San Carlos, Cebu City 6000 (Philippines). Marine Biology Section. Aaron, J.L.J. Bohol Island State Univ., Clarin, Bohol (Philippines). Abao, R.S.A. Jr. Xavier Univ.-Ateneo de Cagayan, Cagayan de Oro (Philippines). Dy, D.T. University of San Carlos, Cebu City 6000 (Philippines). Marine Biology Section.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 13-19. 2019.*

The study investigated the perceptions of fishers on the relationships between catch, fish sizes and the attitudes of fishers towards marine protected areas (MPA) along the coasts of coasts of selected municipalities of Batanagas Province in the Philippines, their benefits, their benefits to fisheries, and the attitudes of local fishers towards MPAs. Data and information from a select group of 209 fisher respondents from the selected MPAs that represented young MPAs (0-5 years since establishment), moderate (10-15 years since establishment) and old MPAs (more than 20 years since establishment). young, moderate and old MPAs. The catches and fish sizes reportedly dropped after MPA establishment at locations with young, moderate and old MPAs. Nevertheless, attitudes of fishers towards MPAs were positive especially at locations with long-established MPAs. Tourism-based livelihoods accounted for the positive attitude of fishers towards MPAs at the young and old

MPA sites where tourism was better developed. At least 65% of the respondents from the young MPA and 35% of the respondents from the old MPA sites were engaged in tourism-related activities.

GRACILARIA SALICORNIA; CHAETOMORPHA LINUM; SARGASSUM POLYCYSTUM; PHYTOPLANKTON; ALLELOPATHY; METABOLITES; FISHES; YIELDS

Perceived benefits of marine protected areas by fishers in Batangas, Philippines. **Samaniego, B.R. badisamaniego@yahoo.com., Rebancos, C.M. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 1-12. 2019.*

The study investigated the relationships between catch, fish sizes and the attitudes of fishers towards marine protected areas (MPA) along the coasts of San Luis, Bauan, Mabini, Lobo, San Juan, Batangas [Philippines], their benefits to fisheries, and the attitudes of local fishers towards MPAs. Data and information from a select group of 209 fisher respondents who represented young, moderate and old MPAs. The catches and fish sizes reportedly dropped after MPA establishment at locations with young, moderate and old MPAs. Nevertheless, attitudes of fishers towards MPAs were positive especially at locations with long-established MPAs. Tourism-based livelihoods accounted for the positive attitude of fishers towards MPAs at the young and old MPA sites where tourism was better developed. At least 65% of the respondents from the young MPA and 35% of the respondents from the old MPA sites were engaged in tourism-related activities.

FISHES; PROTECTED AREAS; FISHERIES; HUMAN BEHAVIOUR; BIODIVERSITY; ENVIRONMENTAL PROTECTION; TOURISM

N - AGRICULTURAL MACHINERY AND ENGINEERING

N10 - AGRICULTURAL STRUCTURES

Sugarcane bioethanol processing plant in the Philippines: energetics and water inventory. **Demafelis, R.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering. Alcantara, A.J. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Movillon, J.L. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering. Espaldon, M.V.O., Pacardo, E.P., Flavier, M.E. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Magadia, B.T., Matanguihan, A.E.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of**

Chemical Engineering. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 80-88. 2020.*

Biofuels production is intended to address shortage on fuel supply. This study assessed the energetics and water inventory of the Philippine bioethanol production from sugarcane, aiming to provide a definitive value from where studies for economic assessment for this system could pick up. A 30-million-liter-per-year (MLPY) processing facility was designed using local field and factory data, from surveys and immersion reports. Assessment showed that sugarcane bioethanol processing facility with co-generation and wastewater treatment units gains a net energy equivalent to 18.62 MJ/L of bioethanol produced, with an energy returned on energy invested ratio of 2.75. The net energy realized from the production compensates the energy expended during the construction of the bioethanol plant within about eight months of operation. Water is being used up at a rate of 2,832.22 L per L of ethanol produced or 133.60 L per MJ or 197,826.09 L per Mg of cane processed, accounting the water used for plantation and the factory. The water inventory in the construction level amounts to 952.64 ML. It is concluded that the production of bioethanol from sugarcane is practical, energy-wise, but its water consumption might make the industry unviable in locations where water is scarce.

SACCHARUM OFFICINARUM; SUGARCANE; BIOFUELS; FACTORIES; WATER USE; PHILIPPINES

P - NATURAL RESOURCES AND ENVIRONMENT

P01 - NATURE CONSERVATION AND LAND RESOURCES

Assessment of the management effectiveness and potential for ecotourism of the Dong Na Tard protected area in Lao PDR. **Vanhnasin, Y. Savannakhet Univ. (Lao PDR) Dept. of Forest Resource. yothvanhnasin@gmail.com., Recalis, D. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 231-242.*

This chapter reports the results of a study conducted in the Dong Na Tard Protected Area (DNTPA). Savannakhrt Province, LAo PDR to assess the management effectiveness and potential for ecotourism using the Management Effectiveness Tracking Tool (METT). Results of the study were based on data gathered from primary and secondary sources from relevant government offices, NGOs and private organizations. METT scores presented in terms of context, planning, input, process, output and outcome of the DNPTA showed

generally high ratings. These are based on the data provided by the interviewees at the Forest Resources Management Section and villages adjacent to the protected areas (PA). The context component had the highest score of 98.04 percent, which could be attributed to the legal status and covenants made for the PA; planning was 85.29 percent, which indicates that a management plan for the PA was in place and subjected for scrutiny by various stakeholders; input was at 72.71 percent, which denotes that in spite of the presence of an organizational structure, there is inadequacy in the number of forest guards and budget allocation; and processes at 59.88%, which suggests that the management of the PA requires some improvements in terms of budget allocation and expenses. The PA seemed to be acceptable using METT because it garnered a mean score of 68.96 percent and for output, 72.55 percent, which suggest that facilities could still be further improved and developed. The outcome component earned in the lowest score at 58.86 percent, which means hat there is a need to further improve the present status of the PA. Current and planned ecotourism activities in the DNT PA could somehow affect the utilization and management of natural resources by local people and, consequently, lead the degradation of the natural ecosystem as shown by the decrease in the size of the area due to temporal changes of forest covers. For sustainable management and conservation of the PA, strategies should be considered for both natural resources and local people.

NATURAL RESOURCES; FARMS; RURAL AREAS; TOURISM; RESOURCE MANAGEMENT; SUSTAINABILITY; LAO PEOPLE'S DEMOCRATIC REPUBLIC

BTS fans plant thousands of native and fruit-bearing trees in Nueva Ecija [Philippines] mountain. **Medenilla, V.** *Agriculture (Philippines). 0118-857-7. v. 25 (5) p. 63-64. 2021.* https://agriculture.com.ph/2021/07/20/bts-fans-plant-thousands-of-native-and-fruit-bearing-trees-in-nueva-ecija-mountain/

HIGHLANDS; NATURE RESERVES; REFORESTATION; FOREST TREES; FRUIT TREES; INDIGENOUS ORGANISMS; RESOURCE CONSERVATION; PHILIPPINES

Climate change adaptation through community-science-policy interface in forest and biodiversity protection and watershed management. **Butardo-Toribio, M.Z. Biodiversity and Watersheds Improved for Stronger Economy and Ecosystem Resilience Program (Philippines).** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *2018. p. 115-135.*

This chapter demonstrates how the participatory implementation of a forest and biodiversity protection system, implemented through program funded by the United States Agency for International Development, can serve as an entry point for implementing

strategies that support climate change adaptation (CCA). This system involves forest conservation area planning; app-based monitoring of forest conditions, threats, and patrol efforts; and response formulation to address the threats that lead to forest loss and degradation. The cases presented in this chapter discuss how CCA mainstreaming can be accomplished when the forest and biodiversity protection system is used in policy development and in the preparation, enhancement, and integration of existing plans. The local stakeholders anchored their responses to the climate change-related threats on national climate change and disaster risk reduction policies. This chapter also shows how the processes that the multi-sectoral stakeholders collectively undertook have been to improve the enabling policy and institutional environment for climate change-related responses at the local level. It also presents the mechanism used to scale up the system, which enabled it to be adopted at the national policy level. The specific cases discussed in this chapter also suggest that locally evolved initiatives can influence the formulation or enhancement of national-level policies; but this often requires champions of the new policy at both local and national levels. Appropriate communication strategies play a critical role in the mainstreaming of the Lawin system as they can enhance the visibility of the intervention and also to build its support base. The cases suggest the local experiences, knowledge and capacities need to be combined with science in order to influence national policies and programs and to make the more evidence-based, effective and responsive. Toward this end, communities, researchers, scientists, and decision and policy makers need to improve their communication with one another. Likewise, decision makers and policy makers need to be involved at the onset of the policy and program implementation. The lessons from the case stories suggest that multi-sectoral and multilevel climate response is needed for greater convergence, synergy, and complementation. Moreover, since building resilience to climate change involves behavioral change, researchers should not focus solely on the science aspect, but should also integrate the behavioral/social/institutional dimension into the policy reform in order to improve policy implementation. Climate researchers should also actively participate in the knowledge management, planting, planning, and budgeting system of national government agencies to inform national policies and budget allocation on CCA.

CLIMATIC CHANGE; ADAPTATION; RURAL COMMUNITIES; FORESTS; BIODIVERSITY; WATERSHED MANAGEMENT

Conservation and consumption of goods and nature-based recreation: a community based ecotourism project. **Anon.** Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. *2022. p. 31-35 .*

COMMUNAL FORESTS; FORESTRY; RURAL AREAS; TOURISM; FARMS; SOCIAL PARTICIPATION; RESOURCE MANAGEMENT

Conservation under regional industrialization: fragmentation and cover change in forest reserve. **Vergara, D.G.K. dkvergara@up.edu.ph., Coladilla, J.O., Alcantara, E.L., Mapacpac, J.C.V., Leyte, J.E.D., Padilla, C.S. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Ruzol, C.D. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Forestry and Forest Governance. Siagian, D.R. Ministry of Agriculturea (Indonesia). Indonesian Agency for Agricultural Research and Development.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 36-53. 2019.*

Buffer zones are established along the perimeters of reserves for their protection. The literature is replete with examples of development in buffer zones that have been detrimental to the conservation efforts of the reserve. Barangay [village] Puting Lupa in Calamba City, Philippines is adjacent to Zone 3 of the Mount Makiling Forest Reserve (MMFR). Despite industrial and settlement development in the periphery, the forest recovered, as evidenced by satellite imagery, with reduced fragmentation, between 1993 and 2014. Although the conservation strategy for MMFR changed from settler antagonism to a participative approach, other factors were involved that brought about the regrowth. Low density settlement development with corporate social responsibility committed to wildlife conservation; high demand for skilled labor due to rapid regional industrialization and urbanization; an aging corps of original farmers; the high regard of Filipino families for their children's education for better opportunities in life; and the livelihood preference of family members other than farming in lands with no security of tenure; all combined in an auspicious mix of factors to bring about apparent partial abandonment of farming within Zone 3 of the MMFR and conservation in the buffer zone. The forest recovered, and with decreased fragmentation, indicative of enhanced forest integrity.

FOREST RESERVES; FOREST DECLINE; NATURE CONSERVATION; NATURE RESERVES; INDUSTRIALIZATION

Contexts, challenges, and opportunities for agrobiodiversity mainstreaming, conservation, and sustainable use in Southeast Asia. **Nelles, W. Chulalongkorn Univ., Pathum Wan, Bangkok (Thailand). School of Agricultural Resources. waynenelles@gmail.com.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2018-2. 2018.*
https://www.searca.org/pubs/discussion-papers?pid=421

BIODIVERSITY; AGRICULTURE; SUSTAINABLE DEVELOPMENT; SOUTH EAST ASIA

Developing an environmental education program for the mangrove forest-based ecotourism in Juru Seberang community forest, Belitung, Indonesia. **Anon.** *Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Laguna (Philippines). Strategic responses to emerging issues in social forestry: experiences from selected ASEAN member states. College, Laguna (Philippines). SEARCA. 2020. p. 27-30*.

COMMUNAL FORESTS; FORESTRY; MANGROVES; RURAL AREAS; TOURISM; SOCIAL PARTICIPATION; RESOURCE MANAGEMENT; INDONESIA

Ecological valuation of the structure and dynamics of the forest biomass at the tropical evergreen Aglaia-Streblus forest of Meru Betiri National Park, Indonesia. **Sulistiyowati, H. Jember Univ., (Indonesia). Biology Dept. sulistiyowati.fmipa@unej.ac.id., Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 126-164.*

Authors conducted a study to determine the ecological value (ecoval, symbolized as I Epsilon) of the structure and dynamics of forest biomass at the tropical evergreen Alaia-Streblus forest of Meru Beteri National Park (MBNP), East Java, Indonesia. This study focused on investigating the structure of plan communities, ecoval of forest biomass, and carbon stocks, and appraising the ecoval of forest biomass. There were 43 families, 67 genera, and 78 species of plants found in the MBNP. The diversity index of plant species in height : greater or equal to 1 m was moderate (2.7), while others were low. Aglaia argentea and Streblus spinosus were dominant plant species of level greater or equal to 1 m height; seedlings of Tractera scandens, Donax canniformis and Panuicum repens of were dominant species of the understory, while Schizostachyum zollinge-Caryota mitis were the dominant species of tree-like plant communities. The plant species (greater or equal to 1 m height) of the MBNP contributed the highest forest biomass ecoval (+- 3, 500 Mg/ha), which resulted in high ecoval of carbon content (1.74 Mg/ha). Using the cost approach, the ecoval of Agiaia-Streblus forest biomass accounted for about USD 601,361 to USD 1,081,495 (IDR 7,705,244,167 to IDR 13,857,197, 433) per hectare. These high I Epsilon reflect the potential value of forest structure and biomass in the MBNP, especially as a carbon sink in Java Island, in particular, and Indonesia in general. The I Epsilon can inform the valuation of natural resources so that the government or management in charge can use this information to conserve the existence of forest structures and functions; and to generate plans, actions and policies to sustain this forest ecosystem.

FORESTS; NATIONAL PARKS; BIOMASS; TREES; STAND CHARACTERISTICS; EVALUATION; RESOURCE MANAGEMENT; INDONESIA

Exploring the link between environmental practices and financial performance: an empirical Study. **de Paula, L.B., Velez, S.L.P. Pontificia Universidad Católica del Peru, Jiron Daniel Alomía Robles N 125, Urbanizacion Los Alamos de Monterrico, Surco, Lima (Peru). Catolica Business School. spalaciov@pucp.edu.pe., Ceballos, H.V., Trujillo, V.M.O. Universidad EAFIT, Medellin, Carrera 49 N 7 sur – 50, Medellin (Colombia). Dept. of Finance.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 29-39. 2020.*

Ongoing environmental deterioration has led governments and other institutions to pay closer attention to pollution problems as pollutant emissions can significantly influence and constrain economic growth. Most countries on the American continent use the ISO 14001 standard and the number of new certifications grows year by year. This work empirically explores the influence of ISO 14001 based environmental management systems upon the financial performance of Colombian companies, 133 ISO 14001 certified and 5,036 non-certified firms. A panel data analysis over three years was the data analysis method. This work studied the financial performance of the companies implementing EMS compared to those that did not in one of the most important Latin American economies (Colombia). It was found that a positive relationship exists between the ISO standard and financial performance measured through the companies' Return on Assets (ROA).

ENVIRONMENT; ENVIRONMENTAL PROTECTION; TECHNOLOGY; ECONOMICS; PUBLIC FINANCE; REGULATIONS; ENVIRONMENTAL POLICIES

Fisherfolks' willingness-to-pay for the conservation of Atulayan Bay Marine Protected area in Sagñay, Camarines Sur, Philippines. **dela Vega, J.M.A. aPhilippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. jadelavega2@up.edu.ph., Predo, C.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Forestry and Natural Resources. Florece, L.M., Sobremisana, M.J. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (2) p. 55-64. 2019.*

The Atulayan Bay is one of the established Marine Protected Areas in the Philippines in 1993 by virtue of Municipal Ordinance No. 93-001. Use of illegal fishing method and declining fish catch were the problems identified in the area. This study estimated the value of the benefits in conserving the marine resources in Atulayan Bay Marine Protected Area in

Sagñay. The survey was conducted on February- March 2019 with 110 Atulayan and 225 Nato fisherfolks. The willingness to pay of the fisherfolks was estimated using the contingent valuation method. The parametric (logit regression) and non-parametric (turnbull) estimation were used to calculate for their willingness to pay to conserve the Atulayan Bay MPA. The estimated average willingness to pay per month of fisherfolk for the parametric estimation of Atulayan and Nato were PhP* 91 (US$1.72) and PhP 179 (US$3.39), respectively, and for the non-parametric estimation, PhP 86 (US$1.63) for Atulayan and PhP 27 (US$0.51) for Nato. The significant factors affecting the willingness to pay of Atulayan fisherfolks were income and bid level while for the Nato fisherfolks were age, income and bid level. The estimated willingness to pay values are a useful basis for the possible amount of tax that will be collected monthly from the registered fisherfolks by the municipal office for the conservation of the Atulayan Bay Marine Protected Area.

MARINE AREAS; NATURE RESERVES; VALUATION; RESOURCE CONSERVATION; FISHERMEN; PHILIPPINES

Genetic diversity and relative abundance of Cebu Black Shama (Copsychus cebuensis Steere) in fragmented forests of Cebu Island, Philippines. **Parilla, R.B. Philippines Univ.-Tacloban College, Tacloban City (Philippines). Div. of Natural Sciences and Mathematics. richardparilla@gmail.com., Laude, R.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Genetics and Molecular Biology Div. de Guia, A.P.O. Philippines Univ. Los Baños, College Laguna (Philippines). Animal Biology Div. Espaldon, M.V.O., Florece, L.M. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (2) p. 65-76. 2019.*

This study determined the relative abundance of Cebu black shama (Copsychus cebuensis Steere) in selected isolated forest fragments in Cebu Island, Philippines and their genetic diversity based on 619 bp cytB gene. Mist nets were used to capture the bird in these forest fragments. Four contour feathers were plucked from the body of the caught birds, before they were released, and were stored in tubes with 70% ethanol before DNA extraction. Fifty-nine black shama (C. cebuensis) individuals were encountered from the visited territories. At least 13 black shama individuals were estimated to inhabit one hectare of forest habitat. For the first time, analyses of mitochondrial genes revealed that C. cebuensis had a long evolutionary history from an initially large and stable population that went through recent expansion resulting from a recent isolating or bottleneck event as indicated by high haplotype diversity (Hd) and nucleotide diversity (Pin), i.e. Hd>0.50 and Pin>0.005, and non-significant values of Tajima's D test, Fu and Li's D*, and Fu's Fs statistics. It is hypothesized that this bottleneck event was habitat fragmentation. Furthermore, phylogenetic analyses of C. cebuensis supported its monophyly.

BIRDS; BIODIVERSITY; GENETIC RESOURCES; RESOURCE CONSERVATION; FORESTS; DEFORESTATION; PHILIPPINES

High school students' conservation values for coral reefs in Sagay Marine Reserve, Negros Occidental, Philippines. **Bocario, S.B., Togonon, C.C., Subade, R.F. Philippines Univ. Visayas, Miagao, Iloilo (Philippines). Div. of Social Sciences. rodanasu@gmail.com.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 8-18. 2019.*

Studies on economic valuation rarely involved the youth in decision making. This study considered the youth, particularly high school students, as the respondents of the survey. The study may prove to be critical in considering the opinions and recommendations of the youth who may become environmental stewards of the future. Through stratified and systematic random sampling, 400 respondents were chosen from five public high schools in Bacolod City to determine their willingness to pay (WTP) for the conservation of the coral reefs in Sagay Marine Reserve. Data was gathered from 80 students per school through a group administered survey. High school students are willing to contribute resources and do volunteer work for conservation activity. The total WTP of the students amounted to Php 3,156,894.02 per month. The selected mode of payment was through student government collection. The top reasons for their decision to pay were: existence values, altruistic motive, and bequest value. The factors that affect the students' WTP were bid price, household size, monthly income and perceived importance. This study amplified the roles of the youth in the conservation of natural resources. Indeed, the youth can be a valuable resource capital for coral reef conservation.

CORAL REEFS; MARINE ENVIRONMENT; MARINE RESOURCES; RESOURCE CONSERVATION; STUDENTS; ECONOMIC VALUE; PHILIPPINES

Linking science to policy for climate change adaptation: institutional innovations in the management of Lake Buhi, Philippines. **Elazegui, D.D., Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Faderogao, J.F. Bicol Agri-Water Project (Philippines).** *Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. 2018. p. 95-113.*

The biggest challenge in any multiple-use lake is how to allocate the water resource to its various uses. Conflict resolution and recognizing the interdependencies in water use should be central to its management. The case story presents the process that the various

stakeholders of Lake Buhi took to arrive at a decision to help strengthen the institutional coordination in the management of the lake in order to adapt to climate-related risks in the context of competing uses of water in Lake Buhi. Lake Buhi serves as habitat to the Philippines' smallest commercial fish, tabios or sinarapan. Over the years, management of the lake has become a compromise among irrigation, hydroelectric power generation, fishery sector, and conservation/sustainability goals. Conflicts arise due the absence of clear rules on water allocation. Accordingly, the two interventions that were introduced to solve the problem were to develop a science-based water allocation model and strengthen the watershed management management council, whose task includes managing the lake ecosystem.

CLIMATIC CHANGE; ADAPTATION; LAKES; WATERSHED MANAGEMENT; WATERSHEDS; WATER USE; PHILIPPINES

Living on the edge: current status of Rare Sulu Endemic Avifauna. **van de Ven, W.A.C. Buhay-ilang Research, Education and Conservation U607 Maia bldg. Mirea Residences, Amang Rodriguez Ave. Santolan, Pasig City (Philippines). Muallil, N.R. Mindanao State Univ.-Tawi- Tawi Coll. of Technology and Oceanography, Bongao, Tawi-Tawi 7500, (Philippines). Realubit, N.D.C. Buhay-ilang Research, Education and Conservation U607 Maia bldg. Mirea Residences, Amang Rodriguez Ave. Santolan, Pasig City (Philippines). dyannerealubit@gmail.com.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 1-7. 2019.*

The Sulu Archipelago, consisting of hundreds of islands, harbors unique and distinct endemic avian fauna. Due to the relatively small size of the islands and the rapid deforestation, many of these species are in danger of extinction. Some of the endemic bird species in the Sulu Archipelago have not been observed in the wild for decades and may already have gone extinct without being noticed. This study uses available information to describe the current status of endemic bird species in the area. Most of the information were gathered from anecdotal reports of birdwatchers who visited the area since very few scientific surveys have been done there. All of the Sulu endemic bird species are forest dependent and categorized as threatened on the IUCN Red List. The Sulu Bleeding-heart Gallicolumba menagei has not been recorded for over a century. The Sulu Hornbill Anthrococeros montani may have no more than 20 pairs left in the wild and not much more is known of the Sulu Hawk-Owl Ninox reyi apart from its name and call. The rapidly disappearing forests, combined with hunting and mining, make the Sulu Archipelago arguably one of the highest priority sites for conservation in the country. The Sulu Archipelago is not only located at the geographical edge of the Philippines, but it is also where unique species are on the edge of extinction. Immediate in situ conservation and

comprehensive surveys of the avifaunal diversity in the Sulu Archipelago are urgently needed.

BIRDS; BIODIVERSITY; INDIGENOUS ORGANISMS; RESOURCE CONSERVATION; PHILIPPINES

Local collaborative engagement toward sustainability of upland farming communities in the Philippines. **Landicho, L.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Agroforestry. Dizon, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 23-49.*

In this chapter, the authors argue that local collaborative engagement is essential towards sustainability of whole upland farming communities in the Philippines. Local collaborative engagement refers to the partnership of local development organizations, particularly the local government units (LGUs), with the upland farming communities, as well as the interactions among the structures and processes within those farming communities. This conclusion is based on the results of the study conducted in nine pilot upland communities of the Conservation Farming Villages (CFV) program in Albay, Ifugao and Negros Oriental. From seven focus group discussions and a farm household survey of 230 upland farmers, research results revealed that the study steps sites in Albay and Negros Oriental had moderate levels of sustainability of 0.26 and 0.49 respectively, while the study site in Ifugao had a low level of -0.46. The level of sustainability was determined using the community capitals framework, which puts emphasis on the seven capitals, namely: human, social, natural, physical, financial, cultural, and political capitals as determinants of a sustainable community. Specifically, human, social, and political capitals were found higher in Albay and Negros Oriental. Active collaboration between LGUs and the upland farming communities in the two study sites had resulted in the following: (1)continuous technical capability-building of upland farmers; (2)maintenanve and expansion of the model agroforestry farm sites; (3)continuous operation of the CFV farmers' association; and (4) institutionalization of local policies that were in line with conservation farming. Logistics regression revealed that informal policies and verbal agreements, formal policies and programs, and the Filipino practice of bayanihan help determine the sustainability of upland farming communities.

HIGHLANDS; RURAL COMMUNITIES; RURAL DEVELOPMENT; AGROFORESTRY; SUSTAINABILITY; PHILIPPINES

Methodologies supportive of sustainable development in agriculture and natural resources management: an overview. **Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna**

(Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA*. 2020. p. 23-49.*

AGRICULTURE; NATURAL RESOURCES; RESOURCE CONSERVATION; RESOURCE MANAGEMENT; SUSTAINABILITY; METHODS

Perspective of environmental education in Taiwan: current status of implementation. **Chang-Mao Lee, Ching-Hwa Lee. Da-Yeh Univ., Changhua (Taiwan). Dept. of Environmental Engineering. chl@mail.dyu.edu.tw., Popuri, S.R. The Univ. of the West Indies, Cave Hill Campus (Barbados). Dept. of Biological and Chemical Science.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 83-95. 2020.*

Environmental education is becoming an essential subject as the environment changes rapidly with human activities. To protect the environment, several countries implemented environmental education acts. Taiwan is the sixth country in the world that implemented an act for environmental protection and sustainability. This study reports the 20-year journey of development and the pioneer status of environmental education act into practice. The Ministry of Education of Taiwan and Environmental Protection Agency jointly proposed the environmental education programme in 1992 to create awareness on the environment protection and develop knowledge, attitudes, skills and values necessary for improving the environment. The Environmental Protection Agency is responsible for accrediting qualified environmental education institutions to handle environmental education personnel training, curriculum plan and management, provide professional service of environmental education with rich ecology, etc. During 2011 to 2019, 200 students in 17 cities were issued environmental education certificates and became qualified environmental education personnel. The number of environmental education personnel in Taiwan has increased every year after the implementation of the Environmental Education Law. This study also provides suggestions of integrating environmental education into the school curriculum and the establishment of corporate social responsibility towards environmental education.

ENVIRONMENT; EDUCATION; ENVIRONMENTAL POLICIES; ENVIRONMENTAL PROTECTION; TAIWAN

Research-based policy formulation for the sustainable utilization and promotion of indigenous food plants in Region 1, Philippines. **Antonio, M.A. menisaantonio@yahoo.com., Ultera, R.T., Agustin, E.O., Jamias, D.L., Badar, A.J. Mariano Marcos State Univ., Roosevelt Avenue Brgy. 12 San Blas, Paoay, 2902 Ilocos Norte**

(Philippines). Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 87-106 .*

Many plant genetic resources (PGR), which include the indigenous and traditional edible species, are disappearing at alarming rates, posing a serious threat to food security. Authors documented the characterized indigenous edible species and their habitats in seven upland and remote municipalities in Ilocos Norte, with the goal of promoting near conservations and sustainable utilization. A total of 46 indigenous food plants (IFPs) [indigenous food plants] representing 27 plant families were identified. Majority of them are wild species; the others are landraces or native varieties of cultivated crops. Genomorphic and soil characteristics influenced the diversity of the identified IFPs especially since they can contribute to food sufficiency, nutrition and supplementation of household income. Some IFPs showed specific elevation and temperature and soil moisture requirements. Many of them, however, showed adaptability to a wide range of genomorphic and soil conditions. So far, there is known local government unit initiative in the province to promote and conserve the IFPs and their habitats. Hence various modalities were employed by the project implementer to promote the sustainable utilization and management of the IFPs. Additionally, the research results were utilized as input for research-based policy formulation stakeholders to actively participate in the conservation, promotion, and sustainable utilization of IFPs in the Ilocos Region.

CROPS; INDIGENOUS ORGANISMS; GENETIC RESOURCES; RESOURCE CONSERVATION; USES; POLICIES; PHILIPPINES

Setting localized conservation priorities of plant species for sustainable forest use. **VIllanueva, E.L.C. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. ecvillanueva4@up.edu.ph., Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 165-179.*

Sustainable use of terrestrial ecosystems is one of the targets of the 2015-2030 UN Sustainable Development Goals (SDGs). This chapter highlights the use of conservation priority setting of plant species at local level as a tool to help attain this goal. Using a point scoring procedure, a localized conservation priority index (CPI) composed of four criteria was developed and utilized on secondary data on plant uses and vegetation data at Mt.

Mayon, Albay, Philippines. Among the 44 woody species assessed, 43 were classified as medium priority species and one as low priority species. Furthermore, non-linear principal component analysis (NLPCA) was used to investigate the interaction of the species in a multidimensional setting. This chapter also explains the strengths and limitations of the study, as well as the advantages of the application of NLPCA in conservation priority setting. Moreover, the priority levels of the plant species are compared with their respective available conservation statuses in the national and global levels, showing the current gaps of the higher scale of analysis (national and global) in conservation that can be addressed by the localized CPI. It recommends validating the results of the CPI in the local community and integrate in the local policies to maximize the full potential of the index.

VEGETATION; PLANTS; SPECIES; FORESTS; RESOURCE CONSERVATION; USES; USE VALUE

Social acceptability of the bioremediation technology for the rehabilitation of an abandoned mined-out area in Mogpog, Marinduque, Philippines. **Alaira, S.A. sofia_alaira@up.edu.ph., Padilla, C.S., Alcantara, E.L. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Aggangan, N.S. Philippines Univ. Los Baños, College, Laguna (Philippines). National Inst. of Molecular Biology and Biotechnology.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 24 (1) p. 77-91. 2021.*

Rehabilitation of mined-out areas poses great challenge because nutrients are depleted and conditions are not conducive for the conditions necessary for the growth and survival of plants. Proper combination of mycorrhizal fungi, nitrogen-fixing bacteria, compost, and lime to support the growth of trees in the poor soil has been discovered by the University of the Philippines Los Baños National Institute of Microbiology and Biotechnology. Having established a protocol using this formulation, a plant survival rate of 95% was achieved in a bioremediation project implemented by the Institute in a mined-out area in Capayang, Mogpog, Marinduque, Philippines. The social acceptance and adoption of this rehabilitation strategy was determined through a survey interview in the study area with the use of questionnaire. Six factors and nine variables were considered in the assessment. The bioremediation technology was acceptable to the community as indicated by the high percentage of respondents who gave an overall positive response (90%) and who were willing to adopt and recommend it for implementation in other mined-out areas (90%). Binary logistic regression showed that income and distance of residence from the rehabilitation site significantly influenced the respondents' decision to accept the technology. Future bioremediation initiatives should also consider the participation and acceptance of stakeholders to ensure sustainability. Indigenous and endemic planting materials should be used in rehabilitation.

BIOREMEDIATION; TECHNOLOGY; TECHNOLOGY TRANSFER; RESOURCE MANAGEMENT; PHILIPPINES

Status of mammals in the expansion sites of the Mt. Hamiguitan Range Wildlife Sanctuary, Mindanao, Philippines. **Amoroso, V.B. Central Mindanao Univ., University Town, Musuan Bukidnon (Philippines). Center for Biodiversity Research and Extension in Mindanao. victorbamoroso@gmail.com., Mohagan, A.B. Central Mindanao Univ., University Town, Musuan Bukidnon (Philippines). Dept. of Biology. Coritico, F.P. Central Mindanao Univ., University Town, Musuan Bukidnon (Philippines). Center for Biodiversity Research and Extension in Mindanao. Laraga, S.H. Central Mindanao Univ., University Town, Musuan Bukidnon (Philippines). Dept. of Biology. Lagunday, N.E., Domingo, K.L.B. Central Mindanao Univ., University Town, Musuan Bukidnon (Philippines). Center for Biodiversity Research and Extension in Mindanao. Colong, R.D. Department of Environment and Natural Resources, Davao Oriental Province, (Philippines). MHRWS-PASO. Ponce, R.G. Davao Oriental State Coll. of Science and Technology, Davao Oriental (Philippines).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (2) p. 6-12. 2019.*

Mt. Hamiguitan Range Wildlife Sanctuary is one of the biodiversity hotspots in the Mindanao faunal region, which is home to about 21 species of mammals. This study provides data on mammal assemblage and assessment on the added value of the ca. 2.99 km2 MHRWS expansion sites to the already protected zone. Faunistic inventory and assessment documented 19 species of mammals belonging to 16 genera, eight families and five orders. This adds nine species to the previously reported mammals of Mt. Hamiguitan range making it a home to 30 species. Relatively low diversity of mammals (H'=0.615) in the expansion sites is attributed to poor soil resulting to low forest productivity and habitat loss due to mining, logging and shifting cultivation. This unique assemblage of vulnerable and endemic species of bats and mammals in Mt. Hamiguitan Range Wildlife Sanctuary expansion sites calls for more sampling effort and conservation strategies to maintain its bat and mammal assemblage.

HIGHLANDS; WILDLIFE; NATURE RESERVES; NATURAL RESOURCES; RESOURCE CONSERVATION; INDIGENOUS ORGANISMS; ENDANGERED SPECIES; BIODIVERSITY; PHILIPPINES

P06 - RENEWABLE ENERGY RESOURCES

Socio-economic and environmental impacts of bioethanol production from sugarcane (Saccharum officinarum) and molasses in the Philippines. **Demafelis, R.B. rbdemafelis@up.edu.ph., Movillon, J.L. Philippines Univ. Los Baños, College, Laguna**

(Philippines). Dept. of Chemical Engineering. Predo, C.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Forestry and Natural Resources. Maligalig, D.S. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Statistics. Eleazar, P.J.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Development Communication. Magadia, B.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 96-110. 2020.*

As the Philippine bioethanol industry reaches a decade and the debate on what bioethanol blending shall be imposed, this study assessed the socio-economic and environmental impacts of domestic bioethanol production parallel to the objectives of the biofuels law. Bioethanol production in the country has generated significant jobs or an estimated jobs of about 2,073 based on the actual bioethanol processing data for Crop Year (CY) 2017-2018 for the three bioethanol production systems (BPS) studied; and could potentially reach 10,620 jobs if mill capacities of the two bioethanol plants are met. Additionally, bioethanol industry was perceived to have a positive change for sugarcane farmers in terms of employment opportunities and cash income from bioethanol-related operations. The domestic bioethanol industry has even opened additional revenues to bioethanol-related industries of about PhP 1.2 B (23.9 M USD) for CY 2017-2018 and could even reach to PhP 3.0 B (60.4 M USD) if bioethanol plants can attain its installed mill and cogeneration capacities. Environmental impact assessment study, on the other hand, revealed that domestic bioethanol production can reduce GHG emissions by about 68 to 91% for the four BPS evaluated, compared to business-as-usual scenario of using fossil fuel.

SACCHARUM OFFICINARUM; MOLASSES; BIOFUELS; ENVIRONMENTAL IMPACT; PRODUCTION; PHILIPPINES

Sugarcane bioethanol processing plant in the Philippines: energetics and water inventory. **Demafelis, R.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering. Alcantara, A.J. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Movillon, J.L. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering. Espaldon, M.V.O., Pacardo, E.P., Flavier, M.E. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Magadia, B.T., Matanguihan, A.E.D. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 80-88. 2020.*

Biofuels production is intended to address shortage on fuel supply. This study assessed the energetics and water inventory of the Philippine bioethanol production from sugarcane,

aiming to provide a definitive value from where studies for economic assessment for this system could pick up. A 30-million-liter-per-year (MLPY) processing facility was designed using local field and factory data, from surveys and immersion reports. Assessment showed that sugarcane bioethanol processing facility with co-generation and wastewater treatment units gains a net energy equivalent to 18.62 MJ/L of bioethanol produced, with an energy returned on energy invested ratio of 2.75. The net energy realized from the production compensates the energy expended during the construction of the bioethanol plant within about eight months of operation. Water is being used up at a rate of 2,832.22 L per L of ethanol produced or 133.60 L per MJ or 197,826.09 L per Mg of cane processed, accounting the water used for plantation and the factory. The water inventory in the construction level amounts to 952.64 ML. It is concluded that the production of bioethanol from sugarcane is practical, energy-wise, but its water consumption might make the industry unviable in locations where water is scarce.

SACCHARUM OFFICINARUM; SUGARCANE; BIOFUELS; FACTORIES; WATER USE; PHILIPPINES

Technical, financial and environmental assessment of bio-oil production from pyrolysis of pigeon pea [Cajanus cajan (L.) Millsp.] wood. **Tanquilut, M.R.C. Pampanga State Agricultural Univ., Magalang, Pampanga 2011 (Philippines). Coll. of Resource Engineering Automation and Mechanization. mctanquilut@up.edu.ph., Elauria, J.C. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Agricultural Engineering. jcelauria@yahoo.com., Genuino, H.C. University of Groningen, Groningen (Netherlands). Dept. of Chemical Engineering, Faculty of Science and Engineering. Elauria, M.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept of Agricultural and Applied Economics. Suministrado, D.C., Amongo, R.M.C., Yaptenco, K.F. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Agricultural Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 40-49. 2020.*

Pigeon pea (Cajanus cajan (L.) Millsp. wood was pyrolyzed using a semi-continuous gram-scale reactor at optimized conditions of temperature (469 deg C), nitrogen flow rate (14.2 mL/min), and particle size (1.3 mm), yielding bio-oil (54%), biochar (26%), and syngas (16%). The cost of bio-oil production for 1 t/yr was estimated to be US$ 681.00. Financial analysis revealed a net present value (NPV)of US$ 24,322.00 at 12% discount rate, an IRR of 343.85 %, with breakeven quantity of 199 L. Sensitivity analysis showed that an increased price of raw materials up to 30 %, and a decreased price of products down to 25 %, resulted to an increased NPV and IRR. Decreasing the bio-oil yield below 40 % gave a negative NPV with an IRR of 9%. If bio-oil and biochar were tapped as alternative bioenergy, 360,000 L of fuel oil and 259 t of coal could be saved. A total greenhouse gas emission of 749 t of CO2 equivalent can be avoided. Thus, pigeon pea pyrolysis for bio-oil production provided a net

positive energy output and was proven to be profitable investment, and environment-friendly as potential bioenergy resource to replace petroleum-based fuels.

CAJANUS CAJAN; PIGEON PEAS; PYROLYSIS; BIOENERGY; ECONOMIC ANALYSIS; ENVIRONMENTAL IMPACT ASSESSMENT; PRODUCTIVITY

P10 - WATER RESOURCES AND MANAGEMENT

Analyzing the temporal and spatial trends of water quality and eutrophication in Laguna de Bay, Philippines, 2000-2012. **Macuroy, J.T. jtmacuroy@up.edu.ph., Faustino-Eslava, D.V., Siababa, A.C., Espaldon, M.V.O., Cui, L.E. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 27-39. 2019.*

Pollution levels may vary greatly in large waterbodies over long periods of time. Hence, classifying pollution must be inclusive of crucial locations and temporal variabilities. This study applied various statistical techniques to look into the spatial and temporal trends of nine physicochemical parameters within the lake: Biochemical Oxygen Demand (BOD, mg/L), Ammonia (NH3, mg/L), Chloride (Cl, mg/L), Nitrate (NO3, mg/L), Inorganic Phosphate (PO4, mg/L), Total Nitrogen (TN, mg/L), Total Phosphorus (TP, mg/L), Turbidity (Turb, NTU), and Chlorophyll a (Chl a, mug/L). Trends were analyzed using data from 2000 to 2012 in five selected stations spread out across the lake. The Trophic State Index (TSI) values of the stations within the study period were also derived from TP, TN, Chl a, and the average of the three parameters. In terms of temporal analysis, general trends, relative monthly values (MV), percent annual changes (PAC) of the nine parameters and their derived TSI values were assessed and analyzed. Spatial trends were assessed by calculating the relative station values (RV) and their standard deviations (SV), principal component analysis (PCA), and hierarchical agglomerated cluster analysis (HACA). BOD and Chl-a have shown statistical growth over the period of 12 years while Cl revealed a consistent decrease in concentration. Moreover, results also showed that Stations 1 and V located at West Bay is the most polluted of all five stations studied, most likely because of its proximity with the highly urbanized and densely populated National Capital Region. This was further supported by HACA results, wherein the two have overwhelmingly similar trends in terms of nutrient and pollutant loadings. Lastly, PCA results revealed that the lake's current condition can be attributed to BOD, TP, and Chl-a. The generated results comprehensively describe the significant changes in pollution levels within the 13-year period and the relationships between the pollution status of stations located at the lake.

WATER QUALITY; EUTROPHICATION; CHEMICOPHYSICAL PROPERTIES; ANALYTICAL METHODS; PHILIPPINES

Application of remote sensing and SWAT [soil and water assessment tool] model to assess climate and land use changes impacts on hydrological responses and sediment yield. **Ngo Thanh Son, Hoang Le Huong, Nguyen Duc Loc, Vo Trong Hoang.** *College, Laguna (Philippines). SEARCA. 2021.*
https://www.searca.org/pubs/monographs?pid=506

The Upper Ma River basin located in Son La and Dien Bien provinces in the northwestern region of Vietnam has a total area of 6,688 km2. It is a typical river basin in Vietnam, a transboundary with variable flow regime and topography, and has high population pressure in its mountainous region. It is also considered as one of the most disaster-prone regions, suffering from typhoons, tropical storms, drought, landslides, soil erosion, and forest fires. In the study area, land use and climate change are two main factors that directly affect regional hydrologic conditions; thus, the segregation of their influences is of great importance to land use planning and water resources management. The study assessed the impacts of land use change and climate change on hydrological process and sediment yield in the Upper Ma River basin in Vietnam through remote sensing (RS) and the soil and water assessment tool (SWAT) model. Maps with land use were generated using RS for the years 1994 and 2015. The SWAT model was used for hydrological process and sediment yield simulation. Results indicated that the SWAT model proved to be a powerful tool in simulating the impacts of land use and climate change on catchment hydrology and sediment yield based on the Nash-Sutcliffe efficiency (NSE), coefficient of determination (R2), and percent bias (PBIAS) values. For runoff, the values of NSE, R2 , and PBIAS were 0.84, 0.85, and 2.61 during calibration period, respectively; and 0.75, 0.81, and –8.30 during validation period. For sediment yield, the values obtained during calibration period were 0.73, 0.76, and –3.61, respectively; during validation period, they were 0.87, 0.88, and –1.46. The change in land use from forest to cash crop and urban combined with climate variability between 1994 and 2015 strongly contributed to increasing hydrological processes (i.e., surface runoff, evapotranspiration, and water yield) and sediment yield, with decreasing percolation and groundwater. Data on climate change for the period 1994–2015 showed significant increase in all hydrological components, but with decrease in sediment load. It can be explained by the decrease in precipitation in the wet season, increase in precipitation in the dry season, and earlier transition of normal rainy season in northwestern Vietnam. Under impacts of projected land use and climate change scenarios on hydrological process and sediment yield of the Upper Ma River basin, results indicated that ET, surface flow, and sediment yield are more sensitive to the changes in land use and climate by 4 percent, –1 percent, and 6 percent, respectively, in the future. Moreover, in comparison with current conditions, the potential soil erosion in the Upper Ma River basin ranges from moderate to high. In general, a deep understanding obtained from hydrological responses and sedimentation, and experience in using RS and SWAT will provide the

guidance and techniques that may be applicable to other river basins in Vietnam. In addition, using SWAT could be of value for decision makers in integrated river basin management in developing adaptation and mitigation strategies in relation to changes in climate and land use.

REMOTE SENSING; CLIMATE; LAND USE; ENVIRONMENTAL IMPACT; HYDROLOGY; SEDIMENT; CLIMATIC CHANGE; WATER RESOURCES

Assessing impacts of land use and climate change on soil and water resources in the Srepok watershed, Central Highland of Vietnam. **Nguyen Thi Thu Huyen. Nong Lam Univ., Ho Chi Minh (Vietnam). Dept. of Applied Geomatics. huyen.gisk26@gmail.com., t.huyen@hcmuaf.edu.vn., Le Hoang Tu, Nguyen Duy Liem, Vo Ngoc Quyn Tram, Duong Ngoc Minh, Nguyen Kim Loi.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2016-2. [2016].*
https://www.searca.org/pubs/discussion-papers?pid=342

The Srepok River basin, which flows along four provinces in Vietnam and parts of Cambodia, is presently facing critical issues such as floods and droughts, pollution of waterways, deforestation of catchments, erosion and resultant sedimentation of reservoirs, overexploitation of groundwater, water-use conflicts, and transborder issues. This study aims to investigate changes in streamflow and sediment yield that result from land use changes, and climatic variation in the Srepok watershed. Plausible scenarios of land use change are simulated through Geographic Information System (GIS) using current conditions and information from the area as bases, and climate change scenarios built on outputs of General Circulation Models (GCMs) from the Southeast Asia System for Analysis, Research and Training (SEA-START 2009). These changes, individually or in combination, are input into the soil and water assessment tool (SWAT) to project future hydrological variables. Simulations have shown increase in annual average temperature at 0.75–2.5 degrees celsius and decrease in precipitation at 200–500 milimeters. These are both in medium- and high-emission scenarios for the period 2011–2039 and 2040–2069. Annual streamflow in medium- and high-emission scenarios appeared to be 3.7–5.6 times lower than the base scenario in 1990–2010. All scenarios are different in terms of amount and distribution of streamflow in the dry and rainy seasons. Shifts in rainy season, rainfall, and land cover have led to fluctuations in the amount of sediments. Total sediment yield in 1990–2010 is 9.1 times higher than in the medium-emission scenario, and 8.1 times higher in the high-emission scenario. For water components, the Srepok watershed showed over 60 percent streamflow and 36 percent evapotranspiration. Groundwater contributes over 60 percent to the total flow in the watershed than surface water. Therefore, groundwater also contributes to water availability in the Srepok watershed in the future. Results of this

research can serve as baseline for plans for the Srepok watershed.

WATERSHEDS; WATER RESOURCES; SOIL RESOURCES; LAND USE; CLIMATIC CHANGE; VIET NAM

Comparison of spectrophotometric and digital photometric methods for determining chemical oxygen demand. **Mallari, R.D.C., Micor, J.R.L., del Rosario, E.J. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. ejdros@yahoo.com.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 16-22. 2018.*

Visible spectrophotometry (VS) and digital photometry (DP) for determining chemical oxygen demand (COD) were compared; the latter method involved image processing of digital photographs of analyte solutions using RGB-AIC software. Statistical analysis showed that COD values of untreated and treated (trickling filter) wastewater samples from a hog slaughterhouse were not significantly different using VS and DP methods. The COD values were not significantly different among the treated samples as well using a* and L* plots. Tests for accuracy and repeatability of the DP method showed acceptable results. The calculated limit of detection (LOD) for DP was 0.73 mg/L while the LOD for VS was 0.33 mg/L . The accuracy of the DP method was validated using glucose solutions of known COD values; t-tests performed at 95% confidence level showed no significant differences in COD values between (1) theory and experiment, (2) VS and DP and (3) a* and L* plots. These findings suggest that digital photometry is accurate and can be used as an equally accurate alternative to conventional spectrophotometry.

SPECTROMETRY; POLLUTANT LOAD; IMAGE PROCESSING; WASTEWATER; TECHNOLOGY TRANSFER; WATER QUALITY

Correlation studies of arsenic level in drinking water and blood samples of females in District Sheikhupura, Pakistan. **Abbas, M. moneeza.rana@gmail.com., Cheema, K.J. Lahore College for Women Univ., Lahore Jail Road, Lahore 54000, (Pakistan). Environmental Science Dept.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (2) p. 1-5. 2019.*

Arsenic contamination of drinking water has become a major health concern all over the world. Pakistan is also facing an arsenic contamination in drinking water. The present study determine the correlation of arsenic level in drinking water and blood sample of females of District Sheikhupura, Pakistan. The study area for the present research work is District Sheikhupura, which is an industrial as well as an agricultural city in the province of Punjab, Pakistan. The arsenic concentration in drinking water from different sources used by the inhabitants and blood samples of females was measured by

using Atomic Absorption Spectrophotometer (AAS). The drinking water of tehsils Sheikhupura and Sharaqpur had higher arsenic as compared to other tehsils (64.25 not equal to 2.55 mug/L and 61.63 not equal to 2.73 mug/L) respectively, and was highest in all hands pumping water (71.14 not equal to 2.6 mug/L). Mean arsenic concentration in blood samples was highest in the age group of 23-25 years (3.2 not equal to 0.23 mug/L) and being highest among respondents of tehsil Sheikhupura. A positive correlation between drinking water and blood samples when analyzed with respect to area and drinking water sources was found. Evidences suggest that the presence of arsenic in drinking water is likely to affect general metabolism and its accumulation in human. This appears to be linked with exposure of varying magnitude and duration.

DRINKING WATER; ARSENIC; CONTAMINATION; BLOOD SAMPLING; FEMALES; PAKISTAN

Current cellulose nanofibrils and cellulose nanocrystals as water purification functional membrane materials. **Santos, E.C.C. Mapua Univ., 658 Muralla St., Intramuros, Manila (Philippines). School of Chemical, Biological and Materials Engineering and Sciences. dbsenoro@mapua.edu.ph., Kaldeus, T. Department of Fibre and Polymer Technology, Wallenberg Wood Science Center, Teknikringen 56-58, SE-100 44, Stockholm (Sweden). KTH Royal Inst. of Technology. Senoro, D.B. Mapua Univ., 658 Muralla St., Intramuros, Manila (Philippines). Resiliency and Sustainable Development Center and School of Civil, Environmental and Geological Engineering. Malmstrom, E., Hult, A. Department of Fibre and Polymer Technology, Wallenberg Wood Science Center, Teknikringen 56-58, SE-100 44, Stockholm (Sweden). KTH Royal Inst. of Technology.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 48-64. 2020.*

This study highlights the beneficial role of cellulose nanofibrils (CNFs) and cellulose nanocrystals (CNCs) as components in functional membranes. The approaches of the use of CNF and CNC as membrane materials for water purification have been studied extensively during the past decades. This is due to its inherent abundance, renewability, sustainability and unique properties such as high aspect ratio, high surface area, high crystallinity, and high mechanical properties. The performance of CNF- and CNC-based membranes especially in treating actual water samples were also highlighted in this review to give a better overview of the behavior of these nanocellulose as membrane materials. The challenges of using CNFs and CNCs and the need for improvements for the future development of membrane materials are also discussed

BAMBOOS; CELLULOSE; MEMBRANES; MECHANICAL PROPERTIES; WATER PURIFICATION

Development of nanocomposite polysulfone- nanoclay membrane with enhanced hydrophilicity. **Basilia, B. basiliablessie@gmail.com., Cayabyab, S.**

srcayabyab@gmail.com., Casa, E., Collera, A.K., de Yro, P.A., Margarito, M., Milo, L., Que, M.C., Lagura, V., Visaya, B. Department of Science and Technology (DOST) Cpd., Bicutan, Taguig City (Philippines). Industrial Technology Development Inst. *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 29-36. 2020.*

This research involves the development of membranes with local raw materials to suit water and wastewater treatment applications. Indigenous montmorillonite clay was surface modified with dialkyldimethyl ammonium chloride to be used as functional additive in polymeric membranes. Polysulfone pellets were dissolved in N-methyl-pyrrolidone (NMP) and organomodified-montmorillonite (OMMT) or nanoclay was incorporated at varying concentrations up to 1.00%. Casting solutions were vacuum mixed and degassed using a planetary mixer then casted using MEMCAST TM to produce flat sheet membranes. Characterizations include X-Ray Diffractometry, Atomic Force Microscopy, Scanning Electron Microscopy, and contact angle measurement. The exfoliation of OMMT platelet structures within the PSf matrix at 1.00% loading showed improved surface roughness and more porous morphology. Improved surface roughness was observed with an increasing value as a function of increasing OMMT concentration. Meanwhile, the morphology of the nanocomposite membranes showed three distinct layers: dense skin layer, porous finger-like layer, and sponge-like structured layer. Moreover, the contact angle of the membranes decreased by 13.7% with 1.00% addition. This enhancement in hydrophilicity could affect properties like permeate flux and membrane fouling which could play an important role in the functional performance of synthesized membranes with nanoclay additives. One-way ANOVA reveals that the change in OMMT concentration has shown significant effect on the surface roughness and contact angles of the membranes at 95% confidence level.

POLYMERS; HYDROPHOBICITY; WATER; WATER QUALITY; WASTEWATER TREATMENT

Economic value of Calliandra calothyrsus in watershed rehabilitation in Manolo Fortich, Bukidnon, Philippines. **de Luna, C.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Interdisciplinary Studies Center for Integrtated Natural Resources and Environment Management. ccdeluna@up.edu.ph., Calderon, M.M., Cruz, R.V.O., Tolentino, E.L. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 2 p. 76-84. 2020.*

This study analyzed the economic value of Calliandra calothyrsus Meissn. as a pioneer species in watershed rehabilitation using benefit-cost analysis (BCA). A cashflow was developed and using the 15% discount rate, the net present value (NPV) and benefit cost ratio (BCR) were computed. Planting C. calothyrsus as pioneer species is financially feasible

having a positive NPV of PhP202,090/ha and a BCR of 14 at 12 years rotation. Following the natural order of succession, benefits derived from planting pioneer species, in this case C. calothyrsus, include reduced labor cost for weeding while attaining benefits like fuelwood, honey and fodder production and environmental services like carbon sequestration. C. calothyrsus was used to shade out grasses and weeds, diminish fire hazard, and facilitate colonization of the site by a wider range of species through planting of desired premium species like dipterocarps to accelerate rehabilitation. Rehabilitation of degraded landscapes could accelerate forest succession using pioneer species to create favorable environment for late successional species, and ensure survival with positive contribution to ecosystem services.

CALLIANDRA CALOTHYRSUS; WATERSHEDS; RESOURCE MANAGEMENT; ECONOMIC VALUE; COST BENEFIT ANALYSIS; PHILIPPINES

Exploring spatial relationship between electrical conductivity and spectral salinity indices in the Mekong Delta. **Thoung V. Tran. University of Social Sciences and Humanities, VNU-HCM, HCMC, 70000 (Vietnam). School of Geography. tvthuong@hcmuss.edu.vn., Duy X. Tran. University Palmerston North 4442 (New Zealand). School of Agriculture and Environment. Hoa V. Pham. Vietnamese Academy of Science and Technology, HCMC 7000 (Viet Nam). Ho Chi Minh City Inst. of Resources Geography. Tuan V. Truong. Ho Chi Minh City Univ. of Education, HCMC, 70000 (Vietnam). School of Geography. Hoanh P. Trinh. Saigon Univ., HCMC 70000 (Viet Nam). School of Education for Social Sciences. Dung Q. Nguyen. Binh A. Nguyen. Hanh C. Nguyen. Vietnamese Academy of Science and Technology, HCMC 7000 (Viet Nam). Ho Chi Minh City Inst. of Resources Geography.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 39-49. 2020.*

The negative impact of salinization concurrent with drought is a severe problem that creates challenges for agriculture in deltas and coastal lowlands. This study aims to investigate the spatial relationship among the field measured electrical conductivity (EC) and spectral salinity indices derived from Remote sensed data in the Mekong Delta using Geographically Weighted Regression (GWR). A wide range of Landsat 8 Operational Land Images (OLI) products, including single bands, band ratios, vegetation indices (NDVI and EVI), intensity indices (INT), and brightness indices (BI) were employed for computing salinity indices. The Kriging and Co-kriging interpolation techniques were used to estimate the spatial pattern of the field measured EC. Additionally, the Ordinary Least Square (OLS) regression were employed to characterize the relationship between single bands and EC measurement before applying the GWR for exploring the spatial correlation among the indices. There was a gradually increased of EC value from inland to coastal area. A significant relationship between EC measurement and spectral salinity indices and the

highest correlation coefficient with p value less than 0.05 was found in EVI (r2 = 0.736). This study demonstrated that the GWR is germane to analyse the spatial correlation among the demonstrated variables in the study area. Moreover, it also revealed that spectral salinity indices could be an alternative option for EC measurement in monitoring salt water intrusion at coastal areas.

SALINITY; MEASUREMENT; SALINE WATER; SPECTROMETRY; ELECTRICAL CONDUCTIVITY; MEKONG RIVER; VIET NAM

Flood disaster risk perception and sense of place among households along the Ocoy River in Negros Oriental, Philippines. **Oracion, E.G. Silliman University, Dumaguete City 6200, Negros Oriental (Philippines). Dept. of Anthropology and Sociology.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 24 (1) p. 56-67. 2021.*

This quantitative study using a survey method aims to understand the relationship between flood disaster risk perception and the sense of place of people living in communities along a river. The survey covered a non-probability sample of 120 respondents from households located along with the downstream, midstream, and upstream sections of the Ocoy River in Negros Oriental. Generally, the respondents have very high flood disaster risk perception and sense of place scores which do not significantly differ across communities. But the significant positive relationship between these two major variables contradicts the common understanding that disaster makes people devalue particular places and relocate to safer areas. The majority who conditionally agreed to relocate may not proceed if they perceived a more difficult life in the resettlement site. Adaptive resettlement programs and policies are recommended where the desired characteristics of a place of flood survivors are reconstructed. At the same time, risk reduction and mitigation mechanisms are designed for those who decided to remain in riverside communities.

RIVERS; HOUSEHOLDS; FLOODING; DISASTERS; RISK; PHILIPPINES

Household awareness on the consequences of untreated wastewater in traditional agro-food processing villages in Nhue-Day Rier Basin, Vietnam. **Tran Thi Thung Trang. Vietnamn National Agricultural Univ., Ha Noi (Vietnam). Dept. of Resources and Environmental Economics. tranthutrang1712@gmail.com., Rañola, R.F. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Agribusiness Management and Entrepreneurship. bert1866@gmail.com., Garcia, Y.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Economics. garcia.yt@gmail.com.** *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 6 (1) p. 57-70. 2020.*

https://jemad.cem.uplb.edu.ph/articles/household-awareness-on-the-consequences-of-untreated-wastewater-in-traditional-agro-food-processing-villages-in-nhue-day-river-basin-vietnam/

The study sought to evaluate the household's awareness of the risks of untreated wastewater on health, agricultural production, environment, and recreational activities. A survey was conducted on 276 agro-food processing households residing on the Nhue-Day river basin in Vietnam. An Ordered Logit Model (OLM) determined that age, educational attainment of the household head, and household's monthly income were the main factors that affect the household's awareness of the effects and consequences of untreated wastewater. Results showed that these factors positively affected the household's awareness of the adverse effects of untreated wastewater health, environment, agricultural production, and recreational activities.

FOODS; PRODUCTS; WASTEWATER; WASTEWATER TREATMENT; HOUSEHOLDS; PROCESSING; INCOME; VIETNAM

Identifying vulnerability indicators of rural freshwater and sanitation systems to climate change and its application in Ho Chi Minh City, Vietnam. **Ngoc Tuan Le. University of Science-Vietnam National Univ., Ho Chi Minh City-227 Nguyen Van Cu St. Ward 4, District 5, Ho Chi Minh City (Vietnam). lntuan@hcmus.edu.vn.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 39-46. 2018.*

Rural fresh water and sanitation (RFWS) is one of vulnerable sector in the context of climate change (CC). However, vulnerability to CC of RFWS has not yet been assessed in-depth and hardly considered the integrated approach via index method. This study thus aimed to establish vulnerability indicators to CC of RFWS for a comprehensive assessment. By literature review, factors reflecting exposure, sensitivity, and adaptive capacity to CC of RFWS were sufficiently and systematically determined. Expert consulting method was then applied to complete the indicator set, consisting of 53 indicators. There were 22 variables reflecting the exposure to temperature, precipitation, storm, flood, riverbank landslide, saltwater intrusion, and drought; 12 sensitivity variables related to population, water supply and waste treatment, and environment; and 19 adaptivity variables mainly based on facilities and human capitals. The feasibility of the indicator set was examined in a coastal area in Ho Chi Minh city, Vietnam, where the RFWS is a matter of concern and at high risk of CC impacts. Research findings were expected to be an important basis for assessing and proposing measures to cope with CC of RFWS sector.

FRESHWATER; HYGIENE; CLIMATIC CHANGE; VIETNAM

Land use/land cover changes assessment and forest fragmentation analysis in the Baroro River Watershed, La Union, Philippines. **Encisa-Garcia, J.O. jegarcia4@up.edu.ph., Pulhin, J.M. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Forestry and Forest Governance. Cruz, R.V.O. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources. Simondac-Peria, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Office of the Coordinator for Research, Extension, and Linkages. Ramirez, M.A.M. Resources, Environment, and Economics Center for Studies, Inc., Project 4, Quezon City (Philippines). De Luna, C.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Interdisciplinary Studies Center for Integrtated Natural Resources and Environment Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 2 p. 14-27. 2020.*

The Baroro River Watershed, like most watersheds in the Philippines, has been experiencing widespread land use changes. With the increasing interest on studies of watersheds as valuable water resources, this study attempted to assess the land use/land cover changes and forest fragmentation using landscape metrics. Three official land cover maps (2003, 2010, and 2015) were obtained. Cross-tabulation detection method in the Geographic Information System module was used to detect land cover changes during the first period (2003-2010) and second period (2010-2015). The landscape fragmentation tool (LFT v2.0) generated a forest fragmentation map, then analyzed patterns and changes in three time periods: 2003-2010, 2010-2015, and 2003-2015. The annual rate of change in the forest cover has a negative trend in all three time periods: 1.16%, 0.91%, and 1.06%, respectively. Conversely, forest fragmentation analysis revealed a markedly decrease of large forest areas and that the number of patches, percentage of land, and edge density of forest patch, edge and small core increased over time. Also, smaller patches (0 – 100 ha) in large forest areas increased rapidly (3 to 225 patches), indicating a more fragmented forest landscape. In 12 years, there were widespread land cover changes and forest fragmentation in the watershed mainly due to expansion in agricultural and built-up areas. It is hoped that results of this study, particularly the application of landscape metrics using spatial data, can serve as necessary inputs in crafting sustainable land use policies, plans, and interventions for effective and comprehensive watershed management.

WATERSHED MANAGEMENT; WATERSHEDS; LAND USE; LANDSCAPE; FORESTS

Morphological changes in Corbicula fluminea (Muller 1774) shells from Laguna de Bay, Philippines due to elevated nitrate and hexavalent chromium. **Elvira, M.V. Caraga State Univ., Ampayon, Butuan City (Philippines). Coll. of Forestry and Environmental Sciences. mvelvira@up.edu.ph., de Chavez, E.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. Faustino-Eslava, D.V., Espaldon, M.V.O., Cui, L.E. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental**

Science and Management. *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 40-57. 2019.*

Developmental instability using fluctuating asymmetry is a tool for morphological assessment to reflect the state of species adaptation and individual fitness. This research focused on the conchological analysis of Corbicula fluminea (Muller, 1774) shells relative to key water parameters in Laguna de Bay, Philippines. Results from the western and eastern regions of the lake, characterized by marked differences in water qualities, indicate that linear shell characteristics are not significantly affected by water quality, in contrast to other geometric parameters. Geometric morphometrics of Malahanobis and Procrustes distances exhibit horizontal elongation in shells from the west, and vertical elongation in those from the east. Generalized linear mixed modelling of shell morphometry with water quality revealed an inverse relationship between NO3- and shell size, and a direct association between shell shape changes and elevated Cr (6). The combination of NO3-, water pH and total suspended solids were the factors identified to have the most effect on shell size, with Cr (VI), NH4+, and water pressure playing significant roles in affecting shape. Results of this work demonstrate the utility of C. fluminea's fluctuating asymmetry as influenced by water quality to constitute important baselines for the management of a lake and its biological resources.

CLAMS; SHELL; SPECIES; ADAPTATION; WATER QUALITY; NITRATES; CHROMIUM; PHILIPPINES

New water technology may solve scarcity of water resources during dry season. **Papa, A.G.** *Agriculture (Philippines). 0118-857-7. v. 26 (9) p. 6-8. 2022.* https://agriculture.com.ph/2022/03/18/new-water-technology-may-solve-scarcity-of-water-resources-during-the-dry-season/

WATER; TECHNOLOGY; WATER SUPPLY; ENVIRONMENTAL IMPACT ASSESSMENT; RAINWATER; STORAGE; DRY SEASON

Phytoremediation potential of vetiver grass (Chrysopogon sp.) system for improving the water quality of aquaculture ponds along the Marilao and Meycauayan River in Bulacan, Philippines. **Pleto, J.V.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Environmental Biology Div. Simbahan, J.F. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Inst. of Biology. Arboleda, M.D.M. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Migo, V.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 19-26. 2019.*

The Marilao and Meycauayan Rivers are known to be polluted with heavy metals and organic matter due to different anthropogenic and industrial activities along the river system. Many aquaculture ponds are situated along the river system and obtain water from the river. In order to address this problem, phytoremediation or the use of plants was tested as a low-cost remediation system to reduce the pollution on the ponds. The vetiver grass was utilized because of its unique features and its ability to accumulate heavy metals. A vetiver pontoon was established on fishponds located at Brgy. [village] Nagbalon, Marilao and Brgy. Liputan, Meycauayan. The vetiver roots and leaves were analyzed for heavy metal content. There is an accumulation of toxic heavy metals such as lead, chromium, manganese and copper in the roots and leaves. Manganese had the highest accumulated metal by the vetiver grass. It was observed that there is a significant difference of heavy metal absorption of Pb, Zn, Mn and Cr through time. The vetiver grass favored accumulating heavy metals in the roots based on the translocation factor (TF). Vetiver grass can potentially improve some water quality parameters such as lowering levels of ammonia, BOD and COD and absorb heavy metals such as Pb, Zn, Mn and Cr which are harmful to fish. The vetiver grass is a low-cost phytoremediation technology with a high potential impact in cleaning up the water in ponds.

CHRYSOPOGON; SPECIES; BIOREMEDIATION; WATER QUALITY; AQUACULTURE; PONDS; WATER POLLUTION; PHILIPPINES

Policy development for climate change adaptation and disaster risk reduction and management in Iligan City, Isabela [Philippines]. **Tongson, E.E. Abuan Integrated Watershed Management Project, World Wide Fund for Nature (Philippines). Balderama, O.F. Isabela State Univ., Echague, Isabela, (Philippines). Trogo-Pantola, R. Smarter Agriculture, IBM-Philippines (Philippines).** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA *2018. . p. 156-173.*

Local government units (LGUs) in the Philippines are at the forefront in implementing disaster risk reduction and management (DRRM) and climate change adaptation (CCA) initiatives in their respective localities. The country's legal framework on DRRM and CCA initiatives in their respective localities. The country's legal framework on DRRM and CCA devolves to LGUs the responsibility to prepare and integrate CCA and DRRM into local plans and policies. However, LGU compliance has not matched the advancement in policy due to the LGU's lack of capacities. CCA and DRRM are multidisciplinary undertakings that require a range of actors and expertise to provide scientific evidence to policy making. The Abuan Integrated Watershed Management Project implemented in Ilagan City, Isabela, Philippines

demonstrates how bottom-up-self-initiated CCA and DRRM strategies had been adopted and replicated by the Ilagan City government through policy outcomes. The tools available (i.e., light detection and ranging in Community-Based Monitoring Systems) helped to recalibrate local CCA and DRRM plans toward greater transparency and accountability. The pilot introduction of ICT-enabled crop and weather advisories have demonstrated great promise for modernizing agriculture; however, such feat would require an enabling policy environment in the ICT sector in order to stimulate growth, and accordingly benefit the agriculture sector.

CLIMATIC CHANGE; ADAPTATION; DISASTERS; RISK; WATERSHED MANAGEMENT; WATERSHEDS; PHILIPPINES

Preparation and characterization of activated carbon derived from Antidesma bunius L. in methylene blue removal from wastewater. **Tolosa, N.C. ntolosa@usa.edu.ph., Mendoza, K.D., Dumayas, D.L.P., De Silva, J.M.D.F. Malayan Colleges Laguna, Cabuyao City, 4025 (Philippines). Chemical Engineering Dept.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 18-28. 2020.*

This study investigated the effect of contact time and concentration of the methylene blue solution on the adsorption capacity of granulated activated carbon derived from bignay (Antidesma bunius L.) seeds. The raw bignay seeds were subjected to physical activation via oven drying at 120 deg C and carbonization at 500 deg C for 30 min. The maximum adsorption capacity of both powdered and granulated activated carbon were determined. The alkyl functional groups of Bignay Activated Carbon (BAC) were determined using Fourier transform infrared (FTIR) analysis and the surface morphology and composition of the BAC were analyzed using scanning electron microscopy-energy dispersive x-ray (SEM-EDX). Langmuir, Freundlich, Temkin, and Dubinin-Radushkevich isotherm models was used to analyze the adsorption isotherm BAC. But the data best fitted with the Freundlich isotherm. The mean energy of the adsorption showed that the adsorption of methylene blue (MB) by BAC was physical adsorption implying that MB molecules were trapped in the pores of the BAC. The maximum adsorption capacity was 1.60 mg/g. The rate of adsorption was used to determine if the process is physisorption or chemisorption using pseudo-first order and pseudo-second order adsorption kinetics. The data shows best fit for pseudo-second order suggesting that the reaction depends on the concentration of both reactants.

ANTIDESMA BUNIUS; DYES; WASTEWATER; WASTEWATER TREATMENT; ACTIVATED CARBON; ADSORPTION

Rehabilitation of eutrophic rivers through phytoremediation in constructed wetland: the case of Balili River in Benguet, Philippines. **Napaldet, J.T. Benguet State Univ., La Trinidad,**

Benguet (Philippines). Biology Dept. jtnapaldet@up.edu.ph., Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 203-229.*

Balili River in Benguet, northern Philippines remains polluted despite more than a decade of rehabilitation efforts; thus an alternative clan-up method, such as phytoremediation, is timely and worth investigating. This chapter describes the phytoremediation potentials of selected local dominant aquatic macrophytes of the river, namely: Amaranthus spinosus, Eichhornia crassipes Eleusine indica and Pennisetum purpureum in pilot-scale constructed wetlands and subjected to varying hydraulic retention time (HRT) treatments. Results showed significant improvement of the wastewater quality in most all parameters of water assessment. At optimal HRT, total suspended solids, dissolved oxygen, nitrate, and mercury were significantly lowered at values passing the particular minimum water quality standards, while biological oxygen demand, phosphate, and lead were slightly above the minimum standards. Against these reduction rates, total and fecal coliform still still did not pass the water quality standard for class A water. The pollution reduction efficiencies of the aquatic macrophytes were significantly affected by HRT. Significant pollution reduction was observed as early as day 1, while optimal reduction was recorded at 3-4 days HRT. Among the macrophytes, P. purpueum, generally, had the best pollution reduction efficiency. Results of the study showed that local dominant aquatic macrophytes are promising phytoremediators and provide a good template for coming up with a full-scale constructed wetland for the rehabilitation of Balili River as well as for other eutrophic rivers in the country.

RIVERS; WETLANDS; BIOREMEDIATION; WATER POLLUTION; WATER QUALITY; PHILIPPINES

Seasonal variation on dissolved oxygen, biochemical oxygen demand and chemical oxygen demand in Terengganu River Basin, Malaysia. **Kamarudin, M.K.A. mkhairulamri@unisza.edu.my., Wahab, N.A., Bati, S.N.A.Md. Universiti Sultan Zainal Abidin, Gong Badak Campus, 21300 Terengganu (Malaysia). East Coast Environmental Research Inst. Toriman, M.E. National University of Malaysia, Bangi, Selangor, 43600 (Malaysia). School of Social, Development and Environmental Studies. Saudi, A.S.M. Universiti Kuala Lumpur,43650, Bangi, Selangor (Malaysia). Centre for Water Engineering Technology. Umar, R. Universiti Sultan Zainal Abidin, Gong Badak Campus, 21300 Terengganu (Malaysia). East Coast Environmental Research Inst. Sunardi. Universitas Padjadjaran, Jl. Dipati Ukur No. 35, Bandung 40132 (Indonesia). Graduate Program on**

Environmental Studies. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 1-7. 2020.*

The rise in human population densities and the pace of development had intensified the depletion of the water quality. This study aimed to analyze the concentration of dissolved oxygen (DO), biochemical oxygen demand (BOD) and chemical oxygen demand (COD) during wet season and dry season at Terengganu River in 2016. A total of 29 monitoring stations in the study area were selected and three water quality parameters were analyzed using descriptive statistics and the correlation matrix methods. The DO ranged from 2.11 to 8.07 mg/L, COD from 2.24 to 39 mg/L and BOD from 0.67 to 6.52 mg/L for the wet season while in dry season, DO ranged from 2.30 to 6.05 mg/L, COD from 1.9 to 20.48 mg/L and BOD from 0.04 to 13.99 mg/L. Spearman's correlation test shows there was a weak correlation between DO and COD during wet season, while in the dry season, there was a weak correlation between DO-COD and DO-BOD. This study also found out that urbanization and anthropogenic activities in the area can gave the more impact towards seasons and water quality deterioration in Terengganu River, Malaysia.

WATERSHEDS; DISSOLVED OXYGEN; POLLUTANT LOAD; MALAYSIA

Socio-economic approach to microscale flood damage assessment in a Lakeshore Community. **Manlosa, A.O. Northern Mindanao State College of Inst. of Technology, Butuan City (Philippines). aisamanlosa@gmail.com., Valera, H.G.A. The Univ. of Waikato, Hamilton, Waikato (New Zealand). hgvrung172gmail.com.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2016-1. [2016].*
https://www.searca.org/pubs/discussion-papers?pid=337

This study sought to determine microscale damage estimates of the largest flood event in the history of the municipality of Jabonga in the province of Agusan del Norte. Jabonga is a lakeside municipality adjacent to Lake Mainit, the fourth largest lake in the Philippines. The study sought to on determine flood-prone areas in the municipality, characterize the flood event that occurred in the site from December 2010 to March 2011, estimate actual and potential damage for different flood scenarios, and determine variables that are significantly related to flood vulnerability and flood damage. A total of 870 households were surveyed. In the flood hazard zone, livelihood areas, particularly farms, are inundated for a month on average. Some houses are also inundated for about the same duration. Inundation time at the municipality scale is shorter. Results showed that the municipality is vulnerable, with about 90 percent of the damage to livelihood coming from the agriculture sector. Damage to the house, properties or belongings inside the house, and health also constitute significant costs. The study found that the duration of inundation of the work area is among the most important variables that determines level of damage. Unlike flash

floods, flood resulting from lake overflow persists for a longer time and inundates important agricultural areas for over a month. Results of probit regression showed that in the hazard zone, monthly household income, land area farmed, number of livestock owned, frequency of flood incidence in the homes, flood velocity, and duration of inundation at the work area are variables significantly related to household flood vulnerability. The computed vulnerability coefficient was used as a variable in the flood damage model ran through tobit regression. Results showed that in the hazard zone, predicted vulnerability to flooding, total household monthly income, type of main occupation, farm area, and number of livestock heads owned are the significant variables. Using the flood damage model, the study found that for a flood that inundates a livelihood area for a duration of seven days, a household could incur damage amounting to at least PHP 7,686.83. The figure could climb higher to PHP 9,911.52 if duration of inundation lasts for 40 days.

FLOODING; DAMAGE; LAKES; SOCIOECONOMIC ENVIRONMENT; FLOOD CONTROL

Sustainability status of Lahumoko Watershed Management, North Buton Regency, Southeast Sulawesi, Indonesia. **Kahirun. Universitas Halu Oleo, Perumahan Dosen Kampus Baru Blok M. No. 15 Kelurahan Kambu, Kecamatan Kambu, Kendari, Sulawesi Tenggara, (Indonesia). Dept. of Environmental Science. irkahirun@gmail.com., Laode Muhammad Harjoni Kilowasid. Universitas Halu Oleo, Perumahan Dosen Kampus Baru Blok M. No. 15 Kelurahan Kambu, Kecamatan Kambu, Kendari, Sulawesi Tenggara, (Indonesia). Dept. of Soil. Laode Sabaruddin. Universitas Halu Oleo, Perumahan Dosen Kampus Baru Blok M. No. 15 Kelurahan Kambu, Kecamatan Kambu, Kendari, Sulawesi Tenggara, (Indonesia). Dept. of Agrotechnology. Mukhtar. Universitas Halu Oleo, Perumahan Dosen Kampus Baru Blok M. No. 15 Kelurahan Kambu, Kecamatan Kambu, Kendari, Sulawesi Tenggara, (Indonesia). Dept. of Agribusiness.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 8-18. 2020.*

The current management of Lahumoko Watershed is still conventional. Mainly, in agricultural land management, the practices do not use the principles of soil and water conservation. This is not sufficient in supporting people's lives so that the biological, physical, social, economic and institutional dimensions do not support the sustainability of the Lahumoko Watershed. This study aimed to analyze the sustainability and the factors that have multidimensional influence on the sustainability of the Lahumoko Watershed, North Buton Regency, Southeast Sulawesi, Indonesia. The method used was Rapid Appraisal for Watersheds, adopted from Rapid Appraisal for Fisheries using the Multi-Dimensional Scaling technique. The sustainability status of the Lahumoko Watershed management for the physical, economic and institutional dimensions were still less sustainable, while the biological and social dimensions were fairly sustainable. Some leverage attributes contributing to improving the sustainability of watershed management were patterns of

agricultural crop cultivation, plant diversity in forest, management of protected organisms, river biota, management of forest cover, soil and water conservation technologies, agricultural infrastructure, runoff, sedimentation, water quality, education level, relationship pattern of the community, conflict status, land dependency, agricultural productivity, access to resources, access to markets, resource management planning and rule comprehensiveness for watershed management.

WATERSHEDS; WATERSHED MANAGEMENT; FOREST MANAGEMENT; RESOURCE CONSERVATION; SUSTAINABILITY; INDONESIA

Use of GIS to visualize spatial distribution of zooplankton in Teluk Bahang Reservoir, Penang, Malaysia. **Ismael, A.H. Universiti Sains Malaysia, Penang 11800 (Malaysia). School of Biological Sciences. azma_hanim@yahoo.com., Rahman, A.A. Universiti Sains Malaysia, Penang 11800 (Malaysia). School of Humanities. Chin, L.S. Universiti Sains Malaysia, Penang 11800 (Malaysia). School of Biological Sciences.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 60-71. 2020.*

The Teluk Bahang Reservoir is the largest in Penang, Malaysia and supplies drinking water to the inhabitants of the Northwest of Penang Island. A monthly testing of water quality and study of zooplankton species abundance was conducted at four different sampling locations and three different water depths. The water quality parameters measured include water temperature, dissolved oxygen, conductivity, pH, orthophosphate (PO4-P), ammonium-nitrogen (NH4-N), nitrite-nitrogen (NO2-N) and nitrate-nitrogen (NO3-N). In this study, multiple techniques in ArcMap software, namely, Inverse Distance Weighted (IDW) and Kernel Density, were used to identify the relationship among water quality parameters and species abundance of zooplankton in the sampling stations. In GIS spatial analysis, high abundance areas or hotspot areas of zooplankton were presented in a visual map. The distribution pattern of zooplankton species and the geographic distribution of water quality parameters were clearly identified based on inspection of the map. The data generated from GIS mapping in this study is important for ecological research, particularly on zooplankton distribution in a drinking water reservoir.

ZOOPLANKTON; GEOGRAPHICAL INFORMATION SYSTEMS; SPATIAL DISTRIBUTION; WATER QUALITY; MALAYSIA

Valuing groundwater in a productive aquifer using the production function approach: the case of rice production in Limban, Laguna, Philippines. **Quilloy, AJ. A. aaquilloy@up.edu.ph., Yorobe, J.M. Jr. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Dept. of Agricultural and Applied Economics. Ella, V.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Agricultural Engineering. Lansigan, F.P.**

Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Statistics. Cruz, R.V.O. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources. *Journal of Economics, Management and Agricultural Development. 2546-1001; 2546-101X. v. 4(2) p. 45-56. 2018.*
https://jemad.cem.uplb.edu.ph/articles/valuing-groundwater-in-a-productive-aquifer-using-the-production-function-approach-the-case-of-rice-production-in-lumban-laguna-philippines/

Establishment of the price of groundwater is a necessary step in designing means for its sustainable management in rice production. There are several techniques that can be used in groundwater valuation. It is important to identify a valuation method that is appropriate to existing natural conditions within which the groundwater is situated. This paper aims to estimate the value of groundwater in a productive aquifer that is located in Lumban, Laguna, Philippines. Based on an estimated rice production function, the paper revealed that the value of groundwater extracted for rice production is approximately PhP 1.13 per m3 . Out of this estimated economic value, resource rent is roughly 66% while the remainder covers the financial cost associated with groundwater extraction.

ORYZA SATIVA; PRODUCTION; RICE FIELDS; PRODUCTION FUNCTIONS; GROUNDWATER; GROUNDWATER TABLE; PHILIPPINES

Water governance framework in Sta. Cruz River Watershed, Laguna, Philippines. **Pintor, L.L. Department of Environment and Natural Resources, College, Laguna (Philippines). Ecosystems Research and Development Bureau. lynlei4@gmail.com., Dizon, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 54-66. 2019.*

Since food security relies on sustainable water supply, this study developed an irrigation water governance framework in order to achieve an effective water irrigation supply. It was conducted in Pila and Sta. Cruz, Laguna with 176 members of the 26 Irrigation Associations. Spearman Rho correlation was used to analyzed the relationship between water governance variables and availability of water. Hindering factors include insufficient water supply during the dry season, deforestation and quarrying, and the limited funds for rehabilitation of the irrigation canals. Majority of the respondents positively declared that their rice production is enough for their household consumption. However, they occasionally experience rice shortage due to strong typhoon and dam was damage by strong typhoon but there is still food security at the household level since rice is available in the market.There is a positive strong linear association between management of water resources and regulation of irrigation water and availability of water. Regulation of

irrigation water and the availability of irrigation water were found to have a strong linear relationship. The IA is at the core of the water governance model since ownership of the irrigation system was already transferred by the NIA to the IA. With these, the study recommended that the political, social, and economic aspects, and administrative systems should be taken into consideration. However, various institutions play a vital role for the IA to address the different factors. Through this, good water governance can be achieved resulting to water security thereby achieving rice security.

RICE; IRRIGATION WATER; WATERSHEDS; MODELS; FOOD SECURITY; PRODUCTION; WATER AVAILABILITY; PHILIPPINES

Water, sanitation and hygiene practices in the Philippines: meeting national and global targets at the local level. **Molina, V.B. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). Coll. of Public Health. vbmolina@up.edu.ph., Sison, O.T. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). National Inst. of Health. Medina, J.R.C. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). Coll. of Public Health. Lumangaya, C.R., Ayes, C.N.P., Joe, J.A.S. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). National Inst. of Health. Belizario, V.Y. Jr. Philippines Univ. Manila, Pedro Gil St., Ermita, Manila City (Philippines). Coll. of Public Health.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 24 (1) p. 1-14. 2021.*

As national and global water, sanitation, and hygiene targets have been set and programs have been implemented, the study aimed to assess the attainment of these targets at the local level in selected areas in Davao region, the Philippines. Randomly selected households were assessed for water, sanitation, and hygiene indicators using a modified tool that combined national guidelines and global recommendations. Validated access to improved water source for drinking was below the targets in most barangays [villages], while validated sanitary toilet coverages in all barangays did not meet the targets. Significant difference was observed between validated and reported access to improved water and sanitation services in some barangays. Approximately 87.5% of households had a handwashing facility, but only 51.2% of which had both water and soap available. Achieving the targets is challenged by the gap in monitoring due to a decentralized health system in the Philippines. There is a need to standardize indicators and optimize the tool to allow a comprehensive assessment of water, sanitation, and hygiene practices. This will help generate local data that are in line with national guidelines and global recommendations to enhance policy and to determine priority areas for improved water, sanitation, and hygiene service delivery.

WATER; WATER SUPPLY; HYGIENE; HOUSEHOLDS; POLICIES; PHILIPPINES

Watershed-based water environment eco-compensation mechanism: a case study of Taihu Lake Basin, China. **Wang Jianjin. Nanjing Univ. of Information Science and Technology, 219 Ningliu Rd, Nanjing 210044 (China). School of Hydrology and Water Resources. hhuwangjianjian@126.com., Jie Zhou. Changzhou Titan Environmental Technology Co., Ltd., 8 Lanxiang Rd, Chanzhou 213000 (China). Qiaohua Zhao. Nanjing Univ. of Information Science and Technology, 219 Ningliu Rd, Nanjing 210044 (China). School of Hydrology and Water Resources. Yong Pang. Hohai Univ., 1 Xikang Rd, Nanjing 210098 (China). Coll. of Environment. Junjie Jia. Hongche Pan. Nanjing Univ., 22 Hankou Rd, Nanjing 210093 (China).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 29-38. 2020.*

In 2008, a simple punitive eco-compensation method was implemented in the Taihu pilot region, China. However, due to the use of a flawed formula and weak compensation criterion the payments were considered unsuitable. To improve the scheme, the following issues were considered: determination of compensation criterion; compensation when water quality is acceptable; consideration of reciprocating flow; control of the errors in pollutant fluxes due to the non-synchronization of river flow and water quality data. Two alternative ways to calculate eco-compensation payments were assessed for a case study in 2013: a payment based on the 'Water quality exceedance rate (WQER) method' was found to be 172 million CNY (24.9 million USD). This method avoided errors caused by the pollutant flux and considered the situations of reciprocating flow and acceptable water quality; and the 'Pollutant treatment cost (PTC) method' was considered suitable for immediate implementation, although the payment was higher at 245 million CNY (35.4 million USD). The determination of compensation criterion using this method had a scientific basis, but it required perfect and reliable monitoring data. If these conditions are met, the method was considered suitable for future implementation.

WATER QUALITY; WATERSHEDS; ENVIRONMENT; WATER POLLUTION; COMPENSATION; CHINA

Watershed-based water governance: role of actors in Santa Cruz Watershed, Laguna, Philippines. **Dayo, M.H.F. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Agriculture and Food Science. Rola, A.C. acrola@up.edu.ph., David, M.E., Nguyen, M.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Puthin, J.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Forestry and Natural Resources. Siason, I.M.L. Philippines Univ. Visayas, Miagao, Iloilo (Philippines). Coll. of Arts and Science.** *Journal of Public Affairs and Development (Philippines). 2224-3983. v. 3 (1 and 2) p. 61-85. 2021.*

https://jpad.cpaf.uplb.edu.ph/articles/watershed-based-water-governance-role-of-actors-in-santa-cruz-watershed-laguna-philippines/

Water governance at the micro watershed scale has not been popularly studied. However, as population increases and urbanization sets in, water conflicts may arise due to increased competition in use. This paper examines the various water governance roles of state and non-state actors within the watershed. While users make decisions and take actions that define the processes by which water is accessed and controlled, discussion and analysis of the interactions of key actor groups: households, farmers, enterprise, and local government were framed from the understanding of resources, mechanisms of access, and outcome. Focus group discussions and key informant interviews with specific actor groups (state and non-state) were conducted in the upstream and downstream villages of the Santa Cruz Watershed (SCW), Laguna, Philippines to generate the needed data. Results suggest that both state and non-state actors positioned themselves to support their respective interests. In times of water shortage, local governments at the village and the municipal levels coordinated and negotiated among themselves for access to water sources. The study concludes that within the watershed, water governance is polycentric and creates spaces for mutual cooperation among state and non-state actors, especially during times of water scarcity. The authors recommend, among others, that in areas where there are conflicts in water access and use, a polycentric approach can be considered to include both customary and formal rules in the water governance.

WATERSHEDS; WATERSHED MANAGEMENT; LOCAL GOVERNMENT; WATER USE; WATER SUPPLY; PHILIPPINES

When sacred water becomes an economic good: tensions and governance challenges in Mount Banahaw, Philippines. **Dayo, M.H.F. Philippines Univ. Los Baños, College, Laguna (Philippines). Agricultural System Cluster. mfdayo@up.edu.ph., Rola, A.C. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development. Abansi, C.L. Philippines Univ. Baguio, Governor Center Road Baguio City (Philippines). Ints. of Management. Lizada, J.C. Philippines Univ. Visayas, Miagao, Iloilo (Philippines). Coll. of Management. Hall, R.A., Siason, I.M.L. Philippines Univ. Visayas, Miagao, Iloilo (Philippines). Coll. of Arts and Science.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 82-93. 2018.*

Mount Banahaw, an active volcano and a watershed in the municipality of Dolores, Quezon province, Philippines, is also a considered a sacred place. This study discussed the community outcomes arising from the conceptual dichotomy of perceptions of multi-use of water by formal organizations such as water districts for domestic use and by informal organizations such as the religious groups for the sacred or religious use of water from the

sacred mountain; and the negotiations among these different actors and agents for water access. Results distilled lessons around the interlocking themes of water use and institutions in the access and allocation of water resources as water transits from non-consumptive use to use value. Polycentric water governance is necessary in the context of Mount Banahaw's cultural, social and economic realities.

WATERSHEDS; WATERSHED MANAGEMENT; WATER USE; HIGHLANDS; GOVERNANCE; PHILIPPINES

P34 - SOIL BIOLOGY

Assessment of the microbial diversity in soils using conventional and molecular technologies. **Ocampo, E.T.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science. emocampo1@up.edu.ph., de los Reyes, A.M.M., Fulleros, M.C.A. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Plant Breeding.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph., editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 53-70.*

Soil microorganisms are highly diverse and perform multiple and beneficial roles in soil ecosystems. However, the study of microbial communities is inherently difficult because only one percent of microorganisms grow in culture. Hence, there is need to explore techniques that result in identifying microbial strains and, consequently, the diversity of microorganisms in a certain community. This chapter presents various techniques ranging from the conventional, culture-dependent methods that are molecular or genetic-based. Included also in the discussion are easy-to-follow and highly specific methodologies from soil collection, microbial isolation, DNA extraction, molecular and PCR analysis, and statistical procedures. Microbial DNA extraction for upland and lowland paddy are presented. The study of soil metagenomes using molecular markers and metagenomics is also discussed.

SOIL; SOIL MICROORGANISMS; MICROBIAL FLORA; BENEFICIAL ORGANISMS; ISOLATION TECHNIQUES; TECHNOLOGY

Coconut farm below ground appreciating vital process in the soil. **Scheewe, W.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 22-24. 2022.*
https://agriculture.com.ph/2022/01/07/the-coconut-farm-below-ground-appreciating-vital-processes-in-the-soil/

COCONUTS; FARMS; SOIL FERTILITY; SOIL MANAGEMENT; SOIL MICROORGANISMS; SOIL DEGRADATION; SOIL BIOLOGY

Microbial biofertilizers and soil amendments enhanced tree growth and survival in a barren mined-out area in Marinduque, Philippines. **Aggangan, N.S. nellysaggangan@gmail.com., Anarma, J.A. Philippines Univ. Los Baños, College, Laguna (Philippines). National Plant Genetic Resources Lab.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (2) p. 77-88. 2019.*

A bioremediation protocol was developed for rehabilitating mine tailing areas using microbial biofertilizers and soil amendments. The effects on the growth and survival of tree species in a three-decade barren mined-out area in Barangay [villages] Capayang, Mogpog, Marinduque, Philippines were also determined. Three concurrent field experiments were established in June 2016 using Pterocarpus indicus, Acacia mangium and Eucalyptus urophylla. Treatments for this study were uninoculated seedlings and seedlings inoculated with mycorrhiza (MYKORICH R for P. indicus) or Surigao isolate (for A. mangium and E. urophylla) with and without nitrogen-fixing bacteria. Aseptically germinated seedlings were inoculated when they were transplanted from seed boxes into individual polybags. After six months, the seedlings were planted in the mined-out area following Randomized Complete Block Design. The excavated soil were mixed with 1 kg vermicompost and 500 g lime before backfilling the 30 cm3 planting hole. After one month, 10 g NPK fertilizer and 5 g urea were applied on each seedling. Microbial-inoculated seedlings showed better growth performance with higher plant dry weight and microbial population compared to the uninoculated plants after 27 months. Hence, P. indicus, A. mangium and E. urophylla inoculated with arbuscular mycorrhizal fungi and applied with lime, vermicompost, and basal inorganic fertilizer could be effective as reforestation species in barren mined-out areas.

PTEROCARPUS INDICUS; NITROGEN FIXING BACTERIA; VESICULAR ARBUSCULAR MYCORRHIZAE; NITROGEN; BIOREMEDIATION; BIOFERTILIZERS; PHILIPPINES

Rhizobacteria in Cyperus iria L.: elucidating its plant growth-promoting potentials. **Gadia, G.L.E. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Graduate School. Jumao-as, C.M. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Biological Sciences. Tanabe, M.E.N. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Graduate School. maelneyra@gmail.com.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 2 (1) p. 23-30. 2020.*
https://doi.org/10.5281/zenodo.8245684

Excessive use of synthetic agents in agricultural production entails negative impacts in the environment. Hence, the search for effective and environment-friendly methods is imperative. This study explored the rhizosphere of Cyperus iria L., a common rice weed, for potential plant growth-promoting rhizobacteria. Fifteen rhizobacterial isolates were tested in vitro for plant growth-promoting characteristics such as phosphate solubilization, ammonia production, catalase production, and antifungal activity. Phosphate solubilization was tested by plating the isolates on Pikovskaya agar while ammonia production was determined via Nessler's reagent. Catalase production was determined using 3% hydrogen peroxide, while antifungal activity was tested against a plant pathogen, Rhizoctonia solani. Results showed that among the fifteen rhizobacterial isolates, five were phosphate solubilizers while eight showed antifungal activity against R. solani. All isolates tested positive for catalase test and negative for ammonia production. Based on the in vitro screening, the highest phosphate solubilization was observed in Curtobacterium sp. while significant antifungal activity against R. solani was demonstrated by Bacillus sp. It can be concluded that the rhizosphere of C. iria is associated with bacteria that can be further studied to elucidate its plant growth-promoting potential.

CYPERUS; SPECIES; RHIZOBACTERIA; AMMONIA; ANTIFUNGAL PROPERTIES; PLANT PRODUCTION

P35 - SOIL FERTILITY

Coconut farm below ground appreciating vital process in the soil. **Scheewe, W.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 22-24. 2022.*
https://agriculture.com.ph/2022/01/07/the-coconut-farm-below-ground-appreciating-vital-processes-in-the-soil/

COCONUTS; FARMS; SOIL FERTILITY; SOIL MANAGEMENT; SOIL MICROORGANISMS; SOIL DEGRADATION; SOIL BIOLOGY

Exploring spatial relationship between electrical conductivity and spectral salinity indices in the Mekong Delta. **Thoung V. Tran. University of Social Sciences and Humanities, VNU-HCM, HCMC, 70000 (Vietnam). School of Geography. tvthuong@hcmuss.edu.vn., Duy X. Tran. University Palmerston North 4442 (New Zealand). School of Agriculture and Environment. Hoa V. Pham. Vietnamese Academy of Science and Technology, HCMC 7000 (Viet Nam). Ho Chi Minh City Inst. of Resources Geography. Tuan V. Truong. Ho Chi Minh City Univ. of Education, HCMC, 70000 (Vietnam). School of Geography. Hoanh P. Trinh. Saigon Univ., HCMC 70000 (Viet Nam). School of Education for Social Sciences. Dung Q. Nguyen. Binh A. Nguyen. Hanh C. Nguyen. Vietnamese Academy of Science and Technology, HCMC 7000 (Viet Nam). Ho Chi Minh City Inst. of Resources Geography.**

Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 39-49. 2020.

The negative impact of salinization concurrent with drought is a severe problem that creates challenges for agriculture in deltas and coastal lowlands. This study aims to investigate the spatial relationship among the field measured electrical conductivity (EC) and spectral salinity indices derived from Remote sensed data in the Mekong Delta using Geographically Weighted Regression (GWR). A wide range of Landsat 8 Operational Land Images (OLI) products, including single bands, band ratios, vegetation indices (NDVI and EVI), intensity indices (INT), and brightness indices (BI) were employed for computing salinity indices. The Kriging and Co-kriging interpolation techniques were used to estimate the spatial pattern of the field measured EC. Additionally, the Ordinary Least Square (OLS) regression were employed to characterize the relationship between single bands and EC measurement before applying the GWR for exploring the spatial correlation among the indices. There was a gradually increased of EC value from inland to coastal area. A significant relationship between EC measurement and spectral salinity indices and the highest correlation coefficient with p value less than 0.05 was found in EVI (r2 = 0.736). This study demonstrated that the GWR is germane to analyse the spatial correlation among the demonstrated variables in the study area. Moreover, it also revealed that spectral salinity indices could be an alternative option for EC measurement in monitoring salt water intrusion at coastal areas.

SALINITY; MEASUREMENT; SALINE WATER; SPECTROMETRY; ELECTRICAL CONDUCTIVITY; MEKONG RIVER; VIET NAM

Land use change effects of plant and soil properties in a mountainous region of Iran. **Rad, M.H., Ebrahimi, M. University of Zabol, Mofateh Street, Jahad Square, Zabol (Iran). Dept. of Range and Watershed Management. maebrahimi2007@uoz.ac.ir., Shirmohammadi, E. University of Zabol, Mofateh Street, Jahad Square, Zabol (Iran). Dept of Soil Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 47-56. 2018.*

This study was conducted to show the effects of rangeland conversion into agricultural land uses in terms of on plant and soil degradation in Choram rangeland, Iran. Three sites, including dry farming, horticultural and rangeland were selected. Across site, vegetation factors such as plant production, canopy cover and density were measured. Soil samples were extracted at depths of 0-30 and 30-60 cm. The highest plant productions (60 kg/ha), vegetation cover (30%) and density of class 1 (3 n -sqm) were recorded in the rangeland. The lowest plant productions (19 kg/ha), vegetation cover (0.41%) and density of class 1, 2 and 3(2, 7, 6 n -sqm, respectively) were measured in the horticultural land use. Except

saturation percentage, clay, silt and sand there were not significant differences among the soil properties of land uses. However, at depth of 30-60 cm the highest significant organic matter (14.33 kg/ha) and potassium (0.84%) were measured in the rangeland and dry farming land uses, respectively. Habitat conversion from the rangeland to arable lands could change the species properties and result in the reduction of vegetation cover and reduction of soil quality.

LAND USE; PLANTS; SOIL CHEMICOPHYSICAL PROPERTIES; HIGHLANDS; SOIL FERTILITY; RANGELAND SOILS; SOIL DEGRADATION; IRAN ISLAMIC REPUBLIC

P36 - SOIL EROSION, CONSERVATION AND RECLAMATION

Using Rose' and Manning's equations to spatially quantify soil erosion in Lagawe River Sub-Watershed, Ifugao, Philippines. **Bato, V.A. vabato@up.edu.ph., Paningbatan, E.P. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Div. of Soil Science. Ella, V.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Land and Water Resources Div. Alcantara, A.J. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Cruz, R.V.O. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources. Sanchez, P.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Div. of Soil Science.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 24 (1) p. 45-55. 2021.*

A dynamic, physical model was created to predict soil erosion of Lagawe River Sub-watershed, a sub-watershed of Magat River Watershed, Philippines. Tipping-bucket rain gauge was installed to gather event-based rainfall data and a water-level recorder was installed on a straight segment of Lagawe River to gather water depth. Sediment samples were taken during rainstorm events and were used to calibrate the model. Manning's equation was used to calculate surface runoff and stream flow velocity. Rose' and Freebairn's Equation was used to calculate sediment mass. Geographic Information System was utilized as a tool for modelling using PCRaster Software. The model estimated a total of 57,905,000 m3 of eroded sediments which was generated during Typhoon Koppu (local name, Lando) in year 2015. A Welch Two Sample t-value of -0.25 and a p-value of 0.81 was achieved on the statistical analysis between the measured sediment yield and the output of the model. Since the p-value is greater than 0.05 (5%), there is no significant difference between the output of the physical dynamic model and the measured value for sediment yield. Likewise, the correlation analysis supports this conclusion with a linearly positive R2 value of 0.74.

GEOGRAPHICAL INFORMATION SYSTEMS; REMOTE SENSING; MODELS; WATERSHEDS; EROSION; CLIMATOLOGY; PHILIPPINES

Assessment of climate hazards using PRECIS Regional Climate Model (RCM): a case study in Cameron Highlands, Pahang, Malaysia. **Suppiah, P., Tan, K.W. tankokweng@utar.edu.my., Chin, K.S. Universiti Tunku Abdul Rahman, Kampar, Perak (Malaysia). Faculty of Engineering and Green Technology. Huang, Y.F. Universiti Tunku Abdul Rahman, Bandar Sungai Long, Selangor (Malaysia). Lee Kong Chian Faculty of Engineering and Science.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 40-59. 2020.*

This study aimed to assess the differences in modelling disaster risks results when using historical precipitation and when using simulated precipitation associated with future Intergovernmental Panel on Climate Change (IPCC) climate scenarios. Subsequently, the relationship between climate change and climate hazards was analyzed in this study. The secondary data analyzed included historical precipitation (1983-2017), flood and landslide events records, and Providing Regional Climates for Impacts Studies (PRECIS) regional climate model (RCM):A1B, A2 and B2 scenarios. By comparing the historical precipitation data with the RCM scenarios, the results showed that the precipitation was correlated with A1B scenario (r= 0.695). The relationship between climate change and hazards was identified to be a positive correlation. The historical daily precipitation (1983-2017) showed a positive correlation with flood and landslide events (r= 0.530, r = 0.797, respectively). As for prediction of climate hazards, the RCM A1B, A2 and B2 scenarios showed correlations with flood event: r= 0.648, 0.384 and 0.417, respectively. Similar results were obtained for landslide and the RCM A1B, A2 and B2 scenario: r = 0.498, 0.751 and 0.654, respectively. Precipitation simulation by PRECIS RCM indicated increased levels of precipitation in the Cameron Highlands for the 2018 - 2069. Commensurate with this, great possibility of increasingly serious consequential hazards such as flood and landslide events are expected.

FLOODING; LANDSLIDES; CLIMATIC CHANGE; CLIMATE; SIMULATION MODELS; HIGHLANDS

Assessment of the household's flood social vulnerability in Vietnam's Mekong River Delta. **Hoang Ha Anh. Northwest A and F Univ., No.3 Taicheng Road, Yangling, Shaanxi (China). Coll. of Economics and Management. yaoshunbo@163.com., Tran Minh Da Hanh. Nong Lam Univ, Thu Duc District, Ho Chi Minh City (Vietnam). Faculty of Economics. Yao Shunbo. Northwest A and F Univ., No.3 Taicheng Road, Yangling, Shaanxi (China). Coll. of Economics and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (2) p. 21-35. 2019.*

Flooding is a natural phenomenon that occurs annually from September to October in Vietnam's Mekong River Delta (MRD). However, its trend is becoming more destructive and

unpredictable in recent years, which tends to threaten people's livelihood, properties, and health. This study attempted to examine the flood vulnerability among households in 14 districts of the delta. The analysis helped identify communities that were subjected to floods and needed more attention in disaster management. People in the MRD had remarkably low exposure, which was the result of investment in water structures. About 59.2 % of the surveyed households were moderately vulnerable to flooding. Families in O Mon, Thanh Binh, Cai Be, and Cho Lach district had the highest vulnerability indices. The most significant indicators to explain the flood-prone state were rice-related indicators, elderly dependency ratios, and social capital. The study suggested that plans to reduce flood vulnerability should focus on the family's adaptability because it had the largest impacts.

FLOODING; MEKONG RIVER; HOUSEHOLDS; DISASTERS; ADAPTATION; VIETNAM

Bacteriological examination and physico-chemical properties of streams receiving industrial effluents in Rosslyn, Pretoria, South Africa. **Salvador-Oke, K., King, P., Olowoyo, J.O. Sefako Makgatho Health Sciences Univ., Medunsa, Pretoria (South Africa). Dept of Biology. woleolowoyo@yahoo.com.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 7-15. 2018.*

The reliance on streams and rivers to provide water for agricultural purposes and to some extent- domestic purpose, is still in existence especially in the semi-urban and rural areas. This study investigated the bacteriological load and physicochemical properties of water from streams receiving industrial effluents and a reservoir receiving wastewater from a hospital. Water samples were collected from March to August, 2015 from ten sampling stations and analysis were carried out following standard procedures. The water pH ranged from 6.21 +- 0.03 – 8.22 +- 0.08. Phosphate ranged from 0.0 – 7. 80 +- 0.38 mg/L. Nitrate ranged from 0.03 +- 0.04 – 209 +- 2.26 mg/L while nitrite ranged from 0.00 – 14. 00 +- 0.30 mg/L. The TSS (total suspended solids) and TDS (total dissolved solids) were in the range 40.0 +- 2 .00 – 58.70 +- 130 mg/L and 40 +- 6.0 – 1010 +- 45.0 mg/L respectively. The bacteriological loads ranged from 4.85 +- 2.0 – 36.5 +- 7.0 cfu 100/ml. Sites receiving effluents from industrial and hospital wastes were highly polluted with values obtained for parameters exceeding the standard set by World Health Organization (WHO). The shapes of the bacteria examined under the microscope were Coccobacilli, Cocci, Vibrio, Diplococci and Bacilli. Vibrio shaped bacteria was only observed from streams receiving wastewater from the hospital. In conclusion, it is necessary to educate people on the danger of using water from these streams and a proper waste management method should be established at the hospital and the industrial areas.

RIVERS; BACTERIA; ANIONS; WASTE MANAGEMENT; SOUTH AFRICA; WASTEWATER; INDUSTRIAL WASTES

Climate change adaptation through community-science-policy interface in forest and biodiversity protection and watershed management. **Butardo-Toribio, M.Z. Biodiversity and Watersheds Improved for Stronger Economy and Ecosystem Resilience Program (Philippines).** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *2018. p. 115-135.*

This chapter demonstrates how the participatory implementation of a forest and biodiversity protection system, implemented through program funded by the United States Agency for International Development, can serve as an entry point for implementing strategies that support climate change adaptation (CCA). This system involves forest conservation area planning; app-based monitoring of forest conditions, threats, and patrol efforts; and response formulation to address the threats that lead to forest loss and degradation. The cases presented in this chapter discuss how CCA mainstreaming can be accomplished when the forest and biodiversity protection system is used in policy development and in the preparation, enhancement, and integration of existing plans. The local stakeholders anchored their responses to the climate change-related threats on national climate change and disaster risk reduction policies. This chapter also shows how the processes that the multi-sectoral stakeholders collectively undertook have been to improve the enabling policy and institutional environment for climate change-related responses at the local level. It also presents the mechanism used to scale up the system, which enabled it to be adopted at the national policy level. The specific cases discussed in this chapter also suggest that locally evolved initiatives can influence the formulation or enhancement of national-level policies; but this often requires champions of the new policy at both local and national levels. Appropriate communication strategies play a critical role in the mainstreaming of the Lawin system as they can enhance the visibility of the intervention and also to build its support base. The cases suggest the local experiences, knowledge and capacities need to be combined with science in order to influence national policies and programs and to make the more evidence-based, effective and responsive. Toward this end, communities, researchers, scientists, and decision and policy makers need to improve their communication with one another. Likewise, decision makers and policy makers need to be involved at the onset of the policy and program implementation. The lessons from the case stories suggest that multi-sectoral and multilevel climate response is needed for greater convergence, synergy, and complementation. Moreover, since building resilience to climate change involves behavioral change, researchers should not focus solely on the science aspect, but should also integrate the behavioral/social/institutional dimension into the policy reform in order to improve policy implementation. Climate

researchers should also actively participate in the knowledge management, planting, planning, and budgeting system of national government agencies to inform national policies and budget allocation on CCA.

CLIMATIC CHANGE; ADAPTATION; RURAL COMMUNITIES; FORESTS; BIODIVERSITY; WATERSHED MANAGEMENT

Climate variability, change and the impacts on livelihood vulnerability of farming households in Koronadal, South Cotabato, Philippines. **Sabino, L.L. llsabino@up.edu.ph., Pulhin, J.M. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Social Forestry and Forest Governance. Dizon, J.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Espaldon, Ma.V.O. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Cruz, R.V.O. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 2 p. 42-59. 2020.*

This study examined the changes and variability in temperature and rainfall patterns in the past 31 years (1981-2012) and assessed their impacts on livelihood vulnerability of farming households in the City of Koronadal, South Cotabato, a less studied area in Mindanao located in Southern Philippines. Using the Intergovernmental Panel on Climate Change (IPCC) framework, household vulnerability was assessed using survey data from 265 respondents, complemented with focus group discussion, and field observations from 2013 to 2015. Results showed significant changes in monthly mean minimum (increased by 0.74 C, $p < 0.01$) and mean maximum (decreased by 0.65C, $p < 0.01$) temperature. Rainfall patterns showed a decreasing trend and revealed significant changes in June ($p<0.01$), August, and December ($p<0.05$), signifying that climate change and variability took place as manifested by floods, landslides, and drought experienced by farming households. The study confirmed that majority of the farming households had 'moderate to high vulnerability' to climate variability and change. As climate change brings new forms of risks, appropriate adaptation strategies are needed to address both current and future vulnerability and require robust vulnerability assessment founded on recent scientific advancement and innovative strategies congruent to this study.

FARMING SYSTEMS; HOUSEHOLDS; CLIMATIC CHANGE; TEMPERATURE; RAIN

Development of the national action plan on climate change adaptation: lessons learned from Indonesia. **Muharam, A. National Planning Agency (BAPPENAS) (Indonesia).** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling

environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *p. 21-31 . 2018.*

Climate change is very crucial issue that has been at the forefront of global discussion in the last two decades. Indonesia is highly concerned about this issue since climate change has and will negatively affect the archipelagic country. Accordingly, in an effort to deal with climate change. Indonesia is highly concerned about that issue since climate change has and will negatively affect the archipelagic country. Accordingly, in an effort to deal with climate change, Indonesia launched the National Action Plan on Climate Change Adaptation (NAP-CCA) in 2014 to guide stakeholders in implementing climate change adaptation (CCA) programs, projects, and activities. This paper explains the process and approaches in the development of the NAP-CCA, its monitoring and evaluation system, and the targets and indicators prescribed in the action plan. Based on the Indonesia's experience in developing the NAP-CCA-, it can be concluded that the NAP-CCA can provide direction to the technical ministries in their development and implementation of CCA programs and activities. The local government in Indonesia have also adopted the action plan in the regional medium-term development plans. However, the government of Indonesia is facing major hurdles in implementing the NAP CCA. Budget constraint is one issue that could impede the effective implementation of the policy at the national and regional levels.

CLIMATIC CHANGE; ADAPTATION; DEVELOPMENT PLANS; PLANNING; MONITORING; BUDGETS; EVOLUTION; INDONESIA

Disaster risk education of climate change impacts on vulnerable coffee farms in Kalinga [Philippines]. **Wacas, R.U., Rodolfo, R.A., Calsiyao, I.S., Garcia, E.J.M.** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 175-207. 2020.*

Coffee growers in Kalinga [Philipines] are imperiled to a number of problems including low productivity caused by aging coffee trees, reduced soil fertility, lack of maintenance, high density of coffee trees and insufficient labor; lack and/or insufficient farm to market road; inaccesability to market which command better price; absence of drying facilities, storage facilities and harvesting facilities and inaccessibility to short and long term credit; and insufficient knowledge on proper harvesting, drying, and storage of coffee beans. According to the farmers, the drastic decline in productivity is also caused by climate change such as drought caused by extreme temperatures during flowering stage, landslides and excessive rains during fruit setting. These situations experienced by coffee farmers and coffee processors need to be addressed so as to sustain one of the province's showcased product-the coffee. Considering the foregoing premises, the Kalingan State University and the CorCAARRD have responded to the climate change problems of farmers in the Coirdillera. Hence the S and T Action Frontline of Emergencies and Hazards (SAFE) through the program

Disaster Risk Reduction of Climate Change Impacts on Agricultural Farms in Cordillera Administrative Region (CAR) was implemented by all State Universities and Colleges in CAR. On the part of Kalinga, it conceptualized the project dubbed as Disaster Risk Reduction on Climate Change Impacts on Vulnerable Coffee Farms in Kalinga. Through this project, the farmers were empowered and their knowledge enhanced on how to cope with the adverse effects of climate change to their coffee farms.

COFFEA; FARMS; CLIMATIC CHANGE; RISK; DROUGHT; LANDSLIDES; RAIN; FARMERS; PHILIPPINES

Formulating and implementing top-level policy-enabling environment for climate change adaptation in Vietnam. **Hoang Thi Bich Hop. Center for Environment Research, Education, and Development (Vietnam).** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *2018. p. 55-85.*

Vietnam is an agricultural country, with about half of its total labor force and about 70 percent of its population living in rural and mountainous areas. The country is located in a hazard-prone region in the world, and is considered one of the most vulnerable countries to a climate change. In the last 50 years, the average temperature in Vietnam has increased by 0.5-0.7 deg C, while sea level has risen by 20 centimeters.The agriculture sector is crucial in ensuring the social well being of Vietnam's population. However, the sector is also highly vulnerable to climate change. As such, the Vietnam Government has crafted policies, mostly using the top-down approach, to reduce the impacts of climate change on Vietnam, particularly on the country's agriculture sector. This report presents some of the most crucial policy-enabling environment for climate change adaption in the agriculture sector of Vietnam and how these policies of being implemented.

CLIMATIC CHANGE; ADAPTATION; POLICIES; ENVIRONMENTAL IMPACT; AGRICULTURE; VIET NAM

From act to action: status and challenges of climate change adaptation policies in the Philippines. **Vargas, M.L., Yoshida, P.P., Lasco, R.D. The Oscar M. Lopez Center for Climate Change Adaptation and Disaster Risk Management Foundation, Inc., 6F Rockwell Business Center Tower, 3 Ortigas Ave, Pasig, 1604 Metro Manila (Philippines).** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *p. 33-53. 2018.*

This case story reviews the development of climate change adaptation policies and legal frameworks in the Philippines, their implementation status, and challenges encountered in ensuring that these policies and frameworks are fully responsive to enable actions at various levels and different sectors. A close dialogue with the Philippine Climate Change Commission, the national agency tasked to formulate and implement plans for the country to better prepare for and respond to natural resources, revealed the gaps in the implementation processes of the policies and identified the opportunities for mowing forward. With the uncertainties brought by climate change, existing policies and frameworks should be continuously reviewed to enhance the systems; to further mainstream the processes; and to strategically monitor, assess and evaluate the effectiveness of such policies and frameworks. The integration of climate change adaptation and disaster risk reduction from policy formulation to development planning also needs to be strengthened, and this can be done through cross-sectoral and participatory approaches toward comprehensive and systematic development plan. These are all urgent policy-related concerns that require immediate response, collective action, and supportive financial mechanisms. Accordingly, such actions would help to embed climate-resilient systems into government programs, activities, and projects at all levels, and accordingly enable the Philippines to cope with climate change and to even progress as a country despite the threats brought by the phenomenon.

CLIMATIC CHANGE; ADAPTATION; POLICIES; DISASTERS; RISK; PHILIPPINES

From policy to action: lessons from the Cambodia climate change strategic pan 2014-2023. **Bandos, R. Ministry of Environment (Cambodia). Dept of Environment.** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *2018. p. 9-19.*

The Cambodia Climate Change Strategic Plan (CCCSP) 2014-2023 is the first comprehensive national policy document in Cambodia that responds to climate change issues. However, it is not clear if this strategic plan is viable. This chapter presents an analysis of the CCCSP and looks at three aspects: resource mobilization, inclusion in local development plans, and coordination to develop and implement the plan. Funding for climate change adaptation initiatives in Cambodia mostly comes from international development organizations and, to a limited extent, from domestic sources. Although the budget allocation from domestic resources (national budget) for climate change expenditure increased steadily from 2009 to 2015, the externally financed climate change expenditure remains very high at 69 percent of total expenditure. The CCCSP was developed mainly by government institutions, especially by the Ministry of Environment and its line ministries, and several development agencies. However, it is not clear inputs were gathered from all stakeholders in Cambodia in

the development of the strategic plan. Although the CCCSP appears to be a very good plan at the national level, its provisions are unlikely to be integrated into municipal/ commune development plan, except for the provision to develop guidelines to development planning in the context of climate change.

CLIMATIC CHANGE; ADAPTATION; DEVELOPMENT PLANS; PLANNING; CAMBODIA

Future adaptability of urban trees due to the effects of climate change: the case of Artvin, Turkey. **Sari, D., Karasah, B. Artvin Coruh Univ., 08000 Arhavi, Artvin (Turkey). Dept. of Landscape Architecture. deryasari@artvin.edu.tr.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 60-70. 2020.*

Global climate change began to affect urban and rural landscape planning decisions. The accurate and efficient use of plants that support urban green infrastructure would play an important role in these decisions. The present study aimed to determine the tolerance of domestic and exotic woody plant species planted in public spaces in Artvin province, Turkey to the effects of climate change. Thus, the tolerance of 59 most prevalent trees and shrubs identified in public spaces and natural fields in 12 sampling areas in Artvin province center, Hopa and Ardanuc district centers were surveyed. Findings of the regression model demonstrated that drought, cold hardiness and precipitation had an impact on the adaptability scores of the plants. The differences between the climate conditions in sample areas had an impact on the future adaptation and tolerance of the plants to climate change. This demonstrated that plant species in urban green areas will be affected not only by the global climate change but also by local climate conditions in the short and long term.

STREET TREES; CLIMATIC CHANGE; TOLERANCE; URBAN FORESTRY; ADAPTATION; ADAPTABILITY; TURKEY

Identifying vulnerability indicators of rural freshwater and sanitation systems to climate change and its application in Ho Chi Minh City, Vietnam. **Ngoc Tuan Le. University of Science-Vietnam National Univ., Ho Chi Minh City-227 Nguyen Van Cu St. Ward 4, District 5, Ho Chi Minh City (Vietnam). lntuan@hcmus.edu.vn.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 39-46. 2018.*

Rural fresh water and sanitation (RFWS) is one of vulnerable sector in the context of climate change (CC). However, vulnerability to CC of RFWS has not yet been assessed in-depth and hardly considered the integrated approach via index method. This study thus aimed to establish vulnerability indicators to CC of RFWS for a comprehensive assessment. By literature review, factors reflecting exposure, sensitivity, and adaptive capacity to CC of RFWS were sufficiently and systematically determined. Expert consulting method was then

applied to complete the indicator set, consisting of 53 indicators. There were 22 variables reflecting the exposure to temperature, precipitation, storm, flood, riverbank landslide, saltwater intrusion, and drought; 12 sensitivity variables related to population, water supply and waste treatment, and environment; and 19 adaptivity variables mainly based on facilities and human capitals. The feasibility of the indicator set was examined in a coastal area in Ho Chi Minh city, Vietnam, where the RFWS is a matter of concern and at high risk of CC impacts. Research findings were expected to be an important basis for assessing and proposing measures to cope with CC of RFWS sector.

FRESHWATER; HYGIENE; CLIMATIC CHANGE; VIETNAM

Impact of climate change on aquaculture in Phu Vang District, Thua Thien Hue Province, Vietnam. **Binh, M.N. Hue Univ. of Agriculture and Forestry, 102 Phung Hung Street, Hue City (Vietnam). macnhubinh@huaf.edu.vn., hubinh2510@gmail.com., An, L.V., Thuy, N.T.T., Giang, N.T.H., Hoai, H.T.T., Dan, T.V.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2016-3. [2016].*
https://www.searca.org/pubs/discussion-papers?pid=366

Climate change is a major global concern that greatly affects people, including their source of living. In 2010, the Asian Development Bank reported that Vietnam is one of the five countries most severely affected by climate change. About 70 percent of the country's total population lives along coastal areas and in islands. This study aimed to (1) evaluate the impacts of climate change on aquaculture in Phu Vang district (Thua Thien Hue province, Vietnam), and (2) develop a climate change adaptation model for aquaculture. Data on impact of climate change to aquaculture production were gathered through participatory rural appraisal tools, while spatial changes in water quality were determined through Geographic Information System (GIS). Experimental polyculture models were set up in the five study-site communes to determine the aquaculture practices that could be disseminated to small farmers. It was found out that Phu Vang had suffered heavy losses from climate change brought about by a combination of droughts and prolonged heat waves, and cold weather that lasted longer. Floods and typhoons have likewise occurred with stronger intensities, and tide amplitude has changed drastically. All these affected agricultural activities, especially aquaculture, which is considered as one of the most vulnerable sectors to climate change impacts. As a result, many households shifted from intensive to extensive culture, and some even left their ponds for other jobs. The limited understanding and capacity of people on climate change aggravated the situation, affecting their ability to respond and mitigate negative impacts. Water quality, specifically for aquaculture, was also affected as a result of rising temperature, prolonged droughts, rainfall, flooding, and salinization, which in turn reduced productivity and yield. Meanwhile, polyculture models of aquaculture implemented for this study brought high economic

returns, and could be promising to replicate in various communes of Phu Vang district. The following are the primary recommendations to mitigate climate change impact in aquaculture and to facilitate sustainable livelihood for coastal people: capacitate communities and government in climate change adaptation and mitigation; expand promising aquaculture practices, area, infrastructure, and marketing of produce; and implement policies to mitigate damages of climate change to aquaculture and the community as a whole.

CLIMATIC CHANGE; AQUACULTURE; WATER QUALITY; GEOGRAPHICAL INFORMATION SYSTEMS; VIET NAM

Index assessment of household social vulnerability to climate change: a case study of Laguna Province, Philippines. **Kamiohkawa, S. Sanyu Consultants Inc., 1-13-17 Kita-Otsuka, Toshima award, Tokyo 170-0004 (Japan). Maruyama, A. Chiba Univ., 648 Matsudo, Matsudo, Chiba 271-8510 (Japan). a.maruyama@faculty.chiba-u.jp., Buot, I.E., Buot, M.M. Philippines Univ. Los Baños, College, Laguna (Philippines).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 24 (1) p. 68-76. 2021.*

This study empirically investigated the social vulnerability of two municipalities of Laguna Province, Philippines, on the impacts of natural disasters associated with climate change. Data were obtained from interviews with seventeen experts and surveys for thirty-seven households conducted in the two municipalities. The results of the index analysis, using the weight average method and ordered probit regression, can be summarized as follows: First, the characteristics of low educational attainment, low labor rate and lack of economic resources were crucial in determining the social vulnerability class of households. Second, the social vulnerability index is determined by multiple factors, and therefore, it should not be assessed by a single variable. Third, the weights for components of the vulnerability index were insignificantly affected by geographical features and the speciality and personal traits of the experts. This suggests that local governments should develop an information system that identifies socially vulnerable households and that this should be utilized to provide the residents with education about climate change and strategies for households to reduce their potential risks from severe climatic events.

CLIMATIC CHANGE; DISASTERS; HOUSEHOLDS; METHODS; SURVEYS; SOCIAL CONDITIONS; PHILIPPINES

Indigenous practices and climate change responses of Ati and Suludnon farmers in Iloilo, Philippines. **Nelson, G.L.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Governance and Rural Development. gmnelson@up.edu.ph., Zamora, O.B., de Guzman, L.E.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Crop Science.**

Tatlonghari, R.V. Philippines Univ. Los Baños, College Laguna (Philippines). Dept. of Science Communication. Espaldon, M.V.O. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Brillon, J.A. West Visayas Univ.-Labunao Campus, Iloilo 5042 (Philippines). Coll. of Agriculture anf Forestry. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 87-98. 2019.*

Climate change has become a major threat to the livelihoods of many farmers in the Philippines, particularly among the indigenous groups. It has been recognized that traditional knowledge is an important source of information for climate change adaptation, for embedded into it are coping strategies evolved through and passed on to generations. This study documented through key informant interviews, focus group discussions and farm visits the indigenous knowledge for climate change adaptation of the Suludnons and Ati in Iloilo [Philippines]. Since 2003, their communities experienced climate change as manifested by strong typhoons, landslides, and the various forms of crop and human diseases. Their responses to climate change include biodiversity-based cropping systems, changes in cropping calendar, use of indigenous varieties, consumption of non-traditional/wild foods, indigenous warning systems and diversified income sources. Both indigenous groups are beneficiaries of government and non-government projects, grants and agricultural trainings where they learned new farming technologies. The traditional practices combined with the adoption of selected agricultural technologies have helped the have helped the Suludnon and the Ati groups become become sustainable and climate-resilient farming communities amidst the adverse impact of climate change on their lives.

CROPS; CULTURAL BEHAVIOUR; ETHNIC GROUPS; FARMERS; CLIMATIC CHANGE; ADAPTATION; FARMING SYSTEMS; PHILIPPINES

Interactive rice production zoning: a web-based system for climate change adaptation in Thailand. **Samranpong, C. Chiang Mai Univ. (Thailand). Center for Agricultural Resource System Research. Rossopa, B. Prachin Buri Research Center (Thailand). Rice Dept. Kaemuangmoon, T. Chiang Mai Univ. (Thailand). Center for Agricultural Resource System Research. Buddahboon, C. Ubon Ratchathani Rice Research Center (Thailand). Jintrawet, A. Chiang Mai Univ. (Thailand). Center for Agricultural Resource System Research.** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *2018. p. 175-185.*

The Interactive Rice Production Zoning (iPRZ) is a web-based spatial decision support tool for rice production zoning in Thailand. The working group of the project used an open source approach through Google MAp application programming interface, coded with

HTML5 and JavaScript. Four groups of maps can be displayed on iRPZ, including maps that show rice variety group, farmers' rice yield and the Rice Department's rice yield (based on good rice technology practice), suitability of rice field, and rice agricultural economic zoning. The iRPZ also provides graphs, charts, and descriptive information. Spatial database from the Department of Agricultural Extensions, Land Development Department, Rice Department, and other related attributes were integrated into iRPZ. Any data scale mismatch caused by multiple data sources was corrected. The iRPZ bridges that gap by using the 'majority approach' at the subdistrict scale as the unit of analysis and display.

CLIMATIC CHANGE; ADAPTATION; RICE; PRODUCTION; ZONING; TECHNOLOGY; THAILAND

Knowledge, attitude and practices of nutrition workers on climate change in Laguna, Batangas and Cavite Provinces, Philippines. **Talavera, M.T.M. mtalavera@up.edu.ph., Bustos, A.R. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Human Nutrition and Food. Rebancos, C.M. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 19-28. 2020.*

Climate change and malnutrition are two global phenomena that affect millions of population groups. The Philippines is considered one of the most vulnerable countries for extreme natural events and at the same time has a high prevalence of underweight (19.0%) and stunting (28.8%) in 2019 among under five children. The nutritionally vulnerable groups are children, pregnant and lactating women, and elderly. These groups are also greatly affected by climate change-related events then the malnutrition situation is exacerbated. The local nutrition workers are the frontline workers who plan, implement, and monitor nutrition programs. Mainstreaming climate change in the local nutrition planning processes will be facilitated if nutrition workers are knowledgeable. This study aimed to determine the current knowledge, attitudes and practices of nutrition workers and perceptions on how to mainstream climate change in the nutrition sector's local planning system. A survey was conducted among local nutrition workers. Ninety-five percent of nutrition workers were highly knowledgeable, 86% were with high level of attitudes and 50% were exhibiting moderate level of practices related to climate change. The gaps can be narrowed by capacity building and possibly this can lead to mainstreaming climate change in the local nutrition planning process.

WORKERS; EMPLOYEE ATTITUDE; HUMAN NUTRITION; DEVELOPMENT PROJECTS; MALNUTRITION; CLIMATIC CHANGE; ADAPTATION; PHILIPPINES

Linking science to policy for climate change adaptation: institutional innovations in the management of Lake Buhi, Philippines. **Elazegui, D.D., Rola, A.C. Philippines Univ. Los**

Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Faderogao, J.F. Bicol Agri-Water Project (Philippines). Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *2018. p. 95-113.*

The biggest challenge in any multiple-use lake is how to allocate the water resource to its various uses. Conflict resolution and recognizing the interdependencies in water use should be central to its management. The case story presents the process that the various stakeholders of Lake Buhi took to arrive at a decision to help strengthen the institutional coordination in the management of the lake in order to adapt to climate-related risks in the context of competing uses of water in Lake Buhi. Lake Buhi serves as habitat to the Philippines' smallest commercial fish, tabios or sinarapan. Over the years, management of the lake has become a compromise among irrigation, hydroelectric power generation, fishery sector, and conservation/sustainability goals. Conflicts arise due the absence of clear rules on water allocation. Accordingly, the two interventions that were introduced to solve the problem were to develop a science-based water allocation model and strengthen the watershed management management council, whose task includes managing the lake ecosystem.

CLIMATIC CHANGE; ADAPTATION; LAKES; WATERSHED MANAGEMENT; WATERSHEDS; WATER USE; PHILIPPINES

National policies and initiatives on climate change. **Lasco, R.D., Sajise, P.E.** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *2018. p. 87-91.*

CLIMATIC CHANGE; ADAPTATION; POLICIES; MONITORING; EVALUATION; SOUTH EAST ASIA

Policy development for climate change adaptation and disaster risk reduction and management in Iligan City, Isabela [Philippines]. **Tongson, E.E. Abuan Integrated Watershed Management Project, World Wide Fund for Nature (Philippines). Balderama, O.F. Isabela State Univ., Echague, Isabela, (Philippines). Trogo-Pantola, R. Smarter Agriculture, IBM-Philippines (Philippines).** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *p. 156-173. 2018.*

Local government units (LGUs) in the Philippines are at the forefront in implementing disaster risk reduction and management (DRRM) and climate change adaptation (CCA) initiatives in their respective localities. The country's legal framework on DRRM and CCA initiatives in their respective localities. The country's legal framework on DRRM and CCA devolves to LGUs the responsibility to prepare and integrate CCA and DRRM into local plans and policies. However, LGU compliance has not matched the advancement in policy due to the LGU's lack of capacities. CCA and DRRM are multidisciplinary undertakings that require a range of actors and expertise to provide scientific evidence to policy making. The Abuan Integrated Watershed Management Project implemented in Ilagan City, Isabela, Philippines demonstrates how bottom-up-self-initiated CCA and DRRM strategies had been adopted and replicated by the Ilagan City government through policy outcomes. The tools available (i.e., light detection and ranging in Community-Based Monitoring Systems) helped to recalibrate local CCA and DRRM plans toward greater transparency and accountability. The pilot introduction of ICT-enabled crop and weather advisories have demonstrated great promise for modernizing agriculture; however, such feat would require an enabling policy environment in the ICT sector in order to stimulate growth, and accordingly benefit the agriculture sector.

CLIMATIC CHANGE; ADAPTATION; DISASTERS; RISK; WATERSHED MANAGEMENT; WATERSHEDS; PHILIPPINES

Social capital and vulnerability to extreme climate in a semi-urban fishing community in Laguna de Bay, Philippines. **Palanca-Tan, R. Ateneo de Manila Univ., 4th Floor, Leong Hall, Loyola Heights, Quezon City, (Philippines). Dept. of Economics. rtan@ateneo.edu.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 89-101. 2020.*

The study looked into the risks associated with extreme climate events in the case of a semi-urban fishing community surrounding Laguna Lake in the Philippines. A survey was undertaken to determine the economic effects (loss of assets, foregone income, and changes in consumption patterns) of strong typhoons and torrential rains on fishing households. Vulnerability, estimated as the perceived probability of lower consumption after flooding or typhoons, was used to assess the economic impact on households. Household characteristics, including social capital, that may influence consumption vulnerability, were analyzed using a binary probit regression model. Social capital, a multi-dimensional concept consisting of social networks and skills possessed and used by household members to facilitate actions, was modeled using four indicators – two associational (membership in a formal organization and usefulness of informal social networks) and two behavioral (trust and cooperativeness). Regression results revealed that fishing income and household size significantly affect vulnerability. The higher the fish catch

and the smaller the household, the less vulnerable is the household to strong storms and torrential rains. Social capital indicators do not significantly affect consumption vulnerability of households.

INCOME; HOUSEHOLDS; CAPITAL; CLIMATIC CHANGE; CYCLONES; RAIN; RISK; PHILIPPINES

Social vulnerability and adaptive capacity to climate change impacts of women-headed households in the Philippines: a comparative analysis. **Delfino, A.N. Partido State Univ., San Juan Evangelista Street, Goa, 4422 Camarines Sur (Philippines). ariel.delfino@parsu.edu.ph., Dizon, J.T., Quimbo, M.A.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Public Affairs and Development. Depositario, D.P.T. Philippines Univ. Los Baños, College, Laguna (Philippines). Coll. of Economics and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (2) p. 36-54. 2019.*

This study analyzed the social vulnerability and adaptive capacity to climate change impacts of women-headed households in two remote coastal communities in Lagonoy, Camarines Sur. Quantitative method following descriptive-correlational research design was employed. Out of 281 WHHs, 162 were randomly selected as the respondents of this study. Descriptive statistics, principal component analysis (PCA), t-test for independent samples, and multiple linear regression analysis were used to analyze the data. Women-headed households in the two remote coastal communities have moderate to high vulnerability in terms of demographic, economic, and social factors. No significant difference was found in their level of social vulnerability; however, a substantial difference was found in the adaptive capacity of the respondents from the East and North coastal communities. Multiple linear regression analysis revealed that the number of household members with disabilities, affiliation with social groups, time travel of the respondents, and household size were significant factors influencing social vulnerability in the two remote coastal communities. The study recommends formulating effective climate change policies and responsive strategies that enhance the rights and welfare of these households for equal distribution and access to resources, especially in socio-political structures in the community.

WOMEN; HOUSEHOLDS; ROLE OF WOMEN; ADAPTATION; CLIMATIC CHANGE; COSTS; SOCIAL STRUCTURE; PHILIPPINES

Sustainable livelihoods-based assessment of adaptive capacity to climate change: the case of organic and conventional vegetable farmers in La Trinidad, Benguet, Philippines. **Colting-Pulumbarit, C. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Social Development Services. ccpulumbarit@up.edu.ph., Lasco, R.D. International Centre for Research in Agroforestry, Los Baños, Laguna (Philippines). Rebancos, C.M., Caladilla, J.O.**

Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 57-69. 2018.*

Climate change adaptation is vital for farmers in developing countries due to the high vulnerability of agricultural livelihoods. Scientific literature proposed that organic farming is a promising adaptation strategy, but micro-level studies are lacking. This study compared the adaptive capacity to climate risks of organic and conventional vegetable farmers in La Trinidad, Benguet in the Philippines. Guided by the Sustainable Livelihoods framework, thirty variables under the five livelihood capitals were used to compute Household Adaptive Capacity Index (HACI). Organic farming households have higher adaptive capacity than the conventional group, and have higher natural, financial, human, and social capital. The higher adaptive capacity of organic farmers was due to farm practices related to organic agriculture such as crop diversification, sustainable land management, and participation in organizations. This indicated that organic farming potentially enhances adaptive capacity of vegetable farming households. Findings support literature on the contribution of organic farming to the resilience of agricultural systems. Increased support toward higher adoption of organic farming in areas with similar context is recommended for adaptive management to climate change.

ORGANIC AGRICULTURE; VEGETABLES; FARMERS; SUSTAINABILITY; CLIMATIC CHANGE; INDIGENOUS KNOWLEDGE; HOUSEHOLDS; ADAPTATION; PHILIPPINES

Synthesis: building up a policy-enabling environment for climate change adaptation from local experiences. **Sajise, P.E., Lasco, R.D.** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. 2018. p. 187-193.

CLIMATIC CHANGE; ADAPTATION; LOCAL GOVERNMENT; DECISION MAKING; POLICIES

Toward a climate adaptation and mitigation umbrella program in Southeast Asia: a proposed framework for collaboration. **Pulhin, J.M. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Social Forestry and Forest Governance. jmpulhin@up.edu.ph.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2016-5 (Special Anniversary Issue). [2016].* https://www.searca.org/pubs/discussion-papers?pid=327

CLIMATIC CHANGE; ADAPTATION; AGRICULTURAL DEVELOPMENT; RURAL DEVELOPMENT

Using digital technology in enhancing climate resilience of Philippine agriculture: the SARAI [Smarter Approaches to Reinvigorate Agriculture as an Industry in the Philippines]-enhanced monitoring system. **Espaldon, M.V.O, Mendoza, H.D. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Quiray, A.E. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Dept. of Geography. Dorado, M.A. Philippines Univ. Los Baños, College Laguna (Philippines). Coll. of Engineering and Agro-Industrial Technology.** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. *College, Laguna (Philippines). SEARCA. 2018. p. 137-153.*

The Philippines' agriculture sector bears the heaviest and most immediate effects of climate change, especially with increasing occurrences of extreme typhoons and prolonged drought. For the longest time, the country's agriculture sector has only been reactive to such disasters and damages. As such, it is imperative to devise solutions that would pave the way for a proactive agriculture sector. As a response, the three-year research program Smarter Approaches to Reinvigorate Agriculture as an Industry in the Philippines (SARAI) is developing a national agricultural monitoring system called SARAI-Enhanced Agricultural Monitoring System (SEAMS). SEAMS uses geographic information system, remote sensing, and normalized difference vegetation index, which allows for a near real-time and site-specific monitoring of crop production areas. More so, with the available free data from the National Aeronautics and Space Administration of the United States and from the European Union, SEAMS can be used to immediately assess production areas that have just been hit by a typhoon; it can also be used to assess the different crop stages currently planted with crops. Currently, SEAMS is being mainstreamed in the Philippine Department of Agriculture Field Programs Operational Planning Division. The primary mainstreaming activity includes conducting SEAMS training, which is being attended by the regional municipal agricultural officers of Department of Agriculture (DA). The training includes basic SEAMS methodologies and technical know-how of the software that municipal agricultural officers can use to assess their respective municipalities. Mainstreaming this system with the DA operations is a tedious process of improving methodologies and of continuously finding ways to integrate the proposed system into the existing national protocols. Ultimately, the goal of mainstreaming the crop monitoring system is to provide local agricultural officers with a more efficient and a more real-time methodology to monitor the effects of climate hazards in their areas.

CLIMATIC CHANGE; CROPS; PRODUCTION; FARM AREA; GEOGRAPHICAL INFORMATION SYSTEMS; REMOTE SENSING; MONITORING; DISASTERS

Q - PROCESSING OF AGRICULTURAL PRODUCTS

Q02 - FOOD PROCESSING AND PRESERVATION

Acceptability of blended taro (Colocasia esculenta) and sweet potato (Ipomoea batatas) polvoron. **Gavino, Z.C., Cammagay, J.R., Mariani, M.J.P., Gunnawa, V.V. Kalinga State Univ., Bulanao, Tabuk City, Kalinga (Philippines).** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 16-23. 2019.*
https://researchextension.ksu.edu.ph/index.php/research-development/faculty-researches/2019-volume-1/8-2019/3-acceptability-of-blended-taro-colocasia-esculenta-and-sweet-potato-ipomoea-batatas-polvoron

The study was conducted to develop the blending of Taro (Colocasia esculenta) and sweet potato (Ipomoea batatas) into polvoron. It aimed to discover the formulation of blended taro and sweet potato into polvoron and determine the acceptability using sensory assessment. Three treatments were presented with different amount of taro and sweet potato flour and keeping the number of other ingredients constant. The panelists evaluated the palatability, texture, flavor, moldability, and overall acceptability of the product. The result as to palatability preference, treatment 1 (control) got the highest frequency of 12 evaluated 'very much palatable' and moldability preference with the highest frequency of 16 evaluated 'moderately molded.' Treatment 3 obtained the highest frequency of preference of 14 evaluated 'moderately smooth texture' and 15 who 'like very much' the flavor, which is the highest frequency of preference. As to over-all acceptability, treatment 1 (control) and three both obtained the highest frequency of liking, which is 'moderately like' the mixtures of polvoron. The chi-square revealed no significant differences among the treatments as to palatability, flavor, and overall acceptability with the computed F-value 8.22, 14.3, and 8.332, respectively lower than the critical value of 15.5 at 0.05 level of significance. Regarding texture and moldability, there are significant differences among the treatments with the computed F critical value of 24.4 and 21.6, respectively higher than the F critical value of 15.5 at 0.05 level of significance.

IPOMOEA BATATAS; SWEET POTATOES; TARO; QUALITY; PALATABILITY; FLAVOUR; FOOD PROCESSING

Effects of varying concentrations of calcium chloride (CaCl2) on the quality of Filipino white cheese (kesong puti) made from frozen-thawed cow's milk. **Moreno, Ma.C.R. mrmoreno1@up.edu.ph., Emata, O.C. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Animal Science.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 3 (1) p. 88-95. 2021.*
https://doi.org/10.5281/zenodo.8296574

Freezing raw milk is a process practiced by Filipino dairy farmers and cooperatives to manage fluctuations in milk production. Freezing can cause physicochemical changes in milk that may affect its processability into value-added products such as cheeses. However, complications in coagulation are often observed in frozen-thawed milk. Filipino fresh white cheese (kesong puti) is typically made from salted fresh milk curdled with rennet or acid (vinegar). Less typical is the use of calcium chloride which enhances curd formation in cheesemaking. Hence, this study determined the effects of varying concentrations of calcium chloride (CaCl2) on the quality of kesong puti made from frozen-thawed cow's milk. Kesong puti treatments were produced by adding 0.02% w/v CaCl2 (T1), 0.05% w/v CaCl2 (T2), and 0.07% w/v CaCl2 (T3). Fat, protein, total solids, and pH were significantly higher in T3 whereas moisture and titratable acidity were significantly higher in T1. Aerobic bacteria, coliform, Escherichia coli, and yeast and mold counts did not significantly differ among treatments. Coliform and Escherichia coli counts in all treatments were acceptable based on the guidelines issued by the Food and Drug Administration. Sensory characteristics and product yield were not significantly different among treatments. Based on the results of this study, the concentration of 0.0 7% w/v CaCl2 is the most effective in addressing problems in curd formation observed in frozen-thawed cow's milk.

COW MILK; CHEESE; QUALITY; CALCIUM CHLORIDE; FREEZING; CHEMICOPHYSICAL PROPERTIES; PHILIPPINES

Entomophagy practices in Kalinga [Philippines]. **Tombali, M.S., Banwa, T.P. Kalinga State Univ., Bulanao, Tabuk City, Kalinga (Philippines).** *KSU [Kalinga State University] Research Journal. 0117-9462. v. 16 (1) p. 84-92. 2019.*
https://researchextension.ksu.edu.ph/index.php/research-development/faculty-researches/2019-volume-1/8-2019/11-entomophagy-practices-in-kalinga

Entomophagy is the process of eating edible insects. This study documented the wild edible insects and related practices in collecting and preparing these species in Lubo, Tanudan, Kalinga Province [Philippines]. A combination of an unstructured interview with key informants and field observations were adopted in this study. Results showed the presence of various edible insects at different habitats in the study site. The documented entomophagy practices included the use of indigenous implements and collection methods, preparation, and utilization of edible insects. This study shows that edible insects in their various stages of life cycles are food components in the study site. It further concludes that edible insects are collected in the wild, and preparations vary depending on the life stages of edible insects.

ODONATA; COLEOPTERA; EPHEMEROPTERA; ACRIDIDAE; AUCHENORRHYNCHA; FORMICIDAE; APIDAE; VESPIDAE; USEFUL INSECTS; FOOD TECHNOLOGY; FOOD RESOURCES; PHILIPPINES

Lipa City [Batangas, Philippines] restaurant serves fresh honey-infused dishes from their bee farm. **Taculao, P.B.S.** *Agriculture (Philippines). 0118-857-7. v. 26 (8) p. 43-44. 2022.* https://agriculture.com.ph/2021/08/30/lipa-city-restaurant-serves-fresh-honey-infused-dishes-from-their-bee-farm/

HONEY; FOODS; FOOD TECHNOLOGY; APIDAE; APICULTURE; PHILIPPINES

Q70 - PROCESSING OF AGRICULTURAL WASTES

Abaca fiber (Musa textilis Nee) and plastic post-consumer wastes (A/PCW) as potential building material. **Hirondo, M.L., mlhirondo@yahoo.com.ph., Hirondo, L.L.M., Mataya, K.J.M., Francisco, E.L., Mazon, A.B., Natal, P.M. Marinduque State Coll., Boac, Marinduque, (Philippines). School of Engineering. Senoro, D.B. Mapua University, 658 Muralla St., Intramuros, Manila (Philippines). Office of International Linkages for Research and Development. Catajay-Mani, M. Marinduque State Coll., Gasan, Marinduque (Philippines). School of Agriculture, Fisheries and Natural Sciences.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 8-17. 2020.*

This study presents the utilization of flexible plastic post-consumer wastes combined with abaca (A/PCW) as a potential composite board for building industry. By employing a simple physico-mechanical process using S2 grade abaca fiber and flexible plastic PCW produced composite board potential for building materials. Hence, the study investigated the best performing formulation of A/PCW composite based on its physical and mechanical properties. Three types of A/PCW samples with six specimen were prepared for each type. These are Sample 1, 2 and 3 which has 50:50, 60:40, and 70:30 wt:wt ratio, respectively. Abaca fiber grade S2 with PCW made of polyethylene terephthalate (PET), and PET with metalized aluminium bonded with R10-103 agent were used to form a composite board. Sample 2 performed best among the samples by recording the most improved physical and mechanical properties. Analysis of Variance (ANOVA) in Statistical Package for the Social Sciences (SPSS) statistics tool was applied., The results supported and confirmed the experimental analyses.

MUSA TEXTILIS; ABACA; FIBRES; WASTES; CHEMICOPHYSICAL PROPERTIES; COMPOSITE BOARD; CONSTRUCTION MATERIALS

Ecological footprint accounting of non- biodegradable wastes of Angeles City, Philippines: the anthropogenic shift to biodegradables. **Lagman-Bautista, J. Holy Angel Univ., Angeles City. (Philippines). School of Business and Accountancy. jenlag_bautista@yahoo.com.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 37-47. 2020.*

This study factored the Ecological Footprint Accounting on Municipal Solid Wastes of Angeles City, Philippines using Waste Analysis and Characterization Summary for 2015 with projections subdivided into the solid wastes of Angeleños expressed as waste generation per capita, depict the level of waste consumption, quality of urban habitat, and the acceleration on waste disposal based on the population growth rate and diversion rate. The results were quantitatively analyzed using Ecological Footprint Accounting and interpreted in monetary terms through Benefit-Cost Analysis. The major research processes include: Analysis of waste generation per capita; Waste Projections net of targeted diversion on non-biodegradables; Cost Analysis on diverted wastes; and Income Analysis on Recyclables. The waste generation for the next five years will be generated 90% by households; 10% by educational and other institutions. With waste composition of 37% biodegradable, 20% recyclables and 43% non-biodegradable. By the year 2022, the city is expected to generate 159 kg/yr 10 sup 6 with waste mitigation at a decreasing rate of 96.89% despite the population acceleration at 136% or equivalent to 561,000 constituents. Lastly, the five-year Benefit-Cost Analysis yielded a budgetary savings of PhP395M, equivalent to US$ 7.4M or an average municipal annual cost savings of 39%.

SOLID WASTES; WASTE MANAGEMENT; BIODEGRADABILITY; COST BENEFIT ANALYSIS; WASTE DISPOSAL; WASTES; WASTE UTILIZATION; PHILIPPINES

Solid waste management and reduction of agricultural post-harvest losses using cold-storage: perceptions of farmers in Benguet, Philippines. **Sanchez, P.A.J. pjsanchez@up.edu.ph., Cruz, M.L., Manansala, J.V.H., Espaldon, M.V.O. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Seroje, K.K. Clever Heat, 1114 Cityland Herrera Tower Salcedo Village, Makati City 1227 (Philippines). Calora, J.F.G. Jr., Malamug, J., Molintas, E. Benguet State Univ., La Trinidad, Benguet (Philippines).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 99-109. 2019.*

Vegetable harvest in the Philippines are wasted due to spoilage (approx 42%) posing a challenge to the country's food security and solid waste management. The study aims to determine current vegetable farming practices and farmer perceptions on the use of cold storage facilities in Benguet Philippines for reducing vegetable waste in the post-handling process system. Specifically, this aims to: identify common high-value crops available and

acceptable to farmers for storing in cold storage facilities by developing the actual cropping calendars (planting and harvest schedules) of these high-value crops; quantify waste generated on-farm and during marketing and identify current farmer practices and perceptions on post-harvest handling. Common high value crops for possible cold-storing are green-leafy vegetables since these command high prices when they are available off-season. Waste generated is 7.5% of total produce during harvest while 20-50% is further lost during the marketing. The three main issues of farmers are price, market and the harvesting process. Timely information dissemination on market demands and prevailing vegetable prices, availability and access to storage and cold-storage facilities are necessary to encourage farmers to minimize vegetable waste generated and optimize farmer income.

VEGETABLES; POSTHARVEST LOSSES; POSTHARVEST TECHNOLOGY; COLD STORAGE; AGRICULTURAL WASTES; WASTE MANAGEMENT; FARMERS; PHILIPPINES

Q80 - PACKAGING

Effect of microcrystalline cellulose reinforcement on mechanical and water barrier properties of sugar palm starch biocomposite films. **Salit, M.S. Universiti Putra Malaysia, Serdang, 43400 Serdang, Selangor (Malaysia). Faculty of Engineering. sapuan@upm.edu.my.** *SEARCA Agriculture and Development Discussion Paper Series. 1908-6164; 2599-3895. No. 2018-1. [2018].*
https://www.searca.org/pubs/discussion-papers?pid=399

Novel biocomposite film materials, 100 percent environmentally friendly with microcrystalline cellulose (MCC) as reinforcement in sugar palm starch (SPS)-based thermoplastic matrix were prepared through casting method. The cellulose content in the composite films varied from 0 to 10 percent w/w. Using atomic force microscopy (AFM), the morphology of the composite films was analyzed. This work is focused on the effects of MCC content on the mechanical and water vapor permeability (WVP) properties of the composites. Incorporation of the MCC to the SPS matrix increased the tensile strength, while the elongation at break decreased with MCC loading. The tensile strength value for the composite with 10 percent w/w of MCC was found maximum (11.30 MPa). Adding 1 percent MCC content significantly reduced the WVP of the composite film by 66.41 percent compared with the neat SPS film. Overall, the incorporation of MCC in the SPS-based films improved the mechanical strength and water barrier properties of the environmentally friendly composite films.

SUGAR PALMS; PACKAGING MATERIALS; CELLULOSE; PROCESSED PLANT PRODUCTS; CHEMICOPHYSICAL PROPERTIES

S - HUMAN NUTRITION

S01 - HUMAN NUTRITION - GENERAL ASPECTS

Food consumption, diet quality, and diversity of rice-based farm households in Central Luzon, Philippines. **Abilgos-Ramos, R.G. ra.ramos@philrice.gov.ph., Ballesteros, J.F. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Rice Chemistry and Food Science Div.** *Rice-Based Biosystems Journal (Philippines). v. 4 p. 51-65. 2018.*

Diet quality is a major determinant of household food and nutrition security. This study evaluated the food intake, diet diversity, and quality associated with the nutritional status of rice-based farm households using the three-day 24-hour food recall data collected in a survey of 953 randomly selected rice-based farm household members in Central Luzon, Philippines. Results showed that male members had more calories, Vitamin A, and iron intakes than female members. Total per capita carbohydrate, protein, and fat intakes were mainly from cereals, fish, and seafood, meat poultry, and offal. Cereals and vegetables were the main sources of iron while vitamin A was mainly from fish and seafood. A household with more than four family members whose iron intakes were below the Estimated Average Requirement (EAR) of 10-26 mg/day for iron were 2.10 times [Adjusted Odd Ratio (AOR) = 2.10; 95% CI:1.19, 3.71] likely to become underweight. Adult members whose iron intake were below EAR for iron were 2.18 times [AOR = 2.18, 95% CI: 1.07, 4.45] likely to become overweight and/or obese Low diet quality was evident with female children and adults having lower calorie intake than male members. Nutrition-and gender-sensitive food-based intervention must be made to improve diet quality and diversity.

RICE; FARMS; HOUSEHOLDS; DIET; NUTRITIONAL STATUS; FOOD INTAKE; PHILIPPINES

S30 - DIET AND DIET-RELATED DISEASES

Food consumption, diet quality, and diversity of rice-based farm households in Central Luzon, Philippines. **Abilgos-Ramos, R.G. ra.ramos@philrice.gov.ph., Ballesteros, J.F. Philippine Rice Research Inst., Maligaya, Science City of Muñoz, Nueva Ecija (Philippines). Rice Chemistry and Food Science Div.** *Rice-Based Biosystems Journal (Philippines). v. 4 p. 51-65. 2018.*

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Philippines. Results showed that male members had more calories, Vitamin A, and iron intakes than female members. Total per capita carbohydrate, protein, and fat intakes were mainly from cereals, fish, and seafood, meat poultry, and offal. Cereals and vegetables were the main sources of iron while vitamin A was mainly from fish and seafood. A household with more than four family members whose iron intakes were below the Estimated Average Requirement (EAR) of 10-26 mg/day for iron were 2.10 times [Adjusted Odd Ratio (AOR) = 2.10; 95% CI:1.19, 3.71] likely to become underweight. Adult members whose iron intake were below EAR for iron were 2.18 times [AOR = 2.18, 95% CI: 1.07, 4.45] likely to become overweight and/or obese Low diet quality was evident with female children and adults having lower calorie intake than male members. Nutrition-and gender-sensitive food-based intervention must be made to improve diet quality and diversity.

RICE; FARMS; HOUSEHOLDS; DIET; NUTRITIONAL STATUS; FOOD INTAKE; PHILIPPINES

S40 - NUTRITION PROGRAMMES

Knowledge, attitude and practices of nutrition workers on climate change in Laguna, Batangas and Cavite Provinces, Philippines. **Talavera, M.T.M. mtalavera@up.edu.ph., Bustos, A.R. Philippines Univ. Los Baños, College Laguna (Philippines). Inst. of Human Nutrition and Food. Rebancos, C.M. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 19-28. 2020.*

Climate change and malnutrition are two global phenomena that affect millions of population groups. The Philippines is considered one of the most vulnerable countries for extreme natural events and at the same time has a high prevalence of underweight (19.0%) and stunting (28.8%) in 2019 among under five children. The nutritionally vulnerable groups are children, pregnant and lactating women, and elderly. These groups are also greatly affected by climate change-related events then the malnutrition situation is exacerbated. The local nutrition workers are the frontline workers who plan, implement, and monitor nutrition programs. Mainstreaming climate change in the local nutrition planning processes will be facilitated if nutrition workers are knowledgeable. This study aimed to determine the current knowledge, attitudes and practices of nutrition workers and perceptions on how to mainstream climate change in the nutrition sector's local planning system. A survey was conducted among local nutrition workers. Ninety-five percent of nutrition workers were highly knowledgeable, 86% were with high level of attitudes and 50% were exhibiting moderate level of practices related to climate change. The gaps can be narrowed by capacity building and possibly this can lead to mainstreaming climate change in the local nutrition planning process.

WORKERS; EMPLOYEE ATTITUDE; HUMAN NUTRITION; DEVELOPMENT PROJECTS; MALNUTRITION; CLIMATIC CHANGE; ADAPTATION; PHILIPPINES

T - POLLUTION

T01 - POLLUTION

Bacteriological examination and physico-chemical properties of streams receiving industrial effluents in Rosslyn, Pretoria, South Africa. **Salvador-Oke, K., King, P., Olowoyo, J.O. Sefako Makgatho Health Sciences Univ., Medunsa, Pretoria (South Africa). Dept of Biology. woleolowoyo@yahoo.com.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 7-15. 2018.*

The reliance on streams and rivers to provide water for agricultural purposes and to some extent- domestic purpose, is still in existence especially in the semi-urban and rural areas. This study investigated the bacteriological load and physicochemical properties of water from streams receiving industrial effluents and a reservoir receiving wastewater from a hospital. Water samples were collected from March to August, 2015 from ten sampling stations and analysis were carried out following standard procedures. The water pH ranged from 6.21 +- 0.03 – 8.22 +- 0.08. Phosphate ranged from 0.0 – 7. 80 +- 0.38 mg/L. Nitrate ranged from 0.03 +- 0.04 – 209 +- 2.26 mg/L while nitrite ranged from 0.00 – 14. 00 +- 0.30 mg/L. The TSS (total suspended solids) and TDS (total dissolved solids) were in the range 40.0 +- 2 .00 – 58.70 +- 130 mg/L and 40 +- 6.0 – 1010 +- 45.0 mg/L respectively. The bacteriological loads ranged from 4.85 +- 2.0 – 36.5 +- 7.0 cfu 100/ml. Sites receiving effluents from industrial and hospital wastes were highly polluted with values obtained for parameters exceeding the standard set by World Health Organization (WHO). The shapes of the bacteria examined under the microscope were Coccobacilli, Cocci, Vibrio, Diplococci and Bacilli. Vibrio shaped bacteria was only observed from streams receiving wastewater from the hospital. In conclusion, it is necessary to educate people on the danger of using water from these streams and a proper waste management method should be established at the hospital and the industrial areas.

RIVERS; BACTERIA; ANIONS; WASTE MANAGEMENT; SOUTH AFRICA; WASTEWATER; INDUSTRIAL WASTES

Evaluation of anticipated performance index of tree species for air pollution mitigation in Islamabad, Pakistan. **Irshad, M.A., Nawaz, R. The University of Lahore, Lahore (Pakistan). Dept. of Environmental Sciences. rab.nawaz@envs.uol.edu.pk., Ahmad, S. COMSATS Univ. Islamabad, Vehari Campus (Pakistan). Dept. of Environmental Sciences. Arshad, M. Karakoman International Univ., Gilgit (Pakistan). Rizwan, M. University Faisalabad,**

Faisalabad (Pakistan). Dept. of Environmental Science and Engineering. Ahmad, N. COMSATS Univ. Islamabad, Vehari Campus (Pakistan). Dept. of Environmental Sciences. Nizami, M. Karakoram International Univ., Gilgit (Pakistan). Dept. of Forestry. Ahmed, T. National Coll. of Business Administration and Economics Lahore (Pakistan). *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 50-59. 2020.*

There is ever increasing problem of air pollution in cities due to urbanization, industrialization, population growth and increased number of vehicles. Plants can play a vital role in mitigation of air pollution in urban areas. The present study was conducted to estimate the Air Pollution Tolerance Index (APTI) and Anticipated Performance Index (API) for 21 different plant species used for green belt development along the roadsides in Islamabad, the capital city of Pakistan. For APTI and API estimation, ascorbic acid, total chlorophyll content, relative water content and pH of leaf extract of selected plant species were measured using standard methods. The results showed that Syzygium cumini L. (jaman), Pterospermum acerifolium (kanak champa) and Alstonia scholaris (devil tree) were the excellent performers. According to API and APTI values, these species were found effective in reducing air pollution and could be effective for green belt development in urban areas. Albezia lebbeck, Melia azedarach, Eucliptus camaldulensis, Dalbergia sissoo, Tamarindus indica, Acacia nilotica L., Callistemon viminalis and Leucaena leucocephala are very poor performers regarding air and noise abatement. These plants are very poor performers and are very sensitive plants to air pollution. These plants can be used as bio-indicators of poor urban air quality.

TREES; SPECIES; URBAN FORESTRY; AIR POLLUTION; ENVIRONMENTAL MANAGEMENT; ECOSYSTEMS; PAKISTAN

Isolation, identification and heavy metal biosorption assessment of yeast isolates indigenous to abandoned mine sites of Itogon Benguet, Philippines. **Gacho, C.C. carmelcg13@gmail.com., Coronado, F.T., Tansengco, M.L., Barcelo, J.R., Borromeo, C.C., Gutierrez, B.J.M. Department of Science and Technology, Bicutan, Taguig City (Philippines). Environment and Biotechnology Div.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 109-121. 2019.*

Water samples collected from abandoned mining sites in Itogon, Benguet, Philippines were screened for metal resistant microorganisms, in particular yeasts that will be used to remove toxic metals such as Zn, Cu, Pb, Cr and Ni from aqueous media. Among the five yeast strains selected and five heavy metals tested, Nodulisporium sp. exhibited the highest removal efficiency of 80% and biosorption capacity of 56.7 mg/g for Pb. This was based on the model equation for each metal that was generated to derive optimum response for removal efficiency. The metal accumulation potential for all selected yeast isolates was

generally higher at the lower initial metal concentration of 25 mg/L, indicating rapid metal absorbing ability of the isolate and that adsorption sites in the biomass are taking up available metal ions more quickly. An increased removal capability was observed when the best isolate was applied in a semi-continuous treatment system thru an Aerobic Cascading Filter Bed Baffled Reactor (ACFBBR). The reactor design including the packing material remarkably enhanced the contact between the yeast biomass and Pb contaminated wastewater resulting in a much greater biosorption capacity of 170.14 mg/g as compared to the biosorption of 56.7 mg/g achieved during the batch adsorption experiment.

HEAVY METALS; BIOREMEDIATION; ISOLATION; IDENTIFICATION; YEASTS; PHILIPPINES

Melanomacrophage centers in Nile tilapia (Oreochromis niloticus L.) as biomarker for carbamate exposure. **Marteja, J.C., Modina, R.M.R. Visayas State Univ., Visca, Baybay City, 6521-A Leyte (Philippines). Dept. of Biological Sciences. rismenoel.modina@vsu.edu.ph.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 24 (1) p. 25-35. 2021.*

Melanomacrophage centers are aggregates of pigment-containing cells found in the animal's hematopoietic tissues. Changes in its characteristics have been used to assess the influence of pesticide exposure, and as tools for potential monitoring for fish and environmental health. This study aimed to evaluate the pesticide-induced hepatic and splenic melanomacrophage center responses in Nile tilapia (Oreochromis niloticus L.) following exposure to fenobucarb in varying lengths of exposure. Five test groups were exposed to constant dose of fenobucarb at 0.08 mg L-1at different periods (0, 7, 14, 21, and 28 days). Fenobucarb only induced significant changes in the splenic melanomacrophage centers. Splenic melanomacrophage centers significantly increased in number in response to the increasing lengths of exposure. Increasing trend of size and cover was also observed, however, significant difference was only detected at 28 days exposure period. Significant difference in hemosiderin and lipofuscin pigments was also detected at 28 days exposure which suggests tissue destruction after prolonged exposure. This study confirms the potential of melanomacrophage centers as a sensitive biomarker for fenobucarb exposure indicated by the changes in its characteristics, particularly in the spleen.

TILAPIA; OREOCHROMIS NILOTICUS; MACROPHAGES; SPLEEN; CARBONATES; CONTAMINATION; TOXICITY

Phytoremediation potential of Dilang-aso (Pseudelephantopus spicatus (Juss.) Rohr) in lead-contaminated soil. **Lu, A.J.D.T., Navarro, F.J.B., Pascual, R.Z. lydiapascual@usm.edu.ph., Clemen-Pascual, L. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Chemistry.** *Journal of Agricultural Research, Development, Extension and*

Technology (Philippines). 2704-3746; 2704-3754. v. 2 (1) p. 40-52. 2020.

This study investigated Pseudelephantopus spicatus, a member of the family Asteraceae that has not yet been explored in terms of its phytoremediation potential. This study utilized two pot experiments: (1) plant tolerance to lead (Pb)-contaminated soil, and (2) plant mechanism for Pb uptake. For the plant tolerance experiment, plants were exposed to different lead concentrations, and the shoot length, width of the largest leaf, and number of leaves were recorded. For the Pb uptake experiment, P. spicatus plants were transplanted in polyethylene bags containing 1 kg of 500 ppm Pb-treated soil, and were observed every five days for 30 days. Results showed that P. spicatus plants in Pb-treated soil had significantly shorter shoot length, smaller width of largest leaf, and reduced number of leaves, as compared to the control treatment. The Pb uptake of P. spicatus also increased with longer exposure time. However higher Pb concentration was still observed in the soil (218.57 ppm) compared to the Pb concentration in roots (29.49 ppm) and shoot (17.07 ppm). Thus, the P. spicatus plant demonstrated tolerance as a Pb excluder, and may not be a good candidate for phytoremediation. However, other studies may investigate whether the phytoremediation potential of P. spicatus can be improved by observing the effects of different Pb concentrations, higher time intervals response, or the use of chelating agents and fertilizers.

ASTERACEAE; SPECIES; BIOREMEDIATION; LEAD; POLLUTED SOIL; HEAVY METALS; BIOACCUMULATION

Phytoremediation potential of vetiver grass (Chrysopogon sp.) system for improving the water quality of aquaculture ponds along the Marilao and Meycauayan River in Bulacan, Philippines. **Pleto, J.V.R. Philippines Univ. Los Baños, College, Laguna (Philippines). Environmental Biology Div. Simbahan, J.F. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Inst. of Biology. Arboleda, M.D.M. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Migo, V.P. Philippines Univ. Los Baños, College, Laguna (Philippines). Dept. of Chemical Engineering.** *Journal of Environmental Science and Management (Philippines). 0119-1144. Special Issue 1 p. 19-26. 2019.*

The Marilao and Meycauayan Rivers are known to be polluted with heavy metals and organic matter due to different anthropogenic and industrial activities along the river system. Many aquaculture ponds are situated along the river system and obtain water from the river. In order to address this problem, phytoremediation or the use of plants was tested as a low-cost remediation system to reduce the pollution on the ponds. The vetiver grass was utilized because of its unique features and its ability to accumulate heavy metals. A vetiver pontoon was established on fishponds located at Brgy. [village] Nagbalon, Marilao

and Brgy. Liputan, Meycauayan. The vetiver roots and leaves were analyzed for heavy metal content. There is an accumulation of toxic heavy metals such as lead, chromium, manganese and copper in the roots and leaves. Manganese had the highest accumulated metal by the vetiver grass. It was observed that there is a significant difference of heavy metal absorption of Pb, Zn, Mn and Cr through time. The vetiver grass favored accumulating heavy metals in the roots based on the translocation factor (TF). Vetiver grass can potentially improve some water quality parameters such as lowering levels of ammonia, BOD and COD and absorb heavy metals such as Pb, Zn, Mn and Cr which are harmful to fish. The vetiver grass is a low-cost phytoremediation technology with a high potential impact in cleaning up the water in ponds.

CHRYSOPOGON; SPECIES; BIOREMEDIATION; WATER QUALITY; AQUACULTURE; PONDS; WATER POLLUTION; PHILIPPINES

Rehabilitation of eutrophic rivers through phytoremediation in constructed wetland: the case of Balili River in Benguet, Philippines. **Napaldet, J.T. Benguet State Univ., La Trinidad, Benguet (Philippines). Biology Dept. jtnapaldet@up.edu.ph., Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 203-229.*

Balili River in Benguet, northern Philippines remains polluted despite more than a decade of rehabilitation efforts; thus an alternative clan-up method, such as phytoremediation, is timely and worth investigating. This chapter describes the phytoremediation potentials of selected local dominant aquatic macrophytes of the river, namely: Amaranthus spinosus, Eichhornia crassipes Eleusine indica and Pennisetum purpureum in pilot-scale constructed wetlands and subjected to varying hydraulic retention time (HRT) treatments. Results showed significant improvement of the wastewater quality in most all parameters of water assessment. At optimal HRT, total suspended solids, dissolved oxygen, nitrate, and mercury were significantly lowered at values passing the particular minimum water quality standards, while biological oxygen demand, phosphate, and lead were slightly above the minimum standards. Against these reduction rates, total and fecal coliform still still did not pass the water quality standard for class A water. The pollution reduction efficiencies of the aquatic macrophytes were significantly affected by HRT. Significant pollution reduction was observed as early as day 1, while optimal reduction was recorded at 3-4 days HRT. Among the macrophytes, P. purpueum, generally, had the best pollution reduction efficiency. Results of the study showed that local dominant aquatic macrophytes are promising phytoremediators and provide a good template for coming up with a full-scale constructed

wetland for the rehabilitation of Balili River as well as for other eutrophic rivers in the country.

RIVERS; WETLANDS; BIOREMEDIATION; WATER POLLUTION; WATER QUALITY; PHILIPPINES

Trace metal deposition on soil and accumulation in plants around a coal power station in Pretoria, South Africa. **Xaba, M.W. xabamandla@gmail.com., Olowoyo, J.O. Sefako Makgatho Health Sciences Univ., Medunsa, Pretoria (South Africa). Dept of Biology. Scott, G. Department of Environmental Affairs, Private Bag X447, Pretoria, 0001 (South Africa).** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 23-29. 2018.*

Combustion of coal in power stations is one of the main sources of environmental pollution due to the generation of trace metals. This study investigated levels of trace metals from five different plants and soils around a coal-fired power station in Tshwane, South Africa. Plants and soil samples were collected from different points (10, 500 and 750 m) along different directions (North West, North East, South West and South East) and analyzed for metals contents using Inductive Couple Plasma–Optical Emission Spectrophotometer (ICP-OES). A significant increase in the concentration of trace metals was detected from the stack pointing to the effect of the long stack in depositing more trace metals at a distance of 750 m away from the power station. Digitaria diagonalis and Tagetes minuta have significantly higher concentrations of trace metals than other plants collected around the area ($p < 0.05$). The soil pH was in the range 5.13 +- 0.11 to 6.01 +- 0.12. The concentrations for all elements in soil were recorded in the following descending order: Fe > Al > Mg > Cr > Zn > Cu > Pb >Ni > Co.

DIGITARIA; TAGETES; PLANTS; COAL; METALS; SOIL; POLLUTION; ENVIRONMENT; SOUTH AFRICA

Using the responses of green algae Spirogyra as bioindicator for metals and pesticides pollution. **Shing, W.L. lingshing.wong@newinti.edu.my., Hwang, T.Y., Yi, K.W., Han, L.J., Hock, O.G. INTI International Univ., Persian Perdana BBN, 71800 Nilai, Nigeria Sembilan (Malaysia). Faculty of Health and Life Sciences.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 1-6. 2018.*

Metals and pesticides are common environmental pollutants. The presence of these pollutants in the environment need to be closely monitored because of its toxicity effects to human beings. In this study, the responses of Spirogyra in the form of changes in chlorophyll content due to the exposure to these pollutants were reported. The algae was collected from natural environment, immobilized with agarose gel, and then being exposed

to lead (Pb), aluminium (Al), calcium (Ca), sodium (Na), atrazine and 2,4-dichlorophenoxyacetic acid (2,4-D). The changes of chlorophyll in the algae were measured for 48 hours using a spectrophotometer at 663 nm and 450 nm respectively. The content of the pigment was changed due to the presence of the pollutants at concentrations of 0.001 mg/L to 1.000 mg/L . The change might due to the biochemical reactions triggered by the pollutants. The response could potentially be used as whole cell bioindicator for the detection of the presence of metals and pesticides.

ALGAE; SPECIES; METALS; PESTICIDES; INDICATOR ORGANISMS; POLLUTION; CHLOROPHYLLS

U - METHODOLOGY

U40 - SURVEYING METHODS

Application of remote sensing and SWAT [soil and water assessment tool] model to assess climate and land use changes impacts on hydrological responses and sediment yield. **Ngo Thanh Son, Hoang Le Huong, Nguyen Duc Loc, Vo Trong Hoang.** *College, Laguna (Philippines). SEARCA. 2021.*
https://www.searca.org/pubs/monographs?pid=506

The Upper Ma River basin located in Son La and Dien Bien provinces in the northwestern region of Vietnam has a total area of 6,688 km2. It is a typical river basin in Vietnam, a transboundary with variable flow regime and topography, and has high population pressure in its mountainous region. It is also considered as one of the most disaster-prone regions, suffering from typhoons, tropical storms, drought, landslides, soil erosion, and forest fires. In the study area, land use and climate change are two main factors that directly affect regional hydrologic conditions; thus, the segregation of their influences is of great importance to land use planning and water resources management. The study assessed the impacts of land use change and climate change on hydrological process and sediment yield in the Upper Ma River basin in Vietnam through remote sensing (RS) and the soil and water assessment tool (SWAT) model. Maps with land use were generated using RS for the years 1994 and 2015. The SWAT model was used for hydrological process and sediment yield simulation. Results indicated that the SWAT model proved to be a powerful tool in simulating the impacts of land use and climate change on catchment hydrology and sediment yield based on the Nash-Sutcliffe efficiency (NSE), coefficient of determination (R2), and percent bias (PBIAS) values. For runoff, the values of NSE, R2 , and PBIAS were 0.84, 0.85, and 2.61 during calibration period, respectively; and 0.75, 0.81, and –8.30 during validation period. For sediment yield, the values obtained during calibration period were 0.73, 0.76, and –3.61, respectively; during validation period, they were 0.87, 0.88, and –

1.46. The change in land use from forest to cash crop and urban combined with climate variability between 1994 and 2015 strongly contributed to increasing hydrological processes (i.e., surface runoff, evapotranspiration, and water yield) and sediment yield, with decreasing percolation and groundwater. Data on climate change for the period 1994–2015 showed significant increase in all hydrological components, but with decrease in sediment load. It can be explained by the decrease in precipitation in the wet season, increase in precipitation in the dry season, and earlier transition of normal rainy season in northwestern Vietnam. Under impacts of projected land use and climate change scenarios on hydrological process and sediment yield of the Upper Ma River basin, results indicated that ET, surface flow, and sediment yield are more sensitive to the changes in land use and climate by 4 percent, –1 percent, and 6 percent, respectively, in the future. Moreover, in comparison with current conditions, the potential soil erosion in the Upper Ma River basin ranges from moderate to high. In general, a deep understanding obtained from hydrological responses and sedimentation, and experience in using RS and SWAT will provide the guidance and techniques that may be applicable to other river basins in Vietnam. In addition, using SWAT could be of value for decision makers in integrated river basin management in developing adaptation and mitigation strategies in relation to changes in climate and land use.

REMOTE SENSING; CLIMATE; LAND USE; ENVIRONMENTAL IMPACT; HYDROLOGY; SEDIMENT; CLIMATIC CHANGE; WATER RESOURCES

Assessing the applicability of radar and optical images in monitoring a mangrove forest: a case study of Ca Mau Province, Vietnam. **Nguyen Thi Huyen. Nong Lam Univ., Ho Chi Minh City (Vietnam). Faculty of Environment and Natural Resources. nt.huyen@hcmuaf.ed.vn., Pham Bach Viet. Lam Dao Nguyen.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 181-192.*

The Ca Mau mangrove forests of Vietnam are typical wetland ecosystems, covering an extensive area, and processing rich biological diversity. Unfortunately, the Ca Mau mangrove forests have been destroyed for aquaculture purposes. In the past, remote sensing images were widely used to monitor mangrove forests and assess them for damage. Both optical and radar images can provide information, but with limitations. If these two are combined, scientists can take advantage of their strengths and can limit weaknesses. This study assessed the accuracy of monitoring a mangrove forest from optical, radar, and combination datasets from optical and radar images. Data from Landsat, SPOT (Satellite Pour I'observation de la Terre), and ALOS PALSAR (Advanced Land Observing Satellite Phased Array Type l-band Synthetic Aperture Radar) data were used to assess their

applicability in monitoring the status of mangrove forests in Ca Mau Province, Vietnam. Each dataset (Landsat, SPOT, ALOS PALSAR, Landsat combined with ALOS PALSAR, and SPOT combined with ALOS PALSAR) was independently classified for mangrove detection by the supervised method. The results of this study show that optical datasets with high spatial resolution such as SPOT (10 m) allowed classification of a mangrove area with the highest accuracy (Accuracy of SPOT: 90%; Kappa: 0.89). This is followed by the combined datasets (SPOT and ALOS PALSAR: 88.3% and Kappa: 0.87; Landsat and ALOS PALSAR: 85.2% and Kappa: 0.84). Landsat and ALOS PALSAR datasets have the lowest classification accuracy at 83.1 percent and 79.2 percent, Kappa has 0.82 and 0.75. Based on the results, optical images like Landsat images, which have medium spatial resolution an are easily affected by cloud cover, should be combined with radar images to improve mangrove classification accuracy. The results can offer an appropriate method to monitor mangrove areas, in general, using the Ca Mau mangrove forest as an example.

MANGROVES; MONITORING; RADAR; IMAGERY; IMAGE PROCESSING; IMAGE ANALYSIS; RESOURCE MANAGEMENT; VIET NAM

Change detection of land cover and land use using remote sensing and GIS techniques in Nong Han wetland in Thailand. **Doydee, P. Kasetsart Uni., Chalermphrakiat Sakon Nakhon Province Campus (Thailand). Dept. of Agriculture and Natural Resources. puvadol.d@ku.th.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 193-202.*

This paper describes the changes in the different land covers and land uses in the Nong Han wetland, Sakon Nakhon provice, Thailand during the ecotourism project called the Lotus and Water Lily Development Project in 2009. These changes were detected through the use of remote sensing and Geographic Information System (GIS) techniques. The results indicated that there were four major types of land cover and land use changes, namely in the: (1)lotus and water lily area (112, 156 sq m); (2)aquatic vegetation zone (20,970 sq m); (3)paddy field (34,498 sq m); and (4)landfill area (52,386 sq m). Land cover and land use change change (LCLUC) is a key driver resulting in climate change and climate variability. Change detection was recommended to be an approach for remote sensing and GIS. Raster to raster images rectification process must be conducted using the same Geodetic Datum and Map Project. Good evenness and distribution of at least 25 ground control points (GCPs) have to be performed associated with the values of not mean square errors that must be <1.00 in all GCPs. In situ data from actual field survey using GPS receivers with <5 m accuracy, while the number of global navigation satellite system for receiving the signal from outer space must be greater than eight satellites. Then, the LCLUC in the form of rater

dataset is converted into binary image files, band interleaved by line, and imported to GIS for map annotation. Remote sensing and GIS are good and quick techniques to determine the LCLUC, with the low cost compared to conventional surveying methods. The analysis of the results showed that most of Nong Han wetland had been significantly, adversely affected by the different classes of land cover and land use changes due to anthropogenic activities.

LAND USE; REMOTE SENSING; GEOGRAPHICAL INFORMATION SYSTEMS; WETLANDS; THAILAND

Comparison of spectrophotometric and digital photometric methods for determining chemical oxygen demand. **Mallari, R.D.C., Micor, J.R.L., del Rosario, E.J. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Chemistry. ejdros@yahoo.com.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 21 (2) p. 16-22. 2018.*

Visible spectrophotometry (VS) and digital photometry (DP) for determining chemical oxygen demand (COD) were compared; the latter method involved image processing of digital photographs of analyte solutions using RGB-AIC software. Statistical analysis showed that COD values of untreated and treated (trickling filter) wastewater samples from a hog slaughterhouse were not significantly different using VS and DP methods. The COD values were not significantly different among the treated samples as well using a* and L* plots. Tests for accuracy and repeatability of the DP method showed acceptable results. The calculated limit of detection (LOD) for DP was 0.73 mg/L while the LOD for VS was 0.33 mg/L . The accuracy of the DP method was validated using glucose solutions of known COD values; t-tests performed at 95% confidence level showed no significant differences in COD values between (1) theory and experiment, (2) VS and DP and (3) a* and L* plots. These findings suggest that digital photometry is accurate and can be used as an equally accurate alternative to conventional spectrophotometry.

SPECTROMETRY; POLLUTANT LOAD; IMAGE PROCESSING; WASTEWATER; TECHNOLOGY TRANSFER; WATER QUALITY

Documenting permaculture farm landscapes in the Philippines using a drone with a smartphone. **Flores, J.J.M. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. jabezjoshuaflores@gmail.com., Bagunu, A.K. Permaculture Research Philippines (Philippines). Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences.** Buot, I.E. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Biological Sciences. iebuot@up.edu.ph. editor. Methodologies supportive of sustainable development in

agriculture and natural resources management: selected cases in Southeast Asia. College, Laguna (Philippines). SEARCA. *2020. p. 71-86.*

The emergence of unmanned aerial vehicles (UAVs) has led their widespread use in agriculture by scientists and farmers for the purposes of mapping, monitoring, and landscape management. However, the high cost of drones, together with the risk and difficulty of flying any drone, has marginalized the small-scale farmers from exploring the potential of the AUV technology appropriate to their context. In this report, the authors aim to introduce a simple documentation methodology to small-scale permaculture farmers using a budget-friendly drone that would promote permaculture design, agroecological farm management, and stimulate environmental awareness. The study developed a 10-step methodology based on experience in the field that maximizes the features on the drone. Originally intended as an entry-level AUV, the Ryze Tello was used as documentation tool to generate baseline data of farm biodiversity and system component interactions as well as landscape heterogeneity. Using aerial photos from the drone's built-in camera, the researchers were able to gather valuable data in four small-scale permaculture farms in the Philippines. Collecting such data would enable farmers to observe and interpret both anthropogenic and natural patterns and processes occurring throughout the year. The results of the study suggest the development of more drones like the Tello with improved features in the near future to empower more farmers to make design-based decisions that would ensure both farm productivity and ecosystem health.

FARMS; LANDSCAPE; ALTERNATIVE AGRICULTURE; MONITORING; TECHNOLOGY; AERIAL SURVEYING; PHOTOGRAPHY; REMOTE SENSING

Evaluation of plant reflectance response with elevation using multispectral images captured by an unmanned aerial vehicle (UAV). **Tidula, T.J.T. University of Southern Mindanao, Kabacan, Cotabato (Philippines). University of Southern Mindanao Agricultural Research Center. tjdidula@usm.edu.ph. Saliling, W.J., Alucilja, R. University of Southern Mindanao, Kabacan, Cotabato (Philippines). Dept. of Agricultural Biosystems Engineering.** *Journal of Agricultural Research, Development, Extension and Technology (Philippines). 2704-3746; 2704-3754. v. 1 (2) p. 1-12. 2020.*
https://doi.org/10.5281/zenodo.8245557

The survival, development and productivity of plants can be affected by elevation. Remote sensing has been used to study altitudinal gradient and plant reflectance. Plant reflectance is an important factor for determining plant health and phenology. This study presents a technique to support a better understanding of how plant reflectance is associated with elevation. In particular, this study determined the effect of elevation on reflectance of pineapple. This study was conducted at Polomolok, South Cotabato, Philippines. The

Unmanned Aerial Vehicle (UAV) platform, eBee Ag, onboard the Parrot Sequoia multispectral camera was used to capture multispectral images at 121 meters flight altitude with 80% image overlap on eight areas located at 400-500 meter-above-sea-level (masl) (Location 1) and 650-700 masl (Location 2) elevations. Image stitching was done through Pix4DMapper 3.1 using Ag Multispectral template. The root mean square error (RMSE) for the x-, y- and z- direction justified good and comparable accuracy for all images stitched. Multispectral images captured by an UAV could discriminate plant reflectance response in different elevations. Most of the data demonstrate a moderate positive correlation between elevation and green, red, red-edge and near-infrared reflectance. The only exceptions were correlations between elevation and red-edge reflectance (no correlation), and between elevation and near-infrared reflectance (weak correlation) in Location 2.

PLANTS; REFLECTANCE; IMAGE PROCESSING; REMOTE SENSING; TECHNOLOGY TRANSFER; ALTITUDE; ANANAS COMOSUS

GIS [Geographic Information System]-assisted carbon stock assessment of Loboc-Bilar Mahogany Plantation, Bohol, Philippines. **Reyes, T.D. Jr. Bohol Island State Univ., Bilar Campus, Zamora, Bilar, Bohol (Philippines). tomseyer@gmail.com.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 22 (1) p. 77-86. 2019.*

The study determined the carbon budget of the Loboc-Bilar Mahogany (Swietenia macrophylla King.) Plantation in the province of Bohol, Philippines within the months of June to October 2018. The plantation straddles two municipalities, Loboc and Bilar. It is a popular destination for local and international tourists due to its compelling tunnel-like vegetative scenery. Delineation of the plantation boundary was fine-tuned using both image digitization and ground survey. A random sampling method was applied in conjunction with Geographic Information System (GIS) software to spatially distribute sampling plots in the research area. Several carbon pools were assessed, namely: aboveground biomass, necromass or ground biomass, and belowground biomass. Allometric and other mathematical equations were used in the calculation of biomass density, stored carbon, and carbon dioxide equivalents. The plantation had 29,428.03 Mg of stored carbon in the biomass distributed over a total land area of 115.21 ha, yielding an estimated stored carbon density of 255.43 Mg/ha. The monetized value of stored carbon in the whole plantation amounted to US$486,003.96.

SWIETENIA MACROPHYLLA; PLANTATIONS; CARBON; GEOGRAPHICAL INFORMATION SYSTEMS; GROWTH; MEASUREMENT; PHILIPPINES

GIS-based approach to determine suitable settlement areas compatible with the natural environment. **Ardahanlioglu, Z.R. Mugla Sitki Kocman Univ., Mugla (Turke). Dept. of**

Landscape and Ornamental Plants. Selim, S. Akdeniz Univ. Antalya (Turkey). Dept. of Remote Sensing. serdarselim@akdeniz.ed.tr., Karakus, N. Akdeniz Univ., Antalya (Turkey). Dept. of Remote Sensing and Geographic Information. Cinar, I. Mugla Sitki Kocman Univ., Mugla (Turke). Dept. of Landscape and Ornamental Plants. *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (1) p. 71-82. 2020.*

This study determined the settlement areas that were suitable for the natural environment in the Seydikemer District in Turkey. Within this context, databases related to the natural environment of the region and existing land uses were created using Unmanned Aerial Vehicle images that were digitized and analysed using geographic information systems. Land cover was classified using Random Forest and Maximum Likelihood Classification methods for remote sensing. The natural environmental properties of the study area were determined based on the resulting classification, and the criteria for the suitability of the settlement areas were defined by the Multi-Criteria Decision Analysis and Analytic Hierarchy Process. Accordingly, eight main criteria and their classes of suitability were analysed and evaluated. Assessment of the natural suitable structure of the area was conducted using weighted overlay analysis. Sixteen percent of the survey area was suitable, while 69.01% was moderately suitable and 14.97% was not suitable for use as a settlement area. Considering that this region is in the process of rapid urbanization, The findings of the study are expected to make a significant contribution to the future settlement and land-use plans of the city.

LAND USE PLANNING; GEOGRAPHICAL INFORMATION SYSTEMS; NATURAL RESOURCES; LAND COVER; URBAN PLANNING; TURKEY

Use of GIS to visualize spatial distribution of zooplankton in Teluk Bahang Reservoir, Penang, Malaysia. **Ismael, A.H. Universiti Sains Malaysia, Penang 11800 (Malaysia). School of Biological Sciences. azma_hanim@yahoo.com., Rahman, A.A. Universiti Sains Malaysia, Penang 11800 (Malaysia). School of Humanities. Chin, L.S. Universiti Sains Malaysia, Penang 11800 (Malaysia). School of Biological Sciences.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 23 (2) p. 60-71. 2020.*

The Teluk Bahang Reservoir is the largest in Penang, Malaysia and supplies drinking water to the inhabitants of the Northwest of Penang Island. A monthly testing of water quality and study of zooplankton species abundance was conducted at four different sampling locations and three different water depths. The water quality parameters measured include water temperature, dissolved oxygen, conductivity, pH, orthophosphate (PO4-P), ammonium-nitrogen (NH4-N), nitrite-nitrogen (NO2-N) and nitrate-nitrogen (NO3-N). In this study, multiple techniques in ArcMap software, namely, Inverse Distance Weighted (IDW) and Kernel Density, were used to identify the relationship among water quality parameters

and species abundance of zooplankton in the sampling stations. In GIS spatial analysis, high abundance areas or hotspot areas of zooplankton were presented in a visual map. The distribution pattern of zooplankton species and the geographic distribution of water quality parameters were clearly identified based on inspection of the map. The data generated from GIS mapping in this study is important for ecological research, particularly on zooplankton distribution in a drinking water reservoir.

ZOOPLANKTON; GEOGRAPHICAL INFORMATION SYSTEMS; SPATIAL DISTRIBUTION; WATER QUALITY; MALAYSIA

Using digital technology in enhancing climate resilience of Philippine agriculture: the SARAI [Smarter Approaches to Reinvigorate Agriculture as an Industry in the Philippines]-enhanced monitoring system. **Espaldon, M.V.O, Mendoza, H.D. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Quiray, A.E. Philippines Univ. Diliman, Diliman, Quezon City (Philippines). Dept. of Geography. Dorado, M.A. Philippines Univ. Los Baños, College Laguna (Philippines). Coll. of Engineering and Agro-Industrial Technology.** Sajise, P.E. editor., Lasco, R.D. editor., Cadiz, M.C.H. editor., Bantayan, R.B. editor. Policy-enabling environment for climate change adaptation: some experiences in Southeast Asia. College, Laguna (Philippines). SEARCA. *2018. p. 137-153.*

The Philippines' agriculture sector bears the heaviest and most immediate effects of climate change, especially with increasing occurrences of extreme typhoons and prolonged drought. For the longest time, the country's agriculture sector has only been reactive to such disasters and damages. As such, it is imperative to devise solutions that would pave the way for a proactive agriculture sector. As a response, the three-year research program Smarter Approaches to Reinvigorate Agriculture as an Industry in the Philippines (SARAI) is developing a national agricultural monitoring system called SARAI-Enhanced Agricultural Monitoring System (SEAMS). SEAMS uses geographic information system, remote sensing, and normalized difference vegetation index, which allows for a near real-time and site-specific monitoring of crop production areas. More so, with the available free data from the National Aeronautics and Space Administration of the United States and from the European Union, SEAMS can be used to immediately assess production areas that have just been hit by a typhoon; it can also be used to assess the different crop stages currently planted with crops. Currently, SEAMS is being mainstreamed in the Philippine Department of Agriculture Field Programs Operational Planning Division. The primary mainstreaming activity includes conducting SEAMS training, which is being attended by the regional municipal agricultural officers of Department of Agriculture (DA). The training includes basic SEAMS methodologies and technical know-how of the software that municipal agricultural officers can use to assess their respective municipalities. Mainstreaming this system with the DA

operations is a tedious process of improving methodologies and of continuously finding ways to integrate the proposed system into the existing national protocols. Ultimately, the goal of mainstreaming the crop monitoring system is to provide local agricultural officers with a more efficient and a more real-time methodology to monitor the effects of climate hazards in their areas.

CLIMATIC CHANGE; CROPS; PRODUCTION; FARM AREA; GEOGRAPHICAL INFORMATION SYSTEMS; REMOTE SENSING; MONITORING; DISASTERS

Using Rose' and Manning's equations to spatially quantify soil erosion in Lagawe River Sub-Watershed, Ifugao, Philippines. **Bato, V.A. vabato@up.edu.ph., Paningbatan, E.P. Jr. Philippines Univ. Los Baños, College, Laguna (Philippines). Div. of Soil Science. Ella, V.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Land and Water Resources Div. Alcantara, A.J. Philippines Univ. Los Baños, College, Laguna (Philippines). School of Environmental Science and Management. Cruz, R.V.O. Philippines Univ. Los Baños, College, Laguna (Philippines). Inst. of Renewable Natural Resources. Sanchez, P.B. Philippines Univ. Los Baños, College, Laguna (Philippines). Div. of Soil Science.** *Journal of Environmental Science and Management (Philippines). 0119-1144. v. 24 (1) p. 45-55. 2021.*

A dynamic, physical model was created to predict soil erosion of Lagawe River Sub-watershed, a sub-watershed of Magat River Watershed, Philippines. Tipping-bucket rain gauge was installed to gather event-based rainfall data and a water-level recorder was installed on a straight segment of Lagawe River to gather water depth. Sediment samples were taken during rainstorm events and were used to calibrate the model. Manning's equation was used to calculate surface runoff and stream flow velocity. Rose' and Freebairn's Equation was used to calculate sediment mass. Geographic Information System was utilized as a tool for modelling using PCRaster Software. The model estimated a total of 57,905,000 m3 of eroded sediments which was generated during Typhoon Koppu (local name, Lando) in year 2015. A Welch Two Sample t-value of -0.25 and a p-value of 0.81 was achieved on the statistical analysis between the measured sediment yield and the output of the model. Since the p-value is greater than 0.05 (5%), there is no significant difference between the output of the physical dynamic model and the measured value for sediment yield. Likewise, the correlation analysis supports this conclusion with a linearly positive R2 value of 0.74.

GEOGRAPHICAL INFORMATION SYSTEMS; REMOTE SENSING; MODELS; WATERSHEDS; EROSION; CLIMATOLOGY; PHILIPPINES