

Journal of Threatened Taxa



Open Access

10.11609/jott.2024.16.3.24819-25018

www.threatenedtaxa.org

26 March 2024 (Online & Print)

16(3): 24819-25018

ISSN 0974-7907 (Online)

ISSN 0974-7893 (Print)

Building evidence
for conservation
globally for



years



Silver Jubilee Issue



ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

Publisher
Wildlife Information Liaison Development Society
www.wild.zooreach.org

Host
Zoo Outreach Organization
www.zooreach.org

43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Registered Office: 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Ph: +91 9385339863 | www.threatenedtaxa.org
Email: sanjay@threatenedtaxa.org

EDITORS

Founder & Chief Editor

Dr. Sanjay Molur

Wildlife Information Liaison Development (WILD) Society & Zoo Outreach Organization (ZOO),
43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore, Tamil Nadu 641006, India

Deputy Chief Editor

Dr. Neelesh Dahanukar

Noida, Uttar Pradesh, India

Managing Editor

Mr. B. Ravichandran, WILD/ZOO, Coimbatore, Tamil Nadu 641006, India

Associate Editors

Dr. Mandar Paingankar, Government Science College Gadchiroli, Maharashtra 442605, India

Dr. Ulrike Streicher, Wildlife Veterinarian, Eugene, Oregon, USA

Ms. Priyanka Iyer, ZOO/WILD, Coimbatore, Tamil Nadu 641006, India

Dr. B.A. Daniel, ZOO/WILD, Coimbatore, Tamil Nadu 641006, India

Editorial Board

Dr. Russel Mittermeier

Executive Vice Chair, Conservation International, Arlington, Virginia 22202, USA

Prof. Mewa Singh Ph.D., FASc, FNA, FNAsc, FNAPsy

Ramanna Fellow and Life-Long Distinguished Professor, Biopsychology Laboratory, and
Institute of Excellence, University of Mysore, Mysuru, Karnataka 570006, India; Honorary
Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore; and Adjunct
Professor, National Institute of Advanced Studies, Bangalore

Stephen D. Nash

Scientific Illustrator, Conservation International, Dept. of Anatomical Sciences, Health Sciences
Center, T-8, Room 045, Stony Brook University, Stony Brook, NY 11794-8081, USA

Dr. Fred Pluthero

Toronto, Canada

Dr. Priya Davidar

Sigur Nature Trust, Chadapatti, Mavinahalla PO, Nilgiris, Tamil Nadu 643223, India

Dr. Martin Fisher

Senior Associate Professor, Battcock Centre for Experimental Astrophysics, Cavendish
Laboratory, JJ Thomson Avenue, Cambridge CB3 0HE, UK

Dr. John Fellowes

Honorary Assistant Professor, The Kadoorie Institute, 8/F, T.T. Tsui Building, The University of
Hong Kong, Pokfulam Road, Hong Kong

Prof. Dr. Mirco Solé

Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas, Vice-coordenador
do Programa de Pós-Graduação em Zoologia, Rodovia Ilhéus/Itabuna, Km 16 (45662-000)
Salobrinho, Ilhéus - Bahia - Brasil

Dr. Rajeev Raghavan

Professor of Taxonomy, Kerala University of Fisheries & Ocean Studies, Kochi, Kerala, India

English Editors

Mrs. Mira Bhojwani, Pune, India

Dr. Fred Pluthero, Toronto, Canada

Mr. P. Ilangoan, Chennai, India

Ms. Sindhura Stothra Bhashyam, Hyderabad, India

Web Development

Mrs. Latha G. Ravikumar, ZOO/WILD, Coimbatore, India

Typesetting

Mrs. Radhika, ZOO, Coimbatore, India

Mrs. Geetha, ZOO, Coimbatore India

Fundraising/Communications

Mrs. Payal B. Molur, Coimbatore, India

Subject Editors 2020–2022

Fungi

Dr. B. Shivaraju, Bengaluru, Karnataka, India

Dr. R.K. Verma, Tropical Forest Research Institute, Jabalpur, India

Dr. Vatsavaya S. Raju, Kakatiya University, Warangal, Andhra Pradesh, India

Dr. M. Krishnappa, Jnana Sahyadri, Kuvempu University, Shimoga, Karnataka, India

Dr. K.R. Sridhar, Mangalore University, Mangalagangothri, Mangalore, Karnataka, India

Dr. Gunjan Biswas, Vidyasagar University, Midnapore, West Bengal, India

Dr. Kiran Ramchandra Ranadive, Annasaheb Magar Mahavidyalaya, Maharashtra, India

Plants

Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India

Dr. N.P. Balakrishnan, Ret. Joint Director, BSI, Coimbatore, India

Dr. Shonil Bhagwat, Open University and University of Oxford, UK

Prof. D.J. Bhat, Retd. Professor, Goa University, Goa, India

Dr. Ferdinando Boero, Università del Salento, Lecce, Italy

Dr. Dale R. Calder, Royal Ontario Museum, Toronto, Ontario, Canada

Dr. Cleofas Cervancia, Univ. of Philippines Los Baños College Laguna, Philippines

Dr. F.B. Vincent Florens, University of Mauritius, Mauritius

Dr. Merlin Franco, Curtin University, Malaysia

Dr. V. Irudayaraj, St. Xavier's College, Palayamkottai, Tamil Nadu, India

Dr. B.S. Kholia, Botanical Survey of India, Gangtok, Sikkim, India

Dr. Pankaj Kumar, Department of Plant and Soil Science, Texas Tech University, Lubbock, Texas, USA.

Dr. V. Sampath Kumar, Botanical Survey of India, Howrah, West Bengal, India

Dr. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Vijayasankar Raman, University of Mississippi, USA

Dr. B. Ravi Prasad Rao, Sri Krishnadevaraya University, Anantpur, India

Dr. K. Ravikumar, FRLHT, Bengaluru, Karnataka, India

Dr. Aparna Watve, Pune, Maharashtra, India

Dr. Qiang Liu, Xishuangbanna Tropical Botanical Garden, Yunnan, China

Dr. Noor Azhar Mohamed Shazili, Universiti Malaysia Terengganu, Kuala Terengganu, Malaysia

Dr. M.K. Vasudeva Rao, Shiv Ranjani Housing Society, Pune, Maharashtra, India

Prof. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Mandar Datar, Agharkar Research Institute, Pune, Maharashtra, India

Dr. M.K. Janarthanam, Goa University, Goa, India

Dr. K. Karthikeyan, Botanical Survey of India, India

Dr. Errol Vela, University of Montpellier, Montpellier, France

Dr. P. Lakshminarasimhan, Botanical Survey of India, Howrah, India

Dr. Larry R. Noblick, Montgomery Botanical Center, Miami, USA

Dr. K. Haridasan, Pallavur, Palakkad District, Kerala, India

Dr. Analinda Manila-Fajard, University of the Philippines Los Banos, Laguna, Philippines

Dr. P.A. Sinu, Central University of Kerala, Kasaragod, Kerala, India

Dr. Afroz Alam, Banasthali Vidyapith (accredited A grade by NAAC), Rajasthan, India

Dr. K.P. Rajesh, Zamorin's Guruvayurappan College, GA College PO, Kozhikode, Kerala, India

Dr. David E. Boufford, Harvard University Herbaria, Cambridge, MA 02138-2020, USA

Dr. Ritesh Kumar Choudhary, Agharkar Research Institute, Pune, Maharashtra, India

Dr. A.G. Pandurangan, Thiruvananthapuram, Kerala, India

Dr. Navendu Page, Wildlife Institute of India, Chandrabani, Dehradun, Uttarakhand, India

Dr. Kannan C.S. Warriar, Institute of Forest Genetics and Tree Breeding, Tamil Nadu, India

Invertebrates

Dr. R.K. Avasthi, Rohtak University, Haryana, India

Dr. D.B. Bastawade, Maharashtra, India

Dr. Partha Pratim Bhattacharjee, Tripura University, Suryamaninagar, India

Dr. Kailash Chandra, Zoological Survey of India, Jabalpur, Madhya Pradesh, India

Dr. Ansie Dippenaar-Schoeman, University of Pretoria, Queenswood, South Africa

Dr. Rory Dow, National Museum of natural History Naturalis, The Netherlands

Dr. Brian Fisher, California Academy of Sciences, USA

Dr. Richard Gallon, Llandudno, North Wales, LL30 1UP

Dr. Hemant V. Ghate, Modern College, Pune, India

Dr. M. Monwar Hossain, Jahangirnagar University, Dhaka, Bangladesh

For Focus, Scope, Aims, and Policies, visit https://threatenedtaxa.org/index.php/JoTT/aims_scope
For Article Submission Guidelines, visit <https://threatenedtaxa.org/index.php/JoTT/about/submissions>
For Policies against Scientific Misconduct, visit https://threatenedtaxa.org/index.php/JoTT/policies_various

continued on the back inside cover

Cover: The breathtakingly beautiful Silver Jubilee cover of JoTT is done in color pencils and ink by the 13-year old darling, Elakshi Mahika Molur.



Identifying plants for priority conservation in Samar Island Natural Park forests (the Philippines) over limestone using a localized conservation priority index

Inocencio Escoton Buot, Jr.¹ , Marne Ga Origenes² , Ren Divien Del Rosario Obeña³ ,
Jonathan O. Hernandez⁴ , Noba F. Hilvano⁵ , Diana Shane A. Balindo⁶ & Edelyn O. Echapare⁷

^{1,2,3} Institute of Biological Sciences, College of Arts and Sciences, ⁴ Forest Biological Sciences, College of Forestry and Natural Resources, University of the Philippines Los Baños, College, Batong Malake, Los Baños, Laguna 4030, Philippines.

⁵ Eastern Samar State University, Maypangdan, Borongan City, Eastern Samar 6800, Philippines.

^{6,7} Science Department, College of Education, Samar State University, Guindapunan, Catbalogan City, 6700, Philippines.

¹iebuot@up.edu.ph (corresponding author), ²mgorigenes@up.edu.ph, ³rdobena@up.edu.ph, ⁴johernandez2@up.edu.ph,

⁵noba.hilvano@essu.edu.ph, ⁶dianashane.balindo@ssu.edu.ph, ⁷edelyn.echapare@ssu.edu.ph

Abstract: The escalating degradation of ecosystems and the consequent reduction in critical services essential for human communities are global concerns. This study aimed to identify top-priority plants for conservation using a localized conservation priority index (LCPI), customized for the locality. The LCPI, a point scoring method, ranked 50 evaluated species based on criteria such as harvesting risk, economic and cultural use, species distribution, and frequency value. Thirteen species were classified as high priority, requiring stringent harvesting regulations, while the remaining 37 were designated at a medium priority level, allowing specific quotas for harvesting. Notably, all 13 high-priority species exhibited higher harvesting risks. These include *Caryota rumphiana* Mart., *Aquilaria cumingiana* (Decne.) Ridl., *Cycas ruminiana* Regel, *Dracaena angustifolia* (Medik.) Roxb., *Oncosperma tigillarum* (Jack) Ridl., *Oreocnide rubescens* (Blume) Miq., *Kleinhovia hospita* L., *Diospyros blancoi* A.DC., *Codiaeum* sp., *Gymnostoma rumphianum* (Miq.) L.A.S.Johnson, *Caryota cumingii* Lodd. ex Mart., *Artocarpus rubrovenius* Warb., and *Palaquium* sp. Local communities engage in harvesting all parts of certain plant species. Following the identification of priority plants, geotagging was employed to enhance targeted in situ conservation efforts, providing valuable guidance for local leaders in initiating localized conservation of threatened biodiversity.

Keywords: Biodiversity, conservation approaches, endemics, forest ecosystem services, geotagging, habitat protection, karst landscape, priority levels, species distribution, threatened plants.

Editor: Aparna Watve, Biome Conservation Foundation, Pune, India.

Date of publication: 26 March 2024 (online & print)

Citation: Buot, Jr. I.E., M.G. Origenes, R.D.D.R. Obeña, J.O. Hernandez, N.F. Hilvano, D.S.A. Balindo & E.O. Echapare (2024). Identifying plants for priority conservation in Samar Island Natural Park forests (the Philippines) over limestone using a localized conservation priority index. *Journal of Threatened Taxa* 16(3): 24821–24837. <https://doi.org/10.11609/jott.8654.16.3.24821-24837>

Copyright: © Buot et al. 2024. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use, reproduction, and distribution of this article in any medium by providing adequate credit to the author(s) and the source of publication.

Funding: Department of Science and Technology -Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD).

Competing interests: The authors declare no competing interests.

Author details & Author contributions: See end of this article.

Acknowledgements: The authors would like to express their heartfelt gratitude to the Department of Science and Technology – Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (DOST-PCAARRD) for funding the CONserve-KAIGANGAN program (Fund codes: N9A6323 & N926423), University of the Philippines Los Baños, Department of Environment and Natural Resources -Protected Area Management Board of Samar Island Natural Park (DENR-PAMB SINP) of Region 8 for issuing a Gratuitous Permit (DENR-GP No. 2019-16 & 2020-10), Samar State University (SSU), Eastern Samar State University and the Peoples organization such as the Basaranan nga Organisasyon han San Isidro Samar (BOSIS) and Tourguide and Boat Operators for River Protection and Environmental Development Organization (TORPEDO) for assisting the program team in conducting the study. Also, to DOST-SEI for allowing the second author to take part in this research program through Career Incentive Program, as well as the Institute of Biological Sciences, University of the Philippines Los Baños (IBS-UPLB), for allowing the program to use the Plant Systematics Laboratory facilities.



INTRODUCTION

Destruction of natural landscapes has been rampant all over the world. This has been one of the triggering bases for the proposed new conservation science by Kareiva & Marvier (2012). Both observed that conservation has been failing and it is until now. A huge track of forests of all types (lowland, lower montane, upper montane, mangroves) dominated by economically and ecologically important tree species (Brown 1921; Ohsawa 1984; Fernando et al. 2008; Buot 2020; Buot et al. 2022; Martinez & Buot 2022) had been destroyed all through these years (Santiago & Buot 2018; Cadiz & Buot 2009, 2010; Caringal et al. 2019; Obeña et al. 2021; Villanueva & Buot 2018; Villanueva et al. 2021a,b; Buot & Osumi 2011; Magcale-Macandog et al. 2022). This massive forest degradation was very prominent during the anthropocene when human activities tended to prevail, aggravating the serious impacts of the global climate change problem (Kamiohikawa et al. 2021; Malhi et al. 2014; Pulhin et al. 2010; Steffen et al. 2007, 2011). The result had been far from what has been expected by humanity: biodiversity loss (FAO 2015), food insecurity (National Research Council 2006; Frongillo 2023), water insecurity (Young et al. 2021; Frongillo 2023), air pollution (National Institute of Environmental Science 2020), eutrophication of water bodies (Yang et al. 2008; Yang 2022), diseases and the subsequent reduction of critical ecosystem services (Anyanwu et al. 2016; Buot et al. 2022) direly needed by the human communities. If this trend is sustained, a remarkable decrease in the community well-being index will be imminent (Buot 2017; Buot et al. 2017; Buot & Cardenas 2018; Buot & Dulce 2019; Buot et al. 2020; Buot & Buot 2022, 2023).

Ecosystem degradation has also been observed in Samar Island Natural Park (SINP) forests over limestone located in central Philippines triggered by both natural and anthropogenic causes. Being located along the Pacific, Samar Island is visited yearly by destructive and fatal typhoons. SINP has one of the most extensive forests over limestone not only in the Philippines but in the southeast Asian region as well. Forests over the limestone of Samar (locally known as 'kaigangan') are characterized by the abundance of calcium due to limestone dissolution, contributing to irregular geomorphology. It has high mineral and aquifer resources, aesthetic, cultural, and tourism value (Fernando et al. 2008; Patindol 2016; Tolentino et al. 2020). Kaigangan is a critical ecosystem serving as a habitats of unique flora and fauna (Obeña et al. 2021; Villanueva et al. 2021a,b; Tolentino et al. 2020)

and microorganisms as well. Phase 1 of CONserve-Kaigangan, a research program led by the University of the Philippines Los Baños (UPLB) in collaboration with Samar State University (SSU) and Eastern Samar State University (ESSU), discovered and described new species of science inhabiting the canopy of the forests over limestone. These new species are *Decaisnina tomentosa* MD Angeles, Tandang, Carab.-Ort., & Buot (Tandang et al. 2022), *Corybas kaiganganianus* Tandang, A.S.Rob. & MD Angeles (delos Angeles et al. 2022a), *Begonia normaaguilariae* MD Angeles, Rubite, & Tandang (delos Angeles et al. 2022b), and *Schismatoglottis minuta* Tandang and MD Angeles (delos Angeles et al. 2023). Several new records have been documented too (Fernandez et al. 2020; Obeña et al. 2021; Villanueva et al. 2021a,b). Owing to these unique endemics and indigenous plant and animal diversity, coupled with the beautiful limestone hills and rocks, SINP has been nominated as a UNESCO World Natural Heritage Site.

The nomination of SINP for UNESCO listing should not be the end of conservation action. Rather, it should be the start of a well-meant conservation practice planning. There is a need to localize and prioritize conservation in Samar's kaigangan forests. This is essential in biodiversity conservation since not all plant species have been assessed yet by the IUCN and by the National Committee on Threatened Species in the Philippines. Prioritizing plants helps identify the taxa that need to be targeted for conservation with local communities taking active participation.

The paper aims to generate a list of top-priority plants for conservation at Samar Island Natural Park (SINP) using a localized conservation priority index (LCPI) (Villanueva & Buot 2020; Chanthavong & Buot 2019). Specifically, it determines the identity of plants and their levels of priority, discusses the uses of these plants by the locality, and geotags the occurrences of these priority plants in the plots to enhance in situ conservation.

The paper addresses UN Sustainable Development Goals 5 (Gender equality), 6 (Clean water), 11 (Sustainable cities and communities), 12 (Responsible consumption and production), 13 (Climate Action), 15 (Life on land), and 17 (Partnership to achieve goals).

METHODOLOGY

The Localized Conservation Priority Index (LCPI)

The *Localized Conservation Priority Index* is a point-scoring method used to rank species by the level of priority considering harvesting risk, economic

use, cultural use, species distribution, and frequency value. These criteria make up the environmental and socio-cultural aspects of each species. The sources of information were sourced from surveys, websites to literature sources.

The score ranges from 1 (lowest) to 5 (highest) for each criterion, where a higher score indicates a higher conservation priority. For harvesting risk, economic use, and cultural use, each plant part and use is equivalent to 1 point. Two plant parts and uses are equivalent to two points and so on. In the case of more than five plant parts (roots, leaves, stems, flowers, and fruits) and uses, the score is still 5. Data were gathered from the field plots, literature reviews, and local key informants. For the species distribution, we gathered data from the floras (Merrill 1923–1926; Pelser et al. 2011-onwards; Rojo 1999) and online databases like the International Plant Name Index (IPNI 2020) and World Flora Online. The more restricted the distribution of a species, the higher the score owing to rarity and the likelihood of the species becoming extinct in the future. If the species is only found in Samar, it receives a score of 5. Four (4) if found in Visayas, three (3) if found in Visayas and Mindanao, two (2) if found in the Philippines, and one (1) if found in Asia and the world (Cosmopolitan). The frequency value has been based on the plot data, referring to the occurrence value of each plant in the study site. A score of 5 for frequency values ranging 0–20, indicates vulnerability to risk. Frequency values of 21–40, 41–60, 61–80, and 81–100 will have scores of 4, 3, 2 and 1, respectively.

The formula that is used in this study is a modification from Villanueva & Buot (2020):

Localized Conservation Priority Index (LCPI) = Harvesting Risk (HR) + Economic Use (EU) + Cultural Use (CU) + Species Distribution (SD) + Frequency Value

A guide in categorizing the conservation priority levels for each plant and the appropriate action to take has been prepared as adopted by Villanueva & Buot (2020).

Geotagging of the priority plants

After identifying the priority plants at SINP, the top 20 priority plants with the highest conservation priority scores were geotagged to enhance in situ conservation. Geotagging was done manually within the 18 sampling plots in SINP using the Google Earth application to determine the latitude and longitude coordinates of each of the top 20 priority plants.

RESULTS AND DISCUSSION

Determining the localized conservation priority scores of plants at Samar Island Natural Park

Samar Island forests over limestone are one of the largest limestone formations in the Philippines, serving as a habitat for unique flora and fauna (Tolentino et al. 2019, 2020). Existing data available from the floral assessment of CONserve-KAIGANGAN in Paranas, Samar, and Taft, Eastern Samar support a high level of floral diversity and endemism of Samar kaigangan.

The evaluation of 50 plant species across 24 families in our study plots (see Table 2) utilized the LCPI, modified from Villanueva and Buot (2020), to identify the top 20 plants for priority conservation. The LCPI results categorized 13 plant species with high priority levels, scoring between 17 and 20, while the remaining 37 were classified with medium-priority levels (refer to Table 2). Notably, all 13 high-priority species scored 5 points for the harvesting risk criterion, indicating that all plant parts—roots, stems, leaves, flowers, and fruits—are susceptible to harvesting at any time. These high-priority species, such as *A. cumingiana*, *C. rumphiana*, *G. rumphianum*, *O. rubescens*, *Codiaeum* sp., and *K. hospita*, are primarily used for medicinal purposes by residents of Samar (see Table 3). Ornamental and landscaping uses are also common, with cultural applications noted for species like *C. rumphiana*, *C. cumingii*, and *A. cumingiana* employed in religious and festival activities, including church ornaments and decorations in Samar. Geographically, these high-priority species exhibit a mostly cosmopolitan distribution in SINP (Table 3), indicating their presence beyond the Philippines. Additionally, most priority species scored 5 points and exhibited frequency values ranging 1–20, signifying a sparse occurrence in the study plots. Given the extensive uses of these 13 high-priority species, with scores ranging 17–20, there is a critical need for strict regulation to prevent overexploitation.

Table 1. Priority scores and priority levels for each plant and the corresponding recommended action to take.

Score	Priority level	Decision
1–8	Low	Suitable for high-impact harvesting
9–16	Medium	Can be harvested with specific quotas
17–25	High	Require strict regulation in harvesting



Image 1. Top 5 priority plants in SINP: a—*Caryota rumphiana* | b—*Aquilaria cumingiana* | c—*Cycas ruminiana* | d—*Dracaena angustifolia* | e—*Oncosperma tigillarum*. © CONserve-KAIGANGAN project.

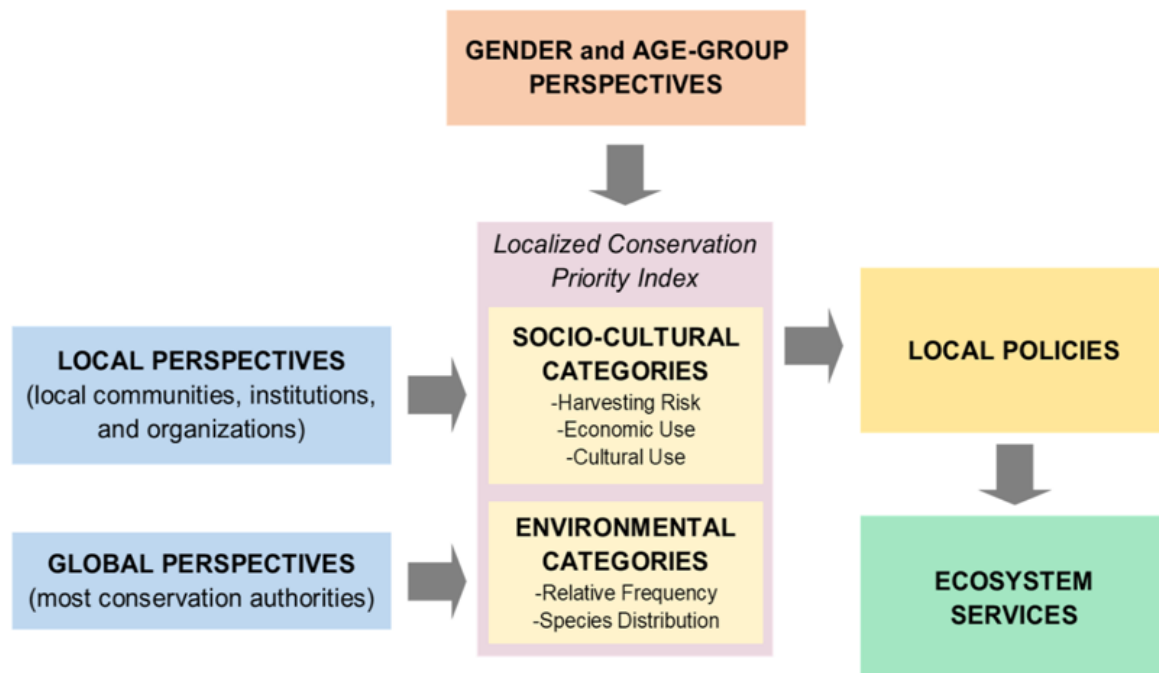


Figure 1. Framework for localized conservation for sustained ecosystem services.

Some Notes on the top 20 plants for priority conservation

Overall, the top 20 priority plants in SINP are composed of 17 species from Paranas, Samar, and eight species from Taft, Eastern Samar.

As seen in Table 3, there are a few high-priority level species that are considered threatened on a national and global scale. At the national level, among the top 20 priority plants in SINP, six are vulnerable species (*A. cumingiana*, *C. riuminiana*, *O. tigillarum*, *D. blancoi*, *S. negrosensis*, and *S. contorta*), and three belonging to other threatened species (*G. rumphianum*, *A. rubrovenius* and *A. rimosa*) (DAO 2017–11). On the other hand, at the global scale, IUCN (2022) identified one critically endangered species (*H. wenzeliana*), one endangered species (*C. riuminiana*), one vulnerable species (*A. cumingiana*), seven least concern species (*C. rumphiana*, *O. rubescens*, *K. hospita*, *C. hirsutum*, *P. nodosa*, *S. negrosensis*, and *S. contorta*), one near threatened species (*A. rimosa*), and one data deficient species (*C. cumingi*). It's noteworthy that the majority of priority plants in SINP lack recorded conservation status on both national and global scales. Surprisingly, many of these crucial plants, extensively utilized at the local level for various purposes, remain largely unexplored. The application of LCPI becomes crucial in documenting locally threatened biodiversity. These priority plants, under threat, hold immense economic significance, serving purposes such as food, medicine, timber, handicrafts, building materials, and ornamental use, as highlighted by Medecilo-Guiang et al. (2021).

***Caryota rumphiana* Mart.**

Caryota rumphiana is the top-ranking species, with an LCPI score of 20 points (Table 2). It is edible and can be used to make a variety of dishes, as well as raw material for furniture (Tropical Plants Database 2022). The fiber of this species is used for fish traps, for sewing, for kindling fires, and as wadding (Tropical Plants Database 2022). It is also used as an ornamental plant. In Samar Island, the leaves are used for church and for fiesta as decoration. The locals also reported that the roots are utilized for herbal medicine. *C. rumphiana* is distributed in the areas of Bismarck Arch, Moluccas, New Guinea, Solomon Island, and Sulawesi. In the Philippines, it was recorded in the province of Samar (Pelser et al. 2011 onwards).

***Aquilaria cumingiana* (Decne.) Ridl.**

Rank 2 is *A. cumingiana* obtaining a score of 19-points in SINP. This species is commonly known as agarwood and is valued for its highly priced resins extracted from the bark. The expensive resins are used to make perfume

and aromatics, which are commonly used for ceremonial incense of rituals and other religious activities. Additionally, this species is used for furniture and traditional medicine (Tawan 2003; Persoon 2008). The locals in Samar Island also utilized the leaves and roots as an ingredient to make a coffee. It is distributed in Borneo, Moluccas, and the Philippines (Pelser et al. 2011 onwards).

***Cycas riuminiana* Regel**

The third in rank is an endemic species used by the locals in Samar as herbal medicine and as ornaments for churches and fiestas. It is distributed in the provinces of Bataan, Batangas, Cagayan, Cavite, Ilocos Norte, Isabela, Laguna, Pampanga, and Mindoro (Pelser et al. 2011 onwards).

***Dracaena angustifolia* (Medik.) Roxb.**

This species is occupying the fourth rank. It is found all throughout the Philippines and in countries such as Andaman Islands, Australia, Bangladesh, Bismarck Arch, Borneo, Cambodia, China, India, Java, Laos, Lesser Sunda Islands, Malay Peninsula, Moluccas, Myanmar, New Guinea, Nicobar Islands, Solomon Islands, Thailand, and Vietnam (Pelser et al. 2011 onwards). The plant is used as ornamental and fodder. The roots and leaves of this species can be used for medicine and the sap is used as a dye (POWO 2022; Tropical Plants Database 2022).

***Oncosperma tigillarum* (Jack) Ridl.**

The species is primarily used for housing and construction material particularly by Samar residents. Its leaves can be a source of fiber and used as a raw material for making baskets and other weaving products (Tropical Plants Database 2022). Additionally, the buds and flowers of this plant are edible, while the roots are used as traditional medicine (Tropical Plants Database 2022). The other parts of this plant, such as sap and spines on stems are used as hunting instruments (Tropical Plants Database 2022). The whole plant is also ideal for landscaping (Fernandez et al. 1995). This species, the fifth in rank, is distributed in Borneo, Cambodia, Java, Malay Peninsula, Sumatra, Thailand, and the Philippines (Pelser et al. 2011 onwards).

***Oreocnide rubescens* (Blume) Miq.**

The leaves and shoots of this species are edible (Brink et al. 2003). The bast can produce fiber and the bark can be a source of dye (Brink et al. 2003). In Samar, the locals used the roots as herbal medicine. In other countries, it is utilized as a living fence (Brink et al. 2003). In the Philippines, this species occupying the 6th rank, is

Table 2. Conservation priority classification of plant species in Samar Island Natural Park.

Family/ Scientific name	Common name	HR	EU	CU	SD	FV	Total score	Priority level
Araliaceae								
<i>Polyscias nodosa</i> (Blume) Seem.	Bongliw	4	3	2	1	5	15	Medium
Arecaceae								
<i>Caryota cumingii</i> Lodd. ex Mart.	Karyota	5	3	2	2	5	17	High
<i>Caryota rumphiana</i> Mart.	Pugahan/ Tagabunga	5	5	4	1	5	20	High
<i>Heterospatha intermedia</i> (Becc.) Fernando	Banga	5	3	2	2	1	13	Medium
<i>Oncosperma tigillarum</i> (Jack) Ridl.	Anibong	5	5	2	1	5	18	High
Asparagaceae								
<i>Dracaena angustifolia</i> (Medik.) Roxb.	Tulang	5	5	2	1	5	18	High
Burseraceae								
<i>Canarium hirsutum</i> Willd.	Milipili	3	5	2	1	5	16	Medium
Casuarinaceae								
<i>Gymnostoma rumphianum</i> (Miq.) L.A.S.Johnson	Agoho del Monte	5	4	2	1	5	17	High
Clusiaceae								
<i>Calophyllum soulattri</i> Burm.f.	Pamintaogon	5	5	2	1	1	14	Medium
<i>Garcinia rubra</i> Merr.	Diis	2	1	2	2	5	12	Medium
<i>Garcinia</i> sp.	Madbad	2	1	2	2	5	12	Medium
Cornaceae								
<i>Mastixia</i> sp.	Tul-anan	4	2	2	2	4	14	Medium
Cycadaceae								
<i>Cycas ruminiana</i> Regel	Pitogo	5	2	4	2	5	18	High
Dipterocarpaceae								
<i>Hopea philippinensis</i> Dyer	Gisok	4	3	2	2	3	14	Medium
<i>Shorea astylosa</i> Foxw.	Yakal	4	4	2	2	1	13	Medium
<i>Shorea contorta</i> S.Vidal	White Iauan	4	2	2	2	5	15	Medium
<i>Shorea negrosensis</i> Foxw.	Red Iauan	5	5	2	2	1	15	Medium
<i>Vatica mangachapoi</i> Blanco	Bunguran Yakal	4	3	2	1	5	15	Medium
Ebenaceae								
<i>Diospyros blancoi</i> A.DC. syn.: <i>D. discolor</i> Willd.	Kamagong	5	5	2	1	5	18	High
Euphorbiaceae								
<i>Codiaeum macgregorii</i> Merr.	Marumanga	1	1	2	2	5	11	Medium
<i>Codiaeum</i> sp.	Dug-an	5	4	2	2	5	18	High
<i>Hancea wenzeliana</i> (Slik) S.E.C.Sierra, Kulju & Welzen	Apanang	4	3	2	2	5	16	Medium
<i>Macaranga bicolor</i> Müll.Arg.	Pailig	3	2	2	2	5	14	Medium
<i>Tritaxis ixoroides</i> (C.B.Rob.) R.Y.Yu & Welzen				2	2	5	9	Medium
Fabaceae								
<i>Wallacedendron celebicum</i> Koord.	Banuyo/ Salukigi	5	2	2	2	4	15	Medium
Gnetaceae								
<i>Gnetum gnemon</i> L.	Bago	4	3	2	1	5	15	Medium
Lamiaceae								
<i>Teijsmanniodendron ahernianum</i> (Merr.) Bakh.	Kulipapa	3	3	2	1	5	14	Medium

Family/ Scientific name	Common name	HR	EU	CU	SD	FV	Total score	Priority level
Malvaceae								
<i>Kleinhovia hospita</i> L.	Tan-ag	5	5	2	1	5	18	High
Meliaceae								
<i>Aglaia rimosa</i> (Blanco) Merr.	Balubar / Bayanti	4	4	2	1	5	16	Medium
<i>Vavaea amicornum</i>	Nangka-nangka	3	3	3	1	5	15	Medium
Moraceae								
<i>Artocarpus rubrovenius</i> Warb.	Tugop	5	5	2	2	3	17	High
<i>Ficus glandulifera</i> var. <i>camiguinensis</i>	Katol	3	4	2	1	5	15	Medium
<i>Ficus ampelas</i> Burm.f.	Upling-gubat	2	3	2	1	5	13	Medium
Pandanaceae								
<i>Benstonea copelandii</i> (Merr.) Callm. & Buerki	Bariw	5	2	2	2	3	14	Medium
Phyllanthaceae								
<i>Bridelia glauca</i> Blume	Anislag	4	3	2	1	5	15	Medium
Rubiaceae								
<i>Lasianthus trichophlebus</i> Hemsl. ex F.B. Forbes & Hemsl.	Malabunot	5	3	2	1	5	16	Medium
<i>Psychotria</i> sp.		4	2	2	2	5	15	Medium
<i>Neonauclea formicaria</i> (Elmer) Merr.	Hambabalud	4	2	2	2	3	13	Medium
Salicaceae								
<i>Flacourtia</i> sp.	Hagupit	3	2	2	2	5	14	Medium
Sapotaceae								
<i>Manilkara fasciculata</i> (Warb) H.J. Lam & Maas Geest.	Patsaragon	4	5	2	1	1	13	Medium
<i>Palaquium</i> cf. <i>elongatum</i>	Long-leaved Nato	3	2	2	1	5	13	Medium
<i>Palaquium</i> sp.	Bagotambis	5	4	2	2	4	17	High
<i>Pouteria velutina</i> Elmer	Wakatan	3	1	2	2	4	12	Medium
Thymelaeaceae								
<i>Aquilaria cumingiana</i> (Decne.) Ridl.	Lapnisan/ Agar	5	5	3	1	5	19	High
<i>Gonystylus reticulatus</i> (Elmer) Merr.	Batuan			2	3	5	10	Medium
Urticaceae								
<i>Oreocnide rubescens</i> (Blume) Miq.	Lingatong	5	5	2	1	5	18	High
unidentified (Barit)	Barit	4	1	2	2	5	14	Medium
unidentified (Sumol)	Sumol	4	1	2	2	5	14	Medium
unidentified (Buskayan)	Buskayan			2	2	5	9	Medium
unidentified (Urukay)	Urukay			2	2	5	9	Medium

distributed in Laguna, Quezon, and Mindanao. It is also found in other neighboring islands of Java, Moluccas, and Sulawesi (Pelser et al. 2011 onwards).

***Kleinhovia hospita* L.**

The timber of this species is used for furniture and fuelwood, while the fiber is a raw material for rope (NRM 1986). It has been used as an ornamental and the leaves

are edible and have medicinal properties (NRM 1986). Actually, the locals in Samar use this species which is in the 7th rank as herbal medicine. It is distributed in other countries such as Bangladesh, Caroline Island, Fiji, Hainan, Lesser Sunda Island, Malaya, Nansei-shoto, Samoa, Society Island, Solomon Island, Taiwan, Tonga, Vanuata, and Vietnam (POWO 2022).

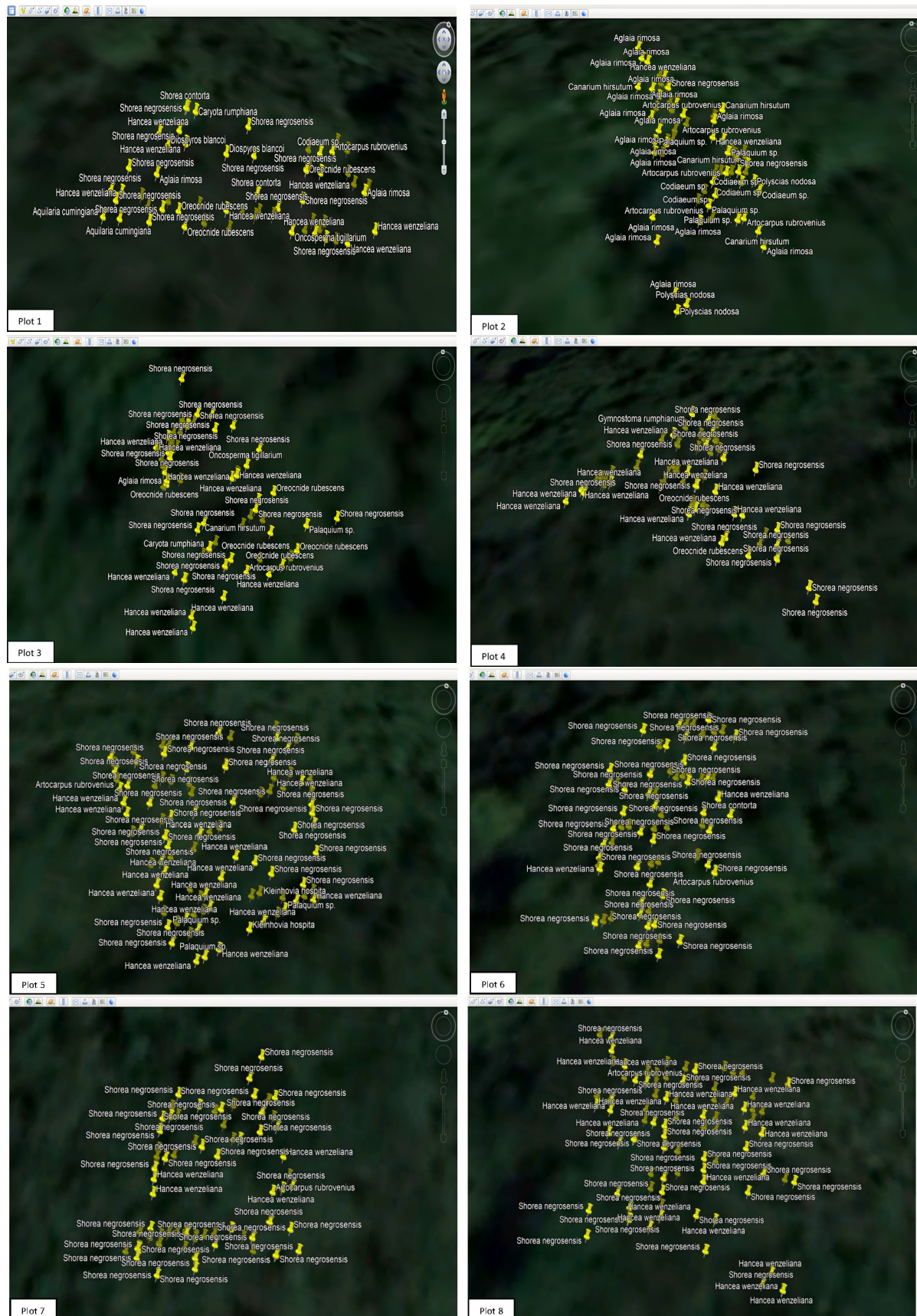


Image 2. Geotagging of priority plants in the municipality of Paranas, Samar in SINP.

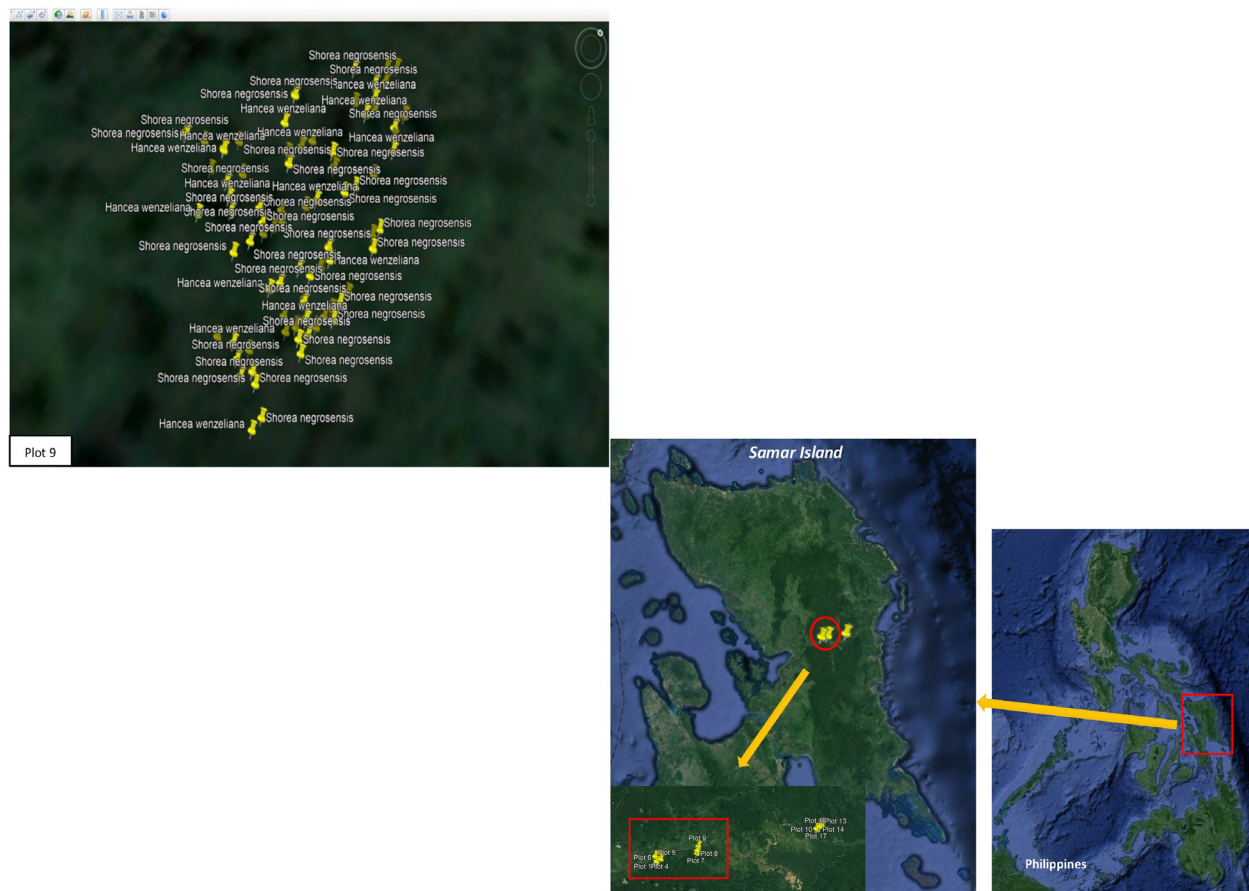


Image 2. Geotagging of priority plants in the municipality of Paranas, Samar in SINP. (cont.)

Diospyros blancoi A. DC.

Like other species, it is used as a material for handicraft, furniture, and construction purposes (Tomas-Carig 2020). This species is ranked 8th and the fruit of this species is edible, and the bark, leaves, and seeds are also used as medicine (Coronel 1991; Tomas-Carig 2020). This species is native to the Philippines and is also distributed in Taiwan and Borneo (POWO 2022).

Codiaeum sp.

This species ranked ninth in the LCPI and has not yet been identified at the species level. Samar residents used this species for medicine, building materials, firewood, and animal forage.

Gymnostoma rumphianum (Miq.) L.A.S.Johnson

This species is used for housing material, fuelwood, and as an ornamental. It is ranked 10th and can also be utilized for pulp making (Sosef & van der Maesen 1997). It is native to the Philippines and is distributed in other countries such as Moluccas, New Guinea, and Sulawesi (Pelser et al. 2011 onwards).

Caryota cumingii Lodd. ex Mart.

Ranked 11th, *Caryota cumingii*, is used as a raw material for weaving products. This species is edible and can be cooked as vegetables as well as ingredient to make sago starch, sugar, and alcoholic beverages (Tropical Plants Based 2022). The plant is also used as ornamental. It is endemic in the Philippines and is distributed in the Philippine provinces of Guimaras, Apayao, Ilocos Norte, La Union, Laguna, Nueva Ecija, Nueva Viscaya, Pangasinan, Quezon, Rizal, Mindoro, Palawan, Panay, Samar, and Tawi-Tawi (Pelser et al. 2011 onwards).

Artocarpus rubrovenius Warb.

This species can be used for construction and as a material for wood carving (NRM 1986). Its bark also has medicinal properties (NRM 1986). This Philippine endemic is ranked 12th and is distributed in the provinces of Batan, Albay, Aurora, Bataan, Batangas, Camarines, Isabela, Laguna, Pampanga, Quezon, Rizal, Sorsogon, and Mindoro (Pelser et al. 2011 onwards).

***Palaquium* sp.**

In Samar, locals use this plant for construction material. It is in the 13th rank and the fruits are edible and observed to be eaten by birds, monkeys, wild pigs, and deer.

***Hancea wenzeliana* (Slik) S.E.C.Sierra, Kulju & Welzen**

The locals in Samar used the timber of this species for housing and construction material, as well as fuelwood or charcoal. It ranked 14th using the LCPI. In the Philippines, this endemic species is distributed in the province of Surigao del Norte in Mindanao (Pelser et al. 2011 onwards).

***Aglaia rimosa* (Blanco) Merr.**

Aglaia rimosa is used as a housing or building material (Widodo 2003). Additionally, it serves as a traditional medicine to treat swollen stomach and has the potential to have anti-cancer properties (Widodo 2003). It is classified as other threatened species (OTS) in the Philippines' DAO 2017–11. It is ranked 15th and is distributed in the provinces of Alabat, Babuyan Island, Batan, Cebu, Guimaras, Albay, Aurora, Bataan, Batangas, Benguet, Cagayan, Camarines, Cavite, Ilocos Norte, Isabela, Laguna, Nueva Ecija, Nueva Viscaya, Pangasinan, Quezon, Rizal, Sorsogon, Agusan, Davao, Mindoro, Negros, Palawan, Panay, Romblon, Sibutu, Sibuyan, Ticao, and Y'ami (Pelser et al. 2011 onwards).

***Canarium hirsutum* Willd.**

Canarium hirsutum is edible and is used as traditional medicine to treat stomach ailments (Tropical Plants Database 2022). It is ranked 16th and is harvested for its resin (Kochummen 1995). It has also traditionally been used to produce light and as adhesive (Tropical Plants Database 2022). The locals of Samar Island have also reported that they used the resin for lighting, the leaves and roots for herbal purposes, and the timber as firewood and charcoal. The species is widely distributed in the Philippines. It is also distributed in other areas including Bismarck Arch, Borneo, Java, Lesser, Sunda Island, Malay Peninsula, Moluccas, New Guinea, Pacific Ocean, Solomon Island, Sulawesi, and Sumatra (Pelser et al. 2011 onwards).

***Lasianthus trichophlebus* Hemsl. ex F.B. Forbes & Hemsl.**

Lasianthus trichophlebus has a medicinal property potential (Tan et al. 2020). This species is distributed in China, Java, Malay Peninsula, Sulawesi, Sumatra, Taiwan, Thailand, and Vietnam. In the Philippines, it is recorded in the provinces of Mindoro and Palawan (Pelser et al. 2011 onwards). It ranked 17th using the LCPI.

***Polyscias nodosa* (Blume) Seem.**

Polyscias nodosa is used as a housing and construction material. It is ranked 18th and has been reported as good raw material for handicrafts, weaving, and woodworking products (Gapido & Batoon 2009). This species is distributed in Australia, Java, Lesser Sunda Islands, Moluccas, New Guinea, Solomon Islands, and Sulawesi. In Philippines, it is distributed in the provinces of Basilan, Leyte, Bataan, Batangas, Benguet, Ilocos Norte, Laguna, Pangasinan, Quezon, Rizal, Sorsogon, Zambales, and Palawan (Pelser et al. 2011 onwards).

***Shorea negrosensis* Foxw.**

This species is primarily used for housing, construction, and furniture material (Garcia et al. 2013; Ghazoul 2016). The locals in Samar use it as fuelwood. They also observed that the fruits are eaten by birds and wild pigs. The species ranking 19th using LCPI is also known to have tumor-inhibiting properties (NRCM 1986). This endemic is distributed in the Philippine provinces of Basilan, Biliran, Cebu, Leyte, Albay, Aurora, Cagayan, Camarines, Isabela, Laguna, Nueva Ecija, Quezon, Polillo, and Samar (Pelser et al. 2011 onwards).

***Shorea contorta* S.Vidal**

The species is used in housing, construction, furniture, veneer, hardboard, and plywood making (NRMC 1986). It is endemic to the Philippines and distributed in the provinces of Babuyan Islands, Basilan, Leyte, Marinduque, Masbate, Agusan, Lanao, Zamboanga, Mindoro, Negros, Polillo, Samar, and Sibuyan (Pelser et al. 2011 onwards). It ranked 20th in terms of conservation priority.

Geotagging priority plants at Samar Island Natural Park

From the identified top 20 priority plants, we meticulously documented a total of 2,000 individual priority species within SINP. The municipality of Paranas, Samar, revealed 17 priority species and 834 individuals, while Taft, Eastern Samar, exhibited eight priority species with 1,169 individuals. Everyone of these plants underwent geotagging to enhance in situ conservation efforts, as illustrated in Image 2 and 3. Geotagging, in this context, refers to the process of attaching geographical metadata to media, such as images and videos, to precisely record the location where the specific data point was captured (Luo et al. 2011). Typically executed using smartphones or GPS-enabled devices, this method involves assigning the media or data points with coordinates, including latitude, longitude, altitude, compass bearing, place names, and other optional fields (Amaral 2014). Demonstrated as cost-effective and secure, geotagging enables teams or

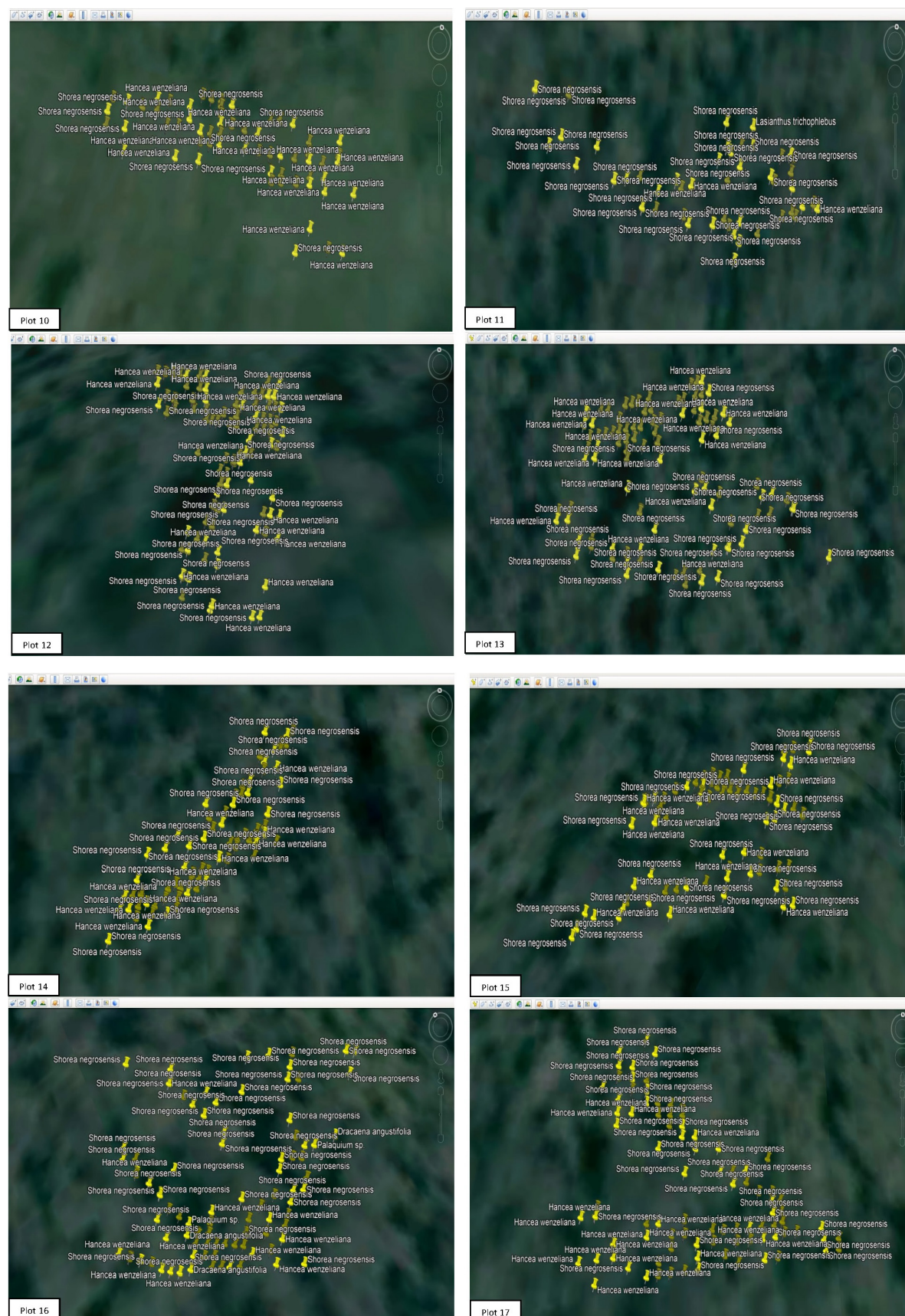


Image 3. Geotagging of priority plants in the municipality of Taft, Eastern Samar in SINP.

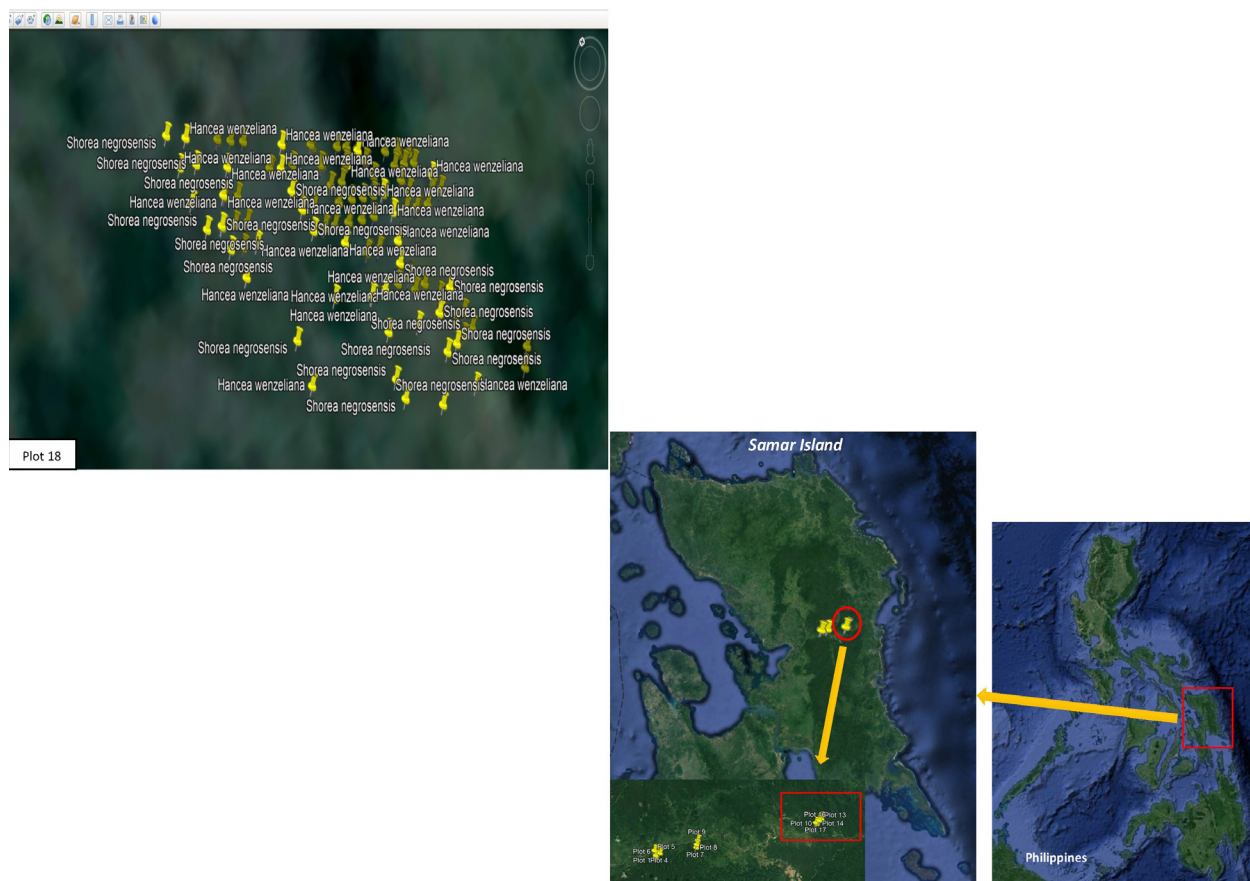


Image 3. Geotagging of priority plants in the municipality of Taft, Eastern Samar in SINP (cont.).

individuals to validate, monitor, and evaluate progress on the ground, thereby streamlining efforts and resources (World Bank 2013). The prevalent species within SINP, identified from the top 20 priority plants, include *S. negrosensis* and *H. wenzeliana*, as highlighted in Figures 2 and 3. Moreover, 89 individuals were meticulously documented from the top 13 species, categorized as high-priority, with 11 species predominantly found in Paranas plots and five in Taft plots. These high-priority species were observed across 10 plots within SINP (plots 1, 2, 3, 4, 5, 7, 8, 10, 13, and 16) (see Image 2 and 3). Noteworthy high-priority species common to both Paranas and Taft plots include *D. blancoi*, *A. rubrovenius*, and *Palaquium* species. Additionally, among the other high-priority plants, *A. rubrovenius* was exclusively identified in nine sampling plots within SINP, and this species remained the sole observation in plots 6, 7, 8, and 10, based on geotagged data. This underscores the resilience of *A. rubrovenius* in withstanding environmental and anthropogenic disturbances within SINP. Furthermore, two high-priority species, *G. rumphianum* and *C. riuminiana*, each accounted for a singular individual plant, with the former

located in plot 4 and the latter in plot 16. Therefore, the essential tracking and monitoring in situ are imperative to safeguard and ensure the survival of these rare plants and their propagules within the protected area. The diminished number of species occurrences is attributed to human disturbances exacerbating agroclimatic anomalies on Samar Island, as outlined in Villanueva et al.'s recent study (2022). These factors significantly influence the physiological performance, encompassing survival, growth, and reproduction, as well as the resource distributions of these species (Bellard et al. 2012; Urban 2015; Howard et al. 2019; Kaspari et al. 2019).

A localized conservation priority framework for sustained ecosystem services

The LCPI serves as a straightforward point-scoring guide designed for local decision-making at the village level, particularly in prioritizing the conservation of locally threatened species. Its framework, depicted in Figure 1, is rooted in a multi-perspective approach to ensure inclusivity. This approach acknowledges the insights originating from local communities, institutions, and

Table 3. Uses, distribution, and conservation status of the species in Samar Island Natural Park.

Family/ Scientific name	Uses	Distribution	Conservation status	
			DAO 2017–11	IUCN
Araliaceae				
<i>Polyscias nodosa</i> (Blume) Seem.	Housing/ construction materials, handicrafts, fodder	Cosmopolitan	-	Least Concern
Arecaceae				
<i>Caryota cumingii</i> Lodd. ex Mart.	Food, handicrafts, plant selling (landscaping, ornamentals, seedling)	Within the Philippines	-	Data Deficient
<i>Caryota rumphiana</i> Mart.	Food, fiber, furniture, medicine, plant selling (landscaping, ornamentals, seedling), religious, festival	Cosmopolitan	-	Least Concern
<i>Heterospatha intermedia</i> (Becc.) Fernando	Fodder, housing materials, plant selling (landscaping, ornamentals, seedling)	Within the Philippines	-	Vulnerable
<i>Oncosperma tigillarum</i> (Jack) Ridl.	Food, medicine, furniture, housing and construction materials, handicrafts, accessories for tapping and hunting animals, plant selling (landscaping, ornamentals, seedling)	Cosmopolitan	Vulnerable	-
Asparagaceae				
<i>Dracaena angustifolia</i> (Medik.) Roxb.	Food, medicine, industrial material, fodder, plant selling (landscaping, ornamentals, seedling)	Cosmopolitan	-	-
Burseraceae				
<i>Canarium hirsutum</i> Willd.	Food, medicine, handicrafts, industrial materials, firewood	Cosmopolitan	-	Least Concern
Casuarinaceae				
<i>Gymnostoma rumphianum</i> (Miq.) L.A.S.Johnson	Firewood, charcoal, housing and construction materials, medicine, plant selling (landscaping, ornamentals, seedling)	Cosmopolitan	Other threatened species	-
Clusiaceae				
<i>Calophyllum soulattri</i> Burm.f.	Food, medicine, furniture, housing and construction materials, handicrafts, accessories for tapping and hunting animals, plant selling (landscaping, ornamentals, seedling)	Cosmopolitan	-	Least Concern
<i>Garcinia rubra</i> Merr.	Food	Within the Philippines	-	Near Threatened
<i>Garcinia</i> sp.	-	-	-	-
Cornaceae				
<i>Mastixia</i> sp.	Housing/ construction materials, furniture	-	-	-
Cycadaceae				
<i>Cycas ruminiana</i> Regel	Medicine, plant selling (landscaping, ornamentals, seedling), festival, religious	Within the Philippines	Vulnerable	Endangered
Dipterocarpaceae				
<i>Hopea philippinensis</i> Dyer	Housing/ construction materials, firewood, fodder	Within the Philippines	Critically endangered	Endangered
<i>Shorea astylosa</i> Foxw.	Medicine, furniture, housing/ construction materials, fodder	Within the Philippines	Critically endangered	Endangered
<i>Shorea contorta</i> S.Vidal	Furniture, housing/ construction materials	Within the Philippines	Vulnerable	Least Concern
<i>Shorea negrosensis</i> Foxw.	Medicine, furniture, housing/ construction materials, firewood, fodder	Within the Philippines	Vulnerable	Least Concern
<i>Vatica mangachapoi</i> Blanco	Housing/ construction materials, furniture, fodder	Cosmopolitan	Endangered	Vulnerable
Ebenaceae				
<i>Diospyros blancoi</i> A.DC. syn.: <i>D. discolor</i> Willd.	Food, medicine, furniture, handicrafts, housing/ construction materials, fodder, plant selling (landscaping, ornamentals, seedling)	Cosmopolitan	Vulnerable	-
Euphorbiaceae				
<i>Codiaeum macgregorii</i> Merr.	Medicine	Within the Philippines	-	-
<i>Codiaeum</i> sp.	Medicine, housing/ construction materials, firewood, fodder	-	-	-
<i>Hancea wenzeliana</i> (Slik) S.E.C.Sierra, Kulju & Welzen	Housing/construction materials, fodder, firewood	Within the Philippines	-	Critically Endangered
<i>Macaranga bicolor</i> Müll.Arg.	Medicine, firewood	Within the Philippines	-	Least Concern
<i>Tritaxis ixoroides</i> (C.B.Rob.) R.Y.Yu & Welzen	-	Within the Philippines	-	Vulnerable
Fabaceae				

Family/ Scientific name	Uses	Distribution	Conservation status	
			DAO 2017–11	IUCN
<i>Wallaceodendron celebicum</i> Koord.	Furniture, plant selling (landscaping, ornamentals, seedling)	Within the Philippines	Vulnerable	-
Gnetaceae				
<i>Gnetum gnemon</i> L.	Food, industrial materials, firewood and charcoal	Cosmopolitan:	-	Least Concern
Lamiaceae				
<i>Teijsmanniodendron ahernianum</i> (Merr.) Bakh.,	Housing/ construction materials, furniture, firewood, implements, plant selling (landscaping, ornamentals, seedling)	Cosmopolitan	-	Least Concern
Malvaceae				
<i>Kleinhovia hospita</i> L.	Food, medicine, furniture, housing/ construction materials, fiber, firewood, plant selling (landscaping, ornamentals, seedling)	Cosmopolitan	-	Least Concern
Meliaceae				
<i>Aglaia rimosa</i> (Blanco) Merr.	Medicine, housing/ construction materials, fodder, firewood	Cosmopolitan	Other threatened species	Near Threatened
<i>Vavaea amicornum</i> Benth.				Least Concern
Moraceae				
<i>Artocarpus rubrovenius</i> Warb.	Food, medicine, housing/construction materials, handicrafts, fodder, firewood, accessories for tapping and hunting wildlife	Within the Philippines	Other threatened species	-
<i>Ficus glandulifera</i> var. <i>camiguinensis</i>	Food, medicine, furniture, industrial, handicrafts, for implements, housing materials, fodder	Cosmopolitan	-	-
<i>Ficus ampelas</i> Burm.f.	Food, medicine, industrial use	Cosmopolitan	-	Least Concern
Pandanaceae				
<i>Benstonea copelandii</i> (Merr.) Callm. & Buerki	Fabric and fiber, plant selling (landscaping, ornamentals, seedling)	Within the Philippines	-	Least Concern
Phyllanthaceae				
<i>Bridelia glauca</i> Blume	Food, housing/construction materials, firewood	Cosmopolitan	-	Least Concern
Rubiaceae				
<i>Lasianthus trichophlebus</i> Hemsl. ex F.B.Forbes & Hemsl.	Medicine, housing/ construction materials, plant selling (landscaping, ornamentals, seedling)	Cosmopolitan	-	-
<i>Psychotria</i> sp.	Fodder, housing/ construction materials			
<i>Neonauclea formicaria</i> (Elmer) Merr.	Medicine, housing/ construction materials	Within the Philippines	-	Least Concern
Salicaceae				
<i>Flacourtia</i> sp.	Medicine, handicrafts			
Sapotaceae				
<i>Manilkara fasciculata</i> (Warb.) H.J.Lam & Maas Geest.	Food, fodder, furniture, housing/ construction materials, implements	Cosmopolitan	-	Vulnerable
<i>Palaquium</i> cf. <i>elongatum</i>		Cosmopolitan	-	Endangered
<i>Palaquium</i> sp.	Food, fodder, housing/ construction materials, plant selling (landscaping, ornamentals, seedling)			
<i>Pouteria velutina</i> Elmer			-	Near Threatened
Thymelaeaceae				
<i>Aquilaria cumingiana</i> (Decne.) Ridl.	Food, medicine, industrial, fodder, plant selling (landscaping, ornamentals, seedling)	Cosmopolitan	Vulnerable	Vulnerable
<i>Gonystylus reticulatus</i> (Elmer) Merr.		Within the Philippines	-	-
Urticaceae				
<i>Oreocnide rubescens</i> (Blume) Miq.	Food, medicine, industrial, fiber, housing/construction materials	Cosmopolitan	-	Least Concern
unidentified (Barit)	Housing/ construction materials	-	-	-
unidentified (Sumol)	Housing/ construction materials	-	-	-
unidentified (Buskayan)	-	-	-	-
unidentified (Urukay)	-	-	-	-

organizations in Samar Island, specifically in Paranas and Taft, where the Samar Island Natural Park is situated. Additionally, the LCPI integrates global perspectives by incorporating conservation concepts and principles from various conservation authorities. Gender and age group perspectives further enrich the framework by incorporating views from diverse age groups and genders, crucial in the decision-making process. The pluralistic lens employed aims to scrutinize both sociocultural and environmental (ecological) aspects of the LCPI, striving for a balance between anthropocentric and ecocentric viewpoints. While this remains an ongoing quest for the development of better tools in the future, the current iteration stands as a valuable interim resource. We remain optimistic that the insights garnered from LCPI can contribute to the refinement of local policies, ultimately leading to the sustained ecosystem services of the limestone forests in Samar Island Natural Park, benefiting both humans and nature.

CONCLUSION AND RECOMMENDATION

A total of 50 plant species had been screened for priority conservation at Samar Island Natural Park using the localized conservation priority index (LCPI). Thirteen have high-priority levels and 37 have either medium or low-priority levels, respectively. The top 20 plants have been prioritized as the focus of conservation action in the next 5–10 years. These are *Caryota rumphiana* Mart., *Aquilaria cumingiana* (Decne.) Ridl., *Cycas riuminiana* Regel, *Dracaena angustifolia* (Medik.) Roxb., *Oncosperma tigillarum* (Jack) Ridl., *Oreocnide rubescens* (Blume) Miq., *Kleinhovia hospita* L., *Diospyros blancoi* A.DC., *Codiaeum* sp., *Gymnostoma rumphianum* (Miq.) L.A.S. Johnson, *Caryota cumingii* Lodd. ex Mart., *Artocarpus rubrovenius* Warb., *Palaquium* sp., *Hancea wenzeliana* (Slik) S.E.C. Sierra, Kulju & Welzen, *Aglaia rimosa* (Blanco) Merr., *Canarium hirsutum* Willd., *Lasianthus trichophlebus* Hemsl. ex F.B. Forbes & Hemsl., *Polyscias nodosa* (Blume) Seem., *Shorea negrosensis* Foxw. and *Shorea contorta* S. Vidal. Furthermore, these top 20 plants had been geotagged in situ to enhance protection through intensive monitoring by park management. We are recommending village-level conservation policies to enhance both habitat and plant protection. Minimizing unnecessary roads or footpaths within the park can contribute to habitat protection. Plant protection can be done through ex situ conservation. Locals can collect scattered propagules under the canopy for backyard and home gardening. Conservationists are encouraged to

undertake additional research aimed at refining the LCPI employed in this study. Furthermore, there is a need to explore more practical conservation options that align with sustainable development goals. This endeavor holds the potential to bring about tangible benefits for multiple stakeholders in the locality.

REFERENCES

- Amaral, I. (2014). Encyclopedia of social media and Politics: Geotagging. SAGE Publications, Inc. pp 575-576; <https://doi.org/10.4135/9781452244723.n230>
- Anyanwu, J.C., G.E. Amaku, L.C. Izunobi, I.O. Egbuawa, & S.M. Onwuagba (2016). Impact of deforestation on biodiversity in Anambra State, Nigeria. *International Journal of Ecology and Ecosolusion* Vol. 3(3): 40–44
- Bellard, C., C. Bertelsmeier, P. Leadley, W. Thuiller & F. Courchamp (2012). Impacts of climate change on the future of biodiversity. *Ecology Letters* 15(4): 365–377.
- Brink, M., P.C.M. Jansen & C.H. Bosch (2003). *Oreocnide rubescens* (Blume) Miq. In: Brink, M and Escobin, R.P. (Editors): Plant Resources of South-East Asia No 17: Fibre plants. PROSEA Foundation, Bogor, Indonesia. Database record: prota4u.org/prosea
- Brown, W.H. (1921). Minor products of Philippine Forest. Department of Agriculture and Natural Resources. *Bureau of Forestry* 2: 421 pp.
- Buot, I.E. Jr. & K. Osumi (2011). Land use Type Pattern and Woody Species Composition Near Human Disturbed Landscapes on Mount Makiling, Luzon Island. *American Journal of Environmental Sciences* 7(4): 306–315.
- Buot, M.M. (2017). Benchmarking concepts of community wellbeing in an area vulnerable to disaster due to volcanic eruption. *International Journal of Environmental and Rural Development* 8(1): 58–62
- Buot, M.M., V.R. Cardenas, G.L.M. Nelson, M.A.T. Quimbo & J.T. Dizon (2017). Developing Community Wellbeing Index (CWBi) in disaster-prone areas of the Philippines. *Journal of Nature Studies* 16(1):63–75
- Buot, M.M. & V.R. Cardenas (2018). Community Wellbeing Index (CWBi) in the area exposed to Mayon Volcanic eruption in Camalig, Albay, Philippines. *Sylvatrop* 28(2): 27–46
- Buot, M.M. & M.Z. Dulce (2019). An index to determine community wellbeing along coastal community in Leyte, Philippines. *Environ Asia* 12(1): 56–67
- Buot, I.E. Jr. (2020). Status, issues and concerns of mangrove ecosystems: Rethinking the role of the university in crafting a sustainable management and conservation strategy. *Journal of Wetlands Biodiversity* 10: 73–93.
- Buot, M.M., V.R. Cardenas, J.T. Dizon, A.T. Quimbo & G.L.M. Nelson (2020). Multisectoral participation in the development of an index for community wellbeing, pp. 243–260. In: Buot I.E. (ed.). Methodologies supportive of sustainable development in agriculture and natural resources management: selected cases in Southeast Asia. Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) and the University of the Philippines Los Baños (UPLB), Laguna.
- Buot, M.M. & I.E. Buot, Jr. (2022). Volcanic seascapes: disaster recovery for community wellbeing and habitat protection, pp. 385–398. In: Pungetti, G. (ed.). Routledge handbook of seascapes. Routledge, New York.
- Buot, I.E. Jr., M.G. Origenes & R.D. Obeña (2022). Conservation Status of Native Mangrove Species in the Philippines. *Journal of Wetlands Biodiversity* 12: 51–65
- Buot, M.M. & I.E. Buot, Jr. (2023). Comprehending the Cultural Landscape of Mount Makiling: A Road to Community Well-Being Necessary to Enhance Ecosystem Integrity, pp. 601–613. In: Ramamoorthy, S., I.E. Buot Jr. & C. Rajasekaran (eds.). *Plant Diversity in Biocultural*

- Landscapes*. Springer, Singapore. https://doi.org/10.1007/978-981-19-8649-9_26
- Cadiz, G.O. & I.E. Buot, Jr. (2009). An enumeration of the woody plants of Cantipla forest fragments, Cebu Island, Philippines. *Philippine Journal of Systematic Biology* 3(1): 1–7.
- Cadiz, G.O. & I.E. Buot, Jr. (2010). An Enumeration of the Vascular Plants of Mount Tabunan, Cebu Island, Philippines. *The Thailand Natural History Museum Journal* 4(2): 71–77.
- Caringal, A.M., I.E. Buot, Jr. & E.L.C. Villanueva (2019). Woody plant communities in the Philippine teak forest landscape along Verde Island Passage, Batangas, Luzon, Philippines. *Biodiversitas Journal of Biological Diversity* 20(11): 3189–3198. <https://doi.org/10.13057/biodiv/d201111>
- Chanthavong, S. & I.E. Buot, Jr. (2019). Priority Areas for Conservation Planning in Dong Na Tard Provincial Protected Area, Lao People's Democratic Republic (Lao PDR). *Environment Asia* 12(2): 116–125.
- Coronel, R.E. (1991). *Diospyros blancoi* A. DC. In: Verheij, E.W.M. and Coronel, R.E. (Editors): Plant Resources of South-East Asia No 2: Edible fruits and nuts. PROSEA Foundation,
- delos Angeles, M.D., I.E. Buot, Jr., C.B. Mora, A.S. Robinso & D.N. Tandang (2022a). *Corybas kaiganganianus* (Orchidaceae), a new, rare helmet orchid from Samar Island, Philippines. *Phytotaxa* 543(2): 127–134. <https://doi.org/10.11646/phytotaxa.543.2.3>
- delos Angeles, M.D., R.R. Rubite, K-F. Chung, I.E. Buot, Jr. & D.N. Tandang (2022b). *Begonia normaaguilariae* (section Baryandra, Begoniaceae), a new species from the limestone forests of Samar Island, Philippines. *Phytotaxa* 541(1): 049–056. <https://doi.org/10.11646/phytotaxa.541.1.4>
- delos Angeles, M.D., D.N. Tandang, M.M.P. Medecilo-Guiang, I.E. Buot Jr, H. Schneider & M.A. Carballo-Ortiz (2023). A new diminutive species of *Schismatoglottis* (Araceae) from Samar Island, Philippines. *Webbia. Journal of Plant Taxonomy and Geography* 78(1): 21–28. <https://doi.org/10.36253/jopt-14411>
- DAO-2017-11 (2016). Updated National List of Threatened Philippine Plants and their Categories. Department of Environmental and Natural Resources, Philippines. <https://www.philippineplants.org/dao-2017-11.pdf>
- FAO (2015). Global forest resources assessment. Food and Agriculture Organization of the United Nations, Rome.
- Fernandez J., F. Fernandez & E.I.F. Legazpi (1995). *Palawan: Flora and Fauna*. Educational Publishing House, Inc. 76 pp.
- Fernandez, D.A.P., M.D. delos Angeles, R.D.R. Obeña, P.J.S. Tolentino, E.L.C. Villanueva & I.E. Buot, Jr (2020). Fauna and Flora of Forests over Limestone in Calicoan Island, Guiuan Marine Reserve Protected Landscape and Seascape (GMRPLS), Eastern Samar, Philippines. *Journal of Marine and Island Cultures* 9(2): 86–104.
- Fernando, E.S., M.H. Suh, J. Lee & D.K. Lee (2008). Forest Formations of the Philippines. ASEAN-Korea Environmental Cooperation Unit (AKECU), Seoul National University, Korea, 232 pp.
- Frongillo, E.A. (2023). Intersection of Food Insecurity and Water Insecurity. *Journal of Nutrition* 153(4): 922–923. <https://doi.org/10.1016/j.tjnut.2023.02.024>
- Gapido, F.P. & F.D. Batoon (2009). Growing malapapaya, *Polyscias nodosa* (Blume) Seeman, and environmentally, economically and friendly source of livelihood. *Journal of ISSAAS [International Society for Southeast Asian Agricultural Sciences (Philippines)]* 15(1): 2009.
- Garcia, K., R. Lasco, A. Ines, B. Lyon & F. Pulhin (2013). Predicting geographic distribution and habitat suitability due to climate change of selected threatened forest tree species in the Philippines. *Applied Geography* 44: 12–22.
- Ghazoul, J. (2016). *Dipterocarp Biology, Ecology, and Conservation*. Oxford University Press, 320 pp. <https://doi.org/10.1093/acprof:oso/9780199639656.001.0001>
- Howard, C., C.H. Flather & P.A. Stephens (2019). What drives at-risk species richness? Environmental factors are more influential than anthropogenic factors or biological traits. *Conservation Letters* 12(2): e12624. <https://doi.org/10.1111/conl.12624>
- IPNI (2022). International Plant Names Index. Published on the Internet <http://www.ipni.org>, The Royal Botanic Gardens, Kew, Harvard University Herbaria & Libraries and Australian National Botanic Gardens. Retrieved 18 July 2022.
- IUCN (2023). The IUCN Red List of Threatened Species. International Union for Conservation of Nature. Version 2022-2; <https://www.iucnredlist.org>
- Kamiohkawa, S., A. Maruyama, I.E. Buot, Jr. & M.M. Buot (2021). Index Assessment of Household Social Vulnerability to Climate Change: A Case Study of Laguna Province, Philippines. *Journal of Environmental Science and Management* 24(1): 68–76.
- Kareiva, P. & M. Marvier (2012). What is conservation science? *BioScience* 62(11): 962–969.
- Kaspari, M., J. Bujan, K.A. Roeder, K. Beurs, & M.D. Weiser (2019). Species energy and Thermal Performance Theory predict 20-yr changes in ant community abundance and richness. *Ecology* 100(12): e02888. <https://doi.org/10.1002/ecy.2888>
- Kochummen, K.M. (1995). *Canarium hirsutum* Willd. In: Lemmens, R.H.M.J., I. Soerianegara & W.C. Wong (Eds.). Plant Resources of South-East Asia No 5(2): Timber trees; Minor commercial timbers. PROSEA Foundation, Bogor, Indonesia. Database record: prota4u.org/prosea
- Luo, J., D. Joshi & J. Yu (2011). Geotagging in multimedia and computer vision—a survey. *Multimedia Tools and Applications* 51: 187–211. <https://doi.org/10.1007/s11042-010-0623-y>
- Magcale-Macandog, D.B., V.G. Paller, N.K. Torreta, I.A. Lambio, A.S. Hadsall, I.E. Buot, Jr., M.D. delos Angeles, C.R. Cervancia, S.G. Quinones & J.M. Laruya (2022). Plant Diversity of Mount Makiling Forest Reserve: Implications to Management and Conservation, pp. 97–120 In: Ramamoorthy, S., I.E. Buot Jr. & R. Chandrasekaran (eds). *Plant Genetic Resources, Inventory, Collection and Conservation*. Springer, Singapore.
- Malhi, Y., T.A. Gardner, G.R. Goldsmith, M.R. Silman & P. Zelazowski (2014). *Tropical Forests in the Anthropocene*. *Annual Review of Environment and Resources* 39(1): 125–159.
- Martinez, M.R. & I.E. Buot, Jr. (2022). Monitoring the Shoreline Dynamics of Manamoc Island, Cuyo, Palawan. *Journal of Marine and Island Cultures* 11: 63–90.
- Medecilo-Guiang, M.M.P., F.P. Coritico, J.C. Nobleza, N.G.B. Casinillo & V.B. Amoroso (2021). Tree species inventory and their economic uses in Mt. Agad Agad, Iligan city, Philippines. *Philippine Journal of Systematic Biology* 15(1): 1–20. <https://orcid.org/0.26757/pjsb2021a15013>
- Merrill, E.D. (1923–1926). An Enumeration of Philippine Flowering Plants. Vol. 1–4. Bureau of Printing, Manila.
- National Institute of Environmental Science (2020). Air pollution and your health. <https://www.niehs.nih.gov/health/topics/agents/air-pollution/index.cfm>
- National Research Council (2006). Food insecurity and hunger in the United States, pp. 1–156. In: Wunderlich G. & J. Norwood (eds.). National Research Council; Washington DC. *Food insecurity and hunger in the United States: an assessment of the measure*.
- Natural Resources Management Center (NRMCC) (Philippines) (1986). Guide to Philippine flora and fauna. Quezon City: Natural Resources Management Center, Ministry of Natural Resources and University of the Philippines.
- Obeña, R.D.R., P.J.S. Tolentino, E.L.C. Villanueva, D.A.P. Fernandez, M.D. delos Angeles & I.E. Buot, Jr (2021). Flora and Fauna Inventory of Limestone Forests in Taft, Eastern Samar, Philippines. *The Thailand Natural History Museum Journal* 15(1): 1–20.
- Ohsawa, M. (1984). Differentiation of vegetation zones and species strategies in the subalpine region of Mt. Fuji. *Plant Ecology* 57: 15–52. <https://doi.org/10.1007/BF00031929>
- Patindol, T. (2016). Post biological assessment of faunal resources in The Samar Island Natural Park. *Annals of Tropical Research* 52–73. <https://doi.org/10.32945/atr3824.2016>
- Pelser, P.B., J.F. Barcelona, & D.L. Nickrent (eds). (2011–onwards). Co's Digital Flora of the Philippines. www.philippineplants.org.
- Persoon, G.A. (2008). Growing 'The Wood of The Gods': agarwood production in Southeast Asia, pp. 245–262. In: Snelder, D.J. & R.D. Lasco (Eds.). *Smallholder Tree Growing for Rural Development and*

- Environmental Services. Springer Science Business Media B.V.
- POWO (2022).** Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet; <http://www.plantsoftheworldonline.org/>. Retrieved 21 July 2022.
- Pulhin, J.M., R.D. Lasco, F.B. Pulhin, L. Ramos & R.J.J. Peras (2010).** Chapter 11 Climate change adaptation and community forest management, pp. 243–263. In *Community, Environment and Disaster Risk Management*. Emerald Group Publishing Limited. [https://doi.org/10.1108/s2040-7262\(2010\)0000004017](https://doi.org/10.1108/s2040-7262(2010)0000004017)
- Rojo, J.P. (1999).** Revised Lexicon of Philippine Trees. Forest Products Research and Development Institute. Department of Science and Technology, Laguna.
- Santiago, J.O. & I.E. Buot, Jr. (2018).** Assessing the status of pinuchu as indicator of socio-ecological resilience of Chaya Socio-Ecological Production Landscape, Ifugao, Philippines. *Biodiversitas Journal of Biological Diversity* 19(6): 2010–2019.
- Sosef, M.S.M. & L.J.G. van der Maesen (1997).** *Gymnostoma rumphianum* (Miquel) L.A.S. Johnson. In: Faridah Hanum, I. & L.J.G. van der Maesen (Eds.). *Plant Resources of South-East Asia No 11: Auxiliary plants*. PROSEA Foundation, Bogor, Indonesia. Database record: prota4u.org/prosea.
- Steffen, W., P.J. Crutzen & J.R. McNeill (2007).** The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature? *Ambio* 36(8): 614–621.
- Steffen, W., J. Grinevald, P. Crutzen & J. McNeill (2011).** The Anthropocene: conceptual and historical perspectives. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences* 369(1938): <https://doi.org/10.1098/rsta.2010.0327>
- Tan, M.A., M.W.D. Lagamayo, G.J.D. Alejandro & S.S.A. An (2020).** Neuroblastoma SH-SY5Y cytotoxicity, anti-amyloidogenic activity and cyclooxygenase inhibition of *Lasianthus trichophlebus* (Rubiaceae). *Springer* 10(152): 1–8. <https://doi.org/10.1007/s13205-020-2145-2>
- Tandang, D., M. delos Angeles, I.E. Buot Jr., M.P. Devkota & M. Caraballo-Ortiz (2022).** *Decasinnia tomentosa* (Loranthaceae), a new species of mistletoe from Samar Island, Philippines. *Biodiversity Data Journal* 10: e78457. <https://doi.org/10.3897/bdj.10.e78457>
- Tawan, C.S. (2003).** *Aquilaria cumingiana* (Decne.) Ridley. In: Lemmens, R.H.M.J. & N. Bunyapraphatsara (eds.). *Plant Resources of South-East Asia No 12(3): Medicinal and poisonous plants 3*. PROSEA Foundation, Bogor, Indonesia. Database record: prota4u.org/prosea
- Tolentino, P.J.S., E.L.C. Villanueva & I.E. Buot, Jr. (2019).** Leaflet: Assessment and Conservation of Forest over Limestone Ecosystem Biodiversity in Selected Municipalities of Samar Island, Philippines. CONSERVE-KAIGANGAN, IBS, UPLB, College, Laguna.
- Tolentino P.J.S., J.R.L. Navidad, M.D. delos Angeles, D.A.P. Fernandez, E.L.C. Villanueva, R.D.R. Obeña & I.E. Buot, Jr. (2020).** Biodiversity of forests over limestone in Southeast Asia with emphasis on the Philippines. *Biodiversitas Journal of Biological Diversity* 21(4): 1597–1613.
- Tomas-Carig, E. (2020).** Field Guidebook on Native Trees within the Quirino Forest Landscape Tropical Plants Database, Ken Fern. tropical.theferns.info. 2022-04-05. (<https://tropical.theferns.info/>)
- Urban, M.C. (2015).** Accelerating extinction risk from climate change. *Science* 348(6234): 571–573. <https://doi.org/10.1126/science.aaa4984>
- Villanueva E.L.C. & I.E. Buot, Jr. (2018).** Vegetation analysis along the altitudinal gradient of Mt. Ilong, Halcon Range, Mindoro Island, Philippines. *Biodiversitas Journal of Biological Diversity* 19(6): 2163–2174.
- Villanueva, E.L.C. & I.E. Buot, Jr. (2020).** Setting Localized Conservation Priorities of Plant Species for Sustainable Forest Use, pp. 165–179. In: Buot, I.E., Jr. (ed.). *Methodologies Supportive of Sustainable Development in Agriculture and Natural Resources Management: Selected Cases in Southeast Asia*. Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) and the University of the Philippines Los Baños (UPLB), Laguna, Philippines.
- Villanueva, E.L.C., D.A.P. Fernandez, M.D. delos Angeles, P.J.S. Tolentino, R.D.R. Obeña & I.E. Buot, Jr. (2021a).** Biodiversity in Forests over Limestone in Paranas, Samar Island Natural Park (SINP) A UNESCO World Natural Heritage Site Nominee. *Tropical Natural History* 21(1): 119–145.
- Villanueva, E.L.C., D.A.P. Fernandez, P.J.S. Tolentino., R.D.R. Obeña & I.E. Buot, Jr. (2021b).** Checklist of the Flora and Fauna of the Karst Forests in Basey, Samar, Philippines. *The Thailand Natural History Museum Journal* 15(2): 147–160.
- Widodo, S.H. (2003).** *Aglaia rimosa* (Blanco) Merr. In: Lemmens, R.H.M.J. & N. Bunyapraphatsara (Eds.). *Plant Resources of South-East Asia No 12(3): Medicinal and poisonous plants 3*. PROSEA Foundation, Bogor, Indonesia. Database record: prota4u.org/prosea
- World Bank (2013).** Mindanao Rural Development Program (MRDP) Phase II-Natural Resource Management Component-P096836. Retrieved September 15, 2021. P096836 <https://projects.worldbank.org/en/projects-operations/project-detail/P096836?lang=en> www.techopedia.com/definition/86/geotagging. Retrieved 12 September 2021.
- Yang, X., X. Wu, H.-L. Hao & Z.-L. He (2008).** Mechanisms and assessment of water eutrophication. *Journal of Zhejiang University, Science B* 9(3): 197–209.
- Yang, C. (2022).** Review on the causes of eutrophication in water, pp. 246–252. In: *Proceedings of the 2022 6th International Seminar on Education, Management and Social Sciences (ISEMSS 2022)*. Atlantis Press SARL. https://doi.org/10.2991/978-2-494069-31-2_30
- Young, S.L., E.A. Frongillo, Z. Jamaluddin, H. Melgar-Quinonez, R. Pérez-Escamilla, C. Ringler, & A.Y. Rosinger (2021).** Perspective: The importance of water security for ensuring food security, good nutrition, and well-being. *Advances in Nutrition* 12(4): 1058–1073. <https://doi.org/10.1093/advances/nmab003>

Author details: INOCENCIO E. BUOT, JR. is a professor of botany, ecology, and systematics at the Plant Biology Division, Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Baños (PBD-IBS-CAS-UPLB) and is the Project Leader of CONSERVE-KAIGANGAN research project. MARNE G. ORIGENES is an MS graduate fellow under the Career Incentive Program of the Department of Science and Technology – Science Education Institute (DOST-SEI), deployed at IBS-CAS, UPLB as part of the CONSERVE-KAIGANGAN Project. REN DIVIEN R. OBEÑA is the previous university research associate of the CONSERVE-KAIGANGAN project. JONATHAN O. HERNANDEZ is an assistant professor of Forest Biological Sciences, College of Forestry and Natural Resources, University of the Philippines Los Baños (FBS-CFNR-UPLB). NOBA F. HILVANO is an associate professor and Dean of the College of Science, Eastern Samar State University (ESSU). DIANA SHANE A. BALINDO and EDELYN O. ECHAPERE are associate professors from Samar State University (SSU).

Author contributions: Inocencio E. Buot, Jr., the paper's main author, led the study, conceptualized the paper, formulated the objectives, developed the methodology, provided framework and direction on the flow of the manuscript discussion and overseeing the revision and review of the paper until publication. Marne G. Origenes contributed to the data analysis, discussion of results, conclusion, and revision of the paper after everyone's comments. Ren Divien R. Obeña assisted in the fieldwork, data analysis, and paper discussion. Jonathan O. Hernandez, Noba F. Hilvano, Diana Shane A. Balindo and Edelyn O. Echapere provided feedback and comments to improve the manuscript discussion.



Mr. Jatishwor Singh Irungbam, Biology Centre CAS, Branišovská, Czech Republic.
Dr. Ian J. Kitching, Natural History Museum, Cromwell Road, UK
Dr. George Mathew, Kerala Forest Research Institute, Peechi, India
Dr. John Noyes, Natural History Museum, London, UK
Dr. Albert G. Orr, Griffith University, Nathan, Australia
Dr. Sameer Padhye, Katholieke Universiteit Leuven, Belgium
Dr. Nancy van der Poorten, Toronto, Canada
Dr. Kareen Schnabel, NIWA, Wellington, New Zealand
Dr. R.M. Sharma, (Retd.) Scientist, Zoological Survey of India, Pune, India
Dr. Manju Siliwal, WILD, Coimbatore, Tamil Nadu, India
Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India
Dr. K.A. Subramanian, Zoological Survey of India, New Alipore, Kolkata, India
Dr. P.M. Sureshan, Zoological Survey of India, Kozhikode, Kerala, India
Dr. R. Varatharajan, Manipur University, Imphal, Manipur, India
Dr. Eduard Vives, Museu de Ciències Naturals de Barcelona, Terrassa, Spain
Dr. James Young, Hong Kong Lepidopterists' Society, Hong Kong
Dr. R. Sundararaj, Institute of Wood Science & Technology, Bengaluru, India
Dr. M. Nithyanandan, Environmental Department, La Ala Al Kuwait Real Estate. Co. K.S.C., Kuwait
Dr. Himender Bharti, Punjabi University, Punjab, India
Mr. Purnendu Roy, London, UK
Dr. Saito Motoki, The Butterfly Society of Japan, Tokyo, Japan
Dr. Sanjay Sondhi, TITLI TRUST, Kalpavriksh, Dehradun, India
Dr. Nguyen Thi Phuong Lien, Vietnam Academy of Science and Technology, Hanoi, Vietnam
Dr. Nitin Kulkarni, Tropical Research Institute, Jabalpur, India
Dr. Robin Wen Jiang Ngiam, National Parks Board, Singapore
Dr. Lionel Monod, Natural History Museum of Geneva, Genève, Switzerland.
Dr. Asheesh Shivam, Nehru Gram Bharti University, Allahabad, India
Dr. Rosana Moreira da Rocha, Universidade Federal do Paraná, Curitiba, Brasil
Dr. Kurt R. Arnold, North Dakota State University, Saxony, Germany
Dr. James M. Carpenter, American Museum of Natural History, New York, USA
Dr. David M. Claborn, Missouri State University, Springfield, USA
Dr. Kareen Schnabel, Marine Biologist, Wellington, New Zealand
Dr. Amazonas Chagas Júnior, Universidade Federal de Mato Grosso, Cuiabá, Brasil
Mr. Monsoon Jyoti Gogoi, Assam University, Silchar, Assam, India
Dr. Heo Chong Chin, Universiti Teknologi MARA (UiTM), Selangor, Malaysia
Dr. R.J. Shiel, University of Adelaide, SA 5005, Australia
Dr. Siddharth Kulkarni, The George Washington University, Washington, USA
Dr. Priyadarsanan Dharma Rajan, ATREE, Bengaluru, India
Dr. Phil Alderslade, CSIRO Marine And Atmospheric Research, Hobart, Australia
Dr. John E.N. Veron, Coral Reef Research, Townsville, Australia
Dr. Daniel Whitmore, State Museum of Natural History Stuttgart, Rosenstein, Germany.
Dr. Yu-Feng Hsu, National Taiwan Normal University, Taipei City, Taiwan
Dr. Keith V. Wolfe, Antioch, California, USA
Dr. Siddharth Kulkarni, The Hormiga Lab, The George Washington University, Washington, D.C., USA
Dr. Tomas Ditrich, Faculty of Education, University of South Bohemia in Ceske Budejovice, Czech Republic
Dr. Mihaly Foldvari, Natural History Museum, University of Oslo, Norway
Dr. V.P. Uniyal, Wildlife Institute of India, Dehradun, Uttarakhand 248001, India
Dr. John T.D. Caleb, Zoological Survey of India, Kolkata, West Bengal, India
Dr. Priyadarsanan Dharma Rajan, Ashoka Trust for Research in Ecology and the Environment (ATREE), Royal Enclave, Bangalore, Karnataka, India

Fishes

Dr. Neelesh Dahanukar, IISER, Pune, Maharashtra, India
Dr. Topiltzin Contreras MacBeath, Universidad Autónoma del estado de Morelos, México
Dr. Heok Hee Ng, National University of Singapore, Science Drive, Singapore
Dr. Rajeev Raghavan, St. Albert's College, Kochi, Kerala, India
Dr. Robert D. Sluka, Chiltern Gateway Project, A Rocha UK, Southall, Middlesex, UK
Dr. E. Vivekanandan, Central Marine Fisheries Research Institute, Chennai, India
Dr. Davor Zanella, University of Zagreb, Zagreb, Croatia
Dr. A. Biju Kumar, University of Kerala, Thiruvananthapuram, Kerala, India
Dr. Akhilesh K.V., ICAR-Central Marine Fisheries Research Institute, Mumbai Research Centre, Mumbai, Maharashtra, India
Dr. J.A. Johnson, Wildlife Institute of India, Dehradun, Uttarakhand, India
Dr. R. Ravinesh, Gujarat Institute of Desert Ecology, Gujarat, India

Amphibians

Dr. Sushil K. Dutta, Indian Institute of Science, Bengaluru, Karnataka, India
Dr. Annemarie Ohler, Muséum national d'Histoire naturelle, Paris, France

Reptiles

Dr. Gernot Vogel, Heidelberg, Germany
Dr. Raju Vyas, Vadodara, Gujarat, India
Dr. Pritpal S. Soorae, Environment Agency, Abu Dubai, UAE.
Prof. Dr. Wayne J. Fuller, Near East University, Mersin, Turkey
Prof. Chandrashekher U. Rivonker, Goa University, Taleigao Plateau, Goa. India
Dr. S.R. Ganesh, Chennai Snake Park, Chennai, Tamil Nadu, India
Dr. Himansu Sekhar Das, Terrestrial & Marine Biodiversity, Abu Dhabi, UAE

Birds

Dr. Hem Sagar Baral, Charles Sturt University, NSW Australia
Mr. H. Byju, Coimbatore, Tamil Nadu, India
Dr. Chris Bowden, Royal Society for the Protection of Birds, Sandy, UK
Dr. Priya Davidar, Pondicherry University, Kalapet, Puducherry, India
Dr. J.W. Duckworth, IUCN SSC, Bath, UK
Dr. Rajah Jayapal, SAGON, Coimbatore, Tamil Nadu, India
Dr. Rajiv S. Kalsi, M.L.N. College, Yamuna Nagar, Haryana, India
Dr. V. Santharam, Rishi Valley Education Centre, Chittoor Dt., Andhra Pradesh, India
Dr. S. Balachandran, Bombay Natural History Society, Mumbai, India
Mr. J. Praveen, Bengaluru, India
Dr. C. Srinivasulu, Osmania University, Hyderabad, India
Dr. K.S. Gopi Sundar, International Crane Foundation, Baraboo, USA
Dr. Gombobaatar Sunde, Professor of Ornithology, Ulaanbaatar, Mongolia
Prof. Reuven Yosef, International Birding & Research Centre, Eilat, Israel
Dr. Taej Mundkur, Wetlands International, Wageningen, The Netherlands
Dr. Carol Inskipp, Bishop Auckland Co., Durham, UK
Dr. Tim Inskipp, Bishop Auckland Co., Durham, UK
Dr. V. Gokula, National College, Tiruchirappalli, Tamil Nadu, India
Dr. Arkady Lelej, Russian Academy of Sciences, Vladivostok, Russia
Dr. Simon Dowell, Science Director, Chester Zoo, UK
Dr. Mário Gabriel Santiago dos Santos, Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, Vila Real, Portugal
Dr. Grant Connette, Smithsonian Institution, Royal, VA, USA
Dr. P.A. Azeez, Coimbatore, Tamil Nadu, India

Mammals

Dr. Giovanni Amori, CNR - Institute of Ecosystem Studies, Rome, Italy
Dr. Anwaruddin Chowdhury, Guwahati, India
Dr. David Mallon, Zoological Society of London, UK
Dr. Shomita Mukherjee, SAGON, Coimbatore, Tamil Nadu, India
Dr. Angie Appel, Wild Cat Network, Germany
Dr. P.O. Nameer, Kerala Agricultural University, Thrissur, Kerala, India
Dr. Ian Redmond, UNEP Convention on Migratory Species, Lansdown, UK
Dr. Heidi S. Riddle, Riddle's Elephant and Wildlife Sanctuary, Arkansas, USA
Dr. Karin Schwartz, George Mason University, Fairfax, Virginia.
Dr. Lala A.K. Singh, Bhubaneswar, Orissa, India
Dr. Mewa Singh, Mysore University, Mysore, India
Dr. Paul Racey, University of Exeter, Devon, UK
Dr. Honnavalli N. Kumara, SAGON, Anaikatty P.O., Coimbatore, Tamil Nadu, India
Dr. Nishith Dharaiya, HNG University, Patan, Gujarat, India
Dr. Spartaco Gippoliti, Socio Onorario Società Italiana per la Storia della Fauna "Giuseppe Altobello", Rome, Italy
Dr. Justus Joshua, Green Future Foundation, Tiruchirappalli, Tamil Nadu, India
Dr. H. Raghuram, The American College, Madurai, Tamil Nadu, India
Dr. Paul Bates, Harison Institute, Kent, UK
Dr. Jim Sanderson, Small Wild Cat Conservation Foundation, Hartford, USA
Dr. Dan Challender, University of Kent, Canterbury, UK
Dr. David Mallon, Manchester Metropolitan University, Derbyshire, UK
Dr. Brian L. Cypher, California State University-Stanislaus, Bakersfield, CA
Dr. S.S. Talmale, Zoological Survey of India, Pune, Maharashtra, India
Prof. Karan Bahadur Shah, Budhanilakantha Municipality, Kathmandu, Nepal
Dr. Susan Cheyne, Borneo Nature Foundation International, Palangkaraja, Indonesia
Dr. Hemanta Kafley, Wildlife Sciences, Tarleton State University, Texas, USA

Other Disciplines

Dr. Aniruddha Belsare, Columbia MO 65203, USA (Veterinary)
Dr. Mandar S. Paingankar, University of Pune, Pune, Maharashtra, India (Molecular)
Dr. Jack Tordoff, Critical Ecosystem Partnership Fund, Arlington, USA (Communities)
Dr. Ulrike Streicher, University of Oregon, Eugene, USA (Veterinary)
Dr. Hari Balasubramanian, EcoAdvisors, Nova Scotia, Canada (Communities)
Dr. Rayanna Hellem Santos Bezerra, Universidade Federal de Sergipe, São Cristóvão, Brazil
Dr. Jamie R. Wood, Landcare Research, Canterbury, New Zealand
Dr. Wendy Collinson-Jonker, Endangered Wildlife Trust, Gauteng, South Africa
Dr. Rajeshkumar G. Jani, Anand Agricultural University, Anand, Gujarat, India
Dr. O.N. Tiwari, Senior Scientist, ICAR-Indian Agricultural Research Institute (IARI), New Delhi, India
Dr. L.D. Singla, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India
Dr. Rupika S. Rajakaruna, University of Peradeniya, Peradeniya, Sri Lanka
Dr. Bahar Baviskar, Wild-CER, Nagpur, Maharashtra 440013, India

Reviewers 2020–2022

Due to pausity of space, the list of reviewers for 2020–2022 is available online.

The opinions expressed by the authors do not reflect the views of the Journal of Threatened Taxa, Wildlife Information Liaison Development Society, Zoo Outreach Organization, or any of the partners. The journal, the publisher, the host, and the partners are not responsible for the accuracy of the political boundaries shown in the maps by the authors.

Print copies of the Journal are available at cost. Write to:
The Managing Editor, JoTT,
c/o Wildlife Information Liaison Development Society,
43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore,
Tamil Nadu 641006, India
ravi@threatenedtaxa.org

Journal of Threatened Taxa is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64



OPEN ACCESS



The Journal of Threatened Taxa (JoTT) is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) unless otherwise mentioned. JoTT allows unrestricted use, reproduction, and distribution of articles in any medium by providing adequate credit to the author(s) and the source of publication.

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

March 2024 | Vol. 16 | No. 3 | Pages: 24819–25018

Date of Publication: 26 March 2024 (Online & Print)

DOI: 10.11609/jott.2024.16.3.24819-25018

www.threatenedtaxa.org

Editorial

Celebrating 25 years of building evidence for conservation

– Sanjay Molur, Pp. 24819–24820

Articles

Identifying plants for priority conservation in Samar Island Natural Park forests (the Philippines) over limestone using a localized conservation priority index

– Inocencio Escoton Buot, Jr., Marne Ga Origenes, Ren Divien Del Rosario Obeña, Jonathan O. Hernandez, Noba F. Hilvano, Diana Shane A. Balindo & Edelyn O. Echapore, Pp. 24821–24837

Status of floristic diversity and impact of development on two sacred groves from Maval Tehsil (Maharashtra, India) after a century

– Kishor Himmat Saste & Rani Babanrao Bhagat, Pp. 24838–24853

Faunal inventory and illustrated taxonomic keys to aquatic Coleoptera (Arthropoda: Insecta) of the northern Western Ghats of Maharashtra, India

– Sayali D. Sheth, Anand D. Padhye & Hemant V. Ghate, Pp. 24854–24880

Communications

A checklist of wild mushroom diversity in Mizoram, India

– Rajesh Kumar & Girish Gogoi, Pp. 24881–24898

New plant records for the flora of Saudi Arabia

– Abdul Wali Al-Khulaidi, Ali M. Alzahrani, Ali A. Al-Namazi, Eisa Ali Al-Faify, Mohammed Musa Alfaifi, Nageeb A. Al-Sagheer & Abdul Nasser Al-Gifri, Pp. 24899–24909

Seagrass ecosystems of Ritche's Archipelago in the Andaman Sea harbor 'Endangered' *Holothuria scabra* Jaeger, 1833 and 'Vulnerable' *Actinopyga mauritiana* (Quoy & Gaimard, 1834) sea cucumber species (Echinodermata: Holothuroidea)

– Amrit Kumar Mishra, R. Raihana, Dilmani Kumari & Syed Hilal Farooq, Pp. 24910–24915

Stypopodium Kütz. - a new generic record for India from the Bay of Bengal

– Y. Aron Santhosh Kumar, M. Palanisamy & S. Vivek, Pp. 24916–24922

First report of *Macrochaetus sericus* Thorpe, 1893 and *Lecane tenuiseta* Harring, 1914 (Rotifera: Monogononta) from Jammu waters (J&K), India

– Deepanjali Slathia, Supreet Kour & Sarbjeet Kour, Pp. 24923–24929

Spider diversity (Arachnida: Araneae) at Saurashtra University Campus, Rajkot, Gujarat during the monsoon

– Jyotil K. Dave & Varsha M. Trivedi, Pp. 24930–24941

Records of three gobioid fishes (Actinopterygii: Gobiiformes: Gobiidae) from the Gujarat coast, India

– Piyush Vadher, Hitesh Kardani, Prakash Bambhaniya & Imtiyaz Beleem, Pp. 24942–24948

Species distribution modelling of Baya Weaver *Ploceus philippinus* in Nagaon District of Assam, India: a zoogeographical analysis

– Nilotpal Kalita, Neeraj Bora, Sandip Choudhury & Dhruvaji Saharia, Pp. 24949–24955

Diversity and species richness of avian fauna in varied habitats of Soraipung range and vicinity in Dehing Patkai National Park, India

– Anubhav Bhuyan, Shilpa Baidya, Nayan Jyoti Hazarika, Sweeta Sumant, Bijay Thakur, Amit Prakash, Nirmali Gogoi, Sumi Handique & Ashalata Devi, Pp. 24956–24966

D'Ering Memorial Wildlife Sanctuary, a significant flyway and a preferred stopover (refuelling) site during the return migration of the Amur Falcon *Falco amurensis* (Radde, 1863)

– Tapak Tamir, Abprez Thungwon Kimsing & Daniel Mize, Pp. 24967–24972

Breeding of the 'Critically Endangered' White-rumped Vulture *Gyps bengalensis* in the Shan Highlands, Myanmar

– Sai Sein Lin Oo, Nang Lao Kham, Marcela Suarez-Rubio & Swen C. Renner, Pp. 24973–24978

Nurturing orphaned Indian Grey Wolf at Machia Biological Park, Jodhpur, India

– Hemsingh Gehlot, Mahendra Gehlot, Tapan Adhikari, Gaurav & Prakash Suthar, Pp. 24979–24985

Short Communications

New records of forty-nine herbaceous plant species from lateritic plateaus for Ratnagiri District of Maharashtra, India

– D.B. Borude, P.P. Bhalekar, A.S. Pansare, K.V.C. Gosavi & A.N. Chandore, Pp. 24986–24991

First report of moth species of the family Tineidae (Lepidoptera) in regurgitated pellets of harriers in India

– S. Thalavaipandi, Arjun Kannan, M.B. Prashanth & T. Ganesh, Pp. 24992–24995

Notes

Capturing the enchanting glow: first-ever photographs of bioluminescent mushroom *Mycena chlorophos* in Tamil Nadu, India

D. Jude, Vinod Sadhasivan, M. Ilayaraja & R. Amirtha Balan, Pp. 24996–24998

Extended distribution of *Clematis wightiana* Wall. (Ranunculaceae) in the Indian State of Arunachal Pradesh – a hitherto endemic species of the Western Ghats, India

– Debasmita Dutta Pramanick & Manas Bhaumik, Pp. 24999–25002

Smilax borneensis A.DC. (Smilacaceae): an addition to the flora of India

– Kishor Deka, Sagarika Das & Bhaben Tanti, Pp. 25003–25005

Recent record of True Giant Clam *Tridacna gigas* from the Sulu Archipelago and insight into the giant clam fisheries and conservation in the southernmost islands of the Philippines

– Richard N. Muallil, Akkil S. Injani, Yennyriza T. Abduraup, Fauriza J. Saddari, Ebrahim R. Ondo, Alimar J. Sakilan, Mohammad Gafor N. Hapid & Haidisheena A. Allama, Pp. 25006–25009

A record of the Hoary Palmer *Unkana ambasa* (Moore, [1858]) (Insecta: Lepidoptera: Hesperidae) from Assam, India

– Sanath Chandra Bohra, Manmath Bharali, Puja Kalita & Rita Roy, Pp. 25010–25012

Sighting of Large Branded Swift *Pelopidas sinensis* (Mabille, 1877)

(Hesperidae: Hesperinae) in Delhi, India
– Rajesh Chaudhary & Sohail Madan, Pp. 25013–25015

Rodent - a part of culture and revolution in India

– Hiranmoy Chetia & Murali Krishna Chatakonda, Pp. 25016–25018

Publisher & Host



Threatened Taxa