

Recent literature from Cambodia

This section summarizes recent scientific publications concerning Cambodian biodiversity and natural resources. The complete abstracts of most articles are freely available online (and can be found using Google Scholar or other internet search engines), but not necessarily the whole article. Lead authors may be willing to provide free reprints or electronic copies on request and their email addresses, where known, are included in the summaries below.

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New species & taxonomic reviews

Bayarsaikhan, U. & Bae Y.S. (2016) A review of the genus *Cyana* Walker, 1854 (Lepidoptera, Erebidae, Arctiinae) from Cambodia, with description of new species. *Zootaxa*, **4114**, 447–463.

A systematic review of *Cyana* moths in Cambodia. Seventeen species are recognized, including seven new country records and one new species to science: *Cyana angkorensis*. A key to Cambodian species within the genus is included with illustrations of adults and genitalia. Author: uug228@yahoo.com

Bayarsaikhan, U. & Bae Y.S. (2016) Review of the genus *Chrysoscota* in Cambodia (Lepidoptera, Erebidae, Arctiinae), with description of a new species. *Zootaxa*, **4154**, 485–488.

A systematic review of the moth genus *Chrysoscota* in Cambodia. A checklist is provided for the genus, which includes one new country record (*C. cotriangulata*) and one new species to science (*Chrysoscota kimsuni*). Descriptions are provided for both species, including illustrations of adults and genitalia. Author: uug228@yahoo.com

Gale, S.W., Schuiteman, A., Watthana, S., Sando, T., Souvannakhoummane, K., Averyanov, L. & Suddee, S. (2016) Studies in Asian *Nervilia* (Nervilieae, Epidendroideae, Orchidaceae) VI: *N. mekongensis*, a new species from Thailand, Cambodia, Laos and Vietnam. *Phytotaxa*, **247**, 267–273.

Describes a new species of the terrestrial orchid genus *Nervilia* from material collected at several localities in the Greater Mekong region of Southeast Asia, including eastern Cambodia. Despite being superficially similar to *N. aragoana*, a widespread species of tropical Asia and Australasia, the new species is most closely affiliated to *N. fordii*, a species known from southern China and Thailand. Taxonomic notes and a conservation assessment are included. Author: stephangale@kfbg.org

Hepner, J.B. & Bae Y.S. (2016) Two new species of *Loboschiza* from Cambodia and Vietnam (Lepidoptera: Tortricidae: Olethreutinae: Enarmoniini). *Zootaxa*, **4169**, 171–178.

Two new species of *Loboschiza* to science are described and illustrated: *L. cambodiensis* from Cambodia and *L. flavobasis* from Vietnam. The two new species bring the number of species described in the genus to 19. Author: jheppner@flmnh.ufl.edu

Kosterin, O.E. (2016) *Microgomphus alani* (Odonata, Gomphidae) sp. nov. from Cambodia. *Zootaxa*, **4114**, 341–350.

Describes a new species of dragonfly to science from male specimens collected in the coastal foothills of the Cardamom Mountains in Koh Kong Province. Females believed to be the same species were previously reported from Phrae Province in northern Thailand. Author: kosterin@bionet.nsc.ru

Kosterin, O.E. (2016) Reconsideration of the genera *Merogomphus* Martin, 1904, and *Anisogomphus* Selys, 1857, including erection of a new genus, with a new species and discussion of additional specimens from Cambodia. *Zootaxa*, **4171**, 51–76.

A systematic revision of the Odonata genus *Merogomphus*, including the description of a new species to science from Cambodia: *Euthygomphus schorri*. The type locality of the new species is near Sen Monorom in Monduliri Province. Author: kosterin@bionet.nsc.ru

Souladeth, P., Prajaksood, A., Parnell, J.A.N. & Newman, M.F. (2016) Typification of names *Eriocaulon* in the flora of Thailand and flora of Cambodia, Laos and Vietnam. *Edinburgh Journal of Botany*. doi:10.1017/S0960428616000238

This paper designates lectotypes for eight names in *Eriocaulon* in tropical Asia, namely *E. alatum*, *E. hamiltonianum*, *E. hookerianum*, *E. infirmum*, *E. lanigerum*, *E. nautiliforme*, *E. nigrum*, and *E. ubonense*. Additional information on the lectotype of *E. quinquangulare* is given. Author: p.souladeth@nuol.edu.la

Tanaka N., Tagane S., Chhang P. & Yahara T. (2015) A purple flowered new *Globba* (Zingiberaceae), *G. bokorensis*, from southern Cambodia. *Bulletin of the National Museum of Nature and Science Series B (Botany)*, **41**, 155–159.

A new plant species to science is described from Bokor National Park. The new species is related to *Globba*

leucantha, but is distinguished by glabrous lamina, a wholly purple inflorescence and flowers and longer anther crests. Author: nobuyuki_tanaka@kahaku.go.jp

Toyama H., Tagane S., Chhang P., Nagamasu H. & Yahara T. (2016) Flora of Bokor National Park, Cambodia III: a new species, *Garcinia bokorensis* (Clusiaceae). *Acta Phytotaxonomica et Geobotanica*, **67**, 47–53.

This study describes a new species of *Garcinina* (Clusiaceae) to science from Bokor National Park with illustrations and photographs. An updated identification key for species of *Garcinina* section *Oxycarpus* in Indochina is also provided. Author: htohyscb@kyushu-u.org

Toyama H., Tagane S., Chhang P., Nagamasu H. & Yahara T. (2016) Flora of Bokor National Park, Cambodia IV: a new section and species of *Euphorbia* subgenus *Euphorbia*. *Acta Phytotaxonomica et Geobotanica*, **67**, 83–96.

Paper not seen. Author: htohyscb@kyushu-u.org

Yahara T., Tagane S., Mase K., Chhang P. & Toyama H. (2016) Flora of Bokor National Park V: two new species of *Machilus* (Lauraceae), *M. bokorensis* and *M. brevipaniculata*. *PhytoKeys*, **65**, 35–46.

Two new species of *Machilus* (Lauraceae) to science are described with illustrations and photographs from Bokor National Park. Author: stagane29@gmail.com

Biodiversity inventories

Goes, F. (2016) *Cambodia Quarterly Bird Reports, April–June 2014*. http://www.samveasna.org/userfiles/cambodia_quarterly_bird_reports__april-june_2014.pdf [accessed 28 November 2016].

Goes, F. (2016) *Cambodia Quarterly Bird Reports, July–September 2014*. http://www.samveasna.org/userfiles/cambodia_quarterly_bird_reports__july-september_2014.pdf [accessed 28 November 2016].

Goes, F. (2016) *Cambodia Quarterly Bird Reports, October–December 2014*. http://www.samveasna.org/userfiles/cambodia_quarterly_bird_reports__october-december_2014.pdf [accessed 28 November 2016].

Part of a continuing series of quarterly reports, compiling bird counts and unusual records across Cambodia. Author: fredbaksey@yahoo.com

Lee S., Duwalb, R.K. & Lee W. (2016) Diversity of stingless bees (Hymenoptera, Apidae, Meliponini) from Cambodia and Laos. *Journal of Asia-Pacific Entomology*, **19**, 947–961.

Stingless bees are restricted to the tropical regions of the world and are important pollinators of various wild and cultivated plants. This study recognizes 14 species of stingless bees in the dry season from Cambodia and Laos, three of which are first records for Cambodia: *Pariotrigona pendleburyi*, *Tetragonula sirindhornae*, and

Tetrigona melanoleuca. Images of morphology, nesting behaviour, and a checklist of stingless bees in Cambodia and Laos are provided. Authors: seung@snu.ac.kr, ramkeshariduwal@gmail.com

Mahood, S. (2016) Chestnut-cheeked starling *Agropsar philippensis*: first unequivocal record for Cambodia. *BirdingASIA*, **25**, 118–119.

This note confirms the occurrence of chestnut-cheeked starling in Cambodia (the only previous record being of a captive bird of unknown provenance) and is based on observations of the species in Phnom Penh in February 2016. Author: smahood@wcs.org

Mahood, S. (2016) The first documented record of northern boobook *Ninox japonica* in Cambodia. *BirdingASIA*, **25**, 119–120.

This note documents the first country record of northern boobook and is based on a single bird incidentally caught and subsequently released in Phnom Penh in March 2013. Author: smahood@wcs.org

McCann, G.E. (2016) Marbled cat *Pardofelis marmorata* at Virachey National Park, Ratanakiri, Cambodia. *Southeast Asia Vertebrate Records*, **2016**, 72–74.

This note documents a camera trap record of a single marbled cat on the summit of Phnom Haling in Virachey National Park in January 2016. Author: greg.mccann1@gmail.com

Nuttall, M., Willcox, D., Nut M., Seng R. & Handschuh, M. (2016) The first records of red-legged crane *Rallina fasciata* for Cambodia. *BirdingASIA*, **25**, 114–115.

This note documents the first records of red-legged crane in Cambodia from three protected areas in August 2010 and July and November 2013. Author: mnuttall@wcs.org

Seehausen, M., Constant, J. & Smets, K. (2016) On a collection of Odonata from Cambodia, with the first record of *Sinictinogomphus clavatus* and a description of the female of *Zyxomma breviventre*. *Notulae odonatologicae*, **8**, 203–245.

This study documents 22 species of Odonata from collections made in Cambodia in May 2003. These include the first country record of *Sinictinogomphus clavatus*. Author: malte.seehausen@museum-wiesbaden.de

Species ecology & status

Barca, B., Vincent, C., Soeung K., Nuttall, M. & Hobson, K. (2016) Multi-female group in the southernmost species of *Nomascus*: field observations in eastern Cambodia reveal multiple breeding females in a single group of southern yellow-cheeked crested gibbon *Nomascus gabriellae*. *Asian Primates Journal*, **6**, 15–19.

Field studies of *Nomascus* gibbons have shown that multi-female polygynous groups are quite common in

the northernmost species. Based on research in Seima (Mondulkiri Province), this study shows that multi-female groups are also present in the southernmost species: *N. gabriellae*. Author: benbarca88@gmail.com

Furey, N.M., Whitten, T., Cappelle, J. & Racey, P.A. (2016) The conservation status of Cambodian cave bats. In *International Speleological Project to Cambodia 2016 (Provinces of Stoeng Treng, Kampong Speu, Banteay Meancheay and Battambang)* (ed M. Laumanns), pp. 82–95. Berliner Höhlenkundliche Berichte, 64, Berlin, Germany.

This review describes the conservation status of cave-roosting bats in Cambodia based on rapid surveys of 98 caves in the Kampot, Kep, Battambang and Stung Treng provinces between 2014 and 2016. Most of the caves surveyed supported a relatively depauperate bat fauna, although repeated surveys would likely reveal additional species and individuals at some sites. Thirteen caves of national significance for bat conservation are identified. Author: neil.m.furey@gmail.com

Gonzalez-Monge, A. (2016) The socioecology, and the effects of human activity on it, of the Annamese silvered langur (*Trachypithecus margarita*) in northeastern Cambodia. PhD thesis, Australian National University, Canberra, Australia.

The effects of human disturbance on langurs are unknown, a reason for concern given the current biodiversity crisis in Southeast Asia. This study explores the socioecology of the Annamese silvered langur and effects of human disturbance on the species in Veun Sai–Siem Pang National Park, Ratanakiri Province. Langurs were strongly affected by logging, moving higher in the canopy as logging intensity increased, and abandoned areas of their home range where it was most destructive. The study concludes that while the langur tolerates some human disturbance, law enforcement must be maintained at the site.

Hon N. (2016) *Food selection by northern yellow-cheeked crested gibbons (Nomascus annamensis) in northern Cambodia*. MSc thesis, Victoria University of Wellington, New Zealand.

This study quantifies food selection by northern yellow-cheeked crested gibbons in northern Cambodia by investigating the main plant species consumed and the influence of the availability of food items on their selection. It also explores the nutritional composition of food items consumed by the species and identifies plant species that provide significant nutrients. Author: navenhon@yahoo.com

Kidney, D., Rawson, B.M., Borchers, D.L., Stevenson, B.C., Marques, T.A. & Thomas, L. (2016) An efficient acoustic density estimation method with human detectors applied to gibbons in Cambodia. *PLoS ONE*, **11**, e0155066. doi:10.1371/journal.pone.0155066

Animal species such as gibbons are hard to see but easy to hear. Standard visual methods for estimating population density for these species are often ineffective or inefficient, but methods based on passive acoustics show promise. This article presents a spatially explicit capture-recapture method for territorial vocalising species, where humans act as acoustic detectors. The results suggest that the method provides reliable density estimates for gibbons and is efficient because it only requires routine survey data. Author: darrenkidney@googlemail.com

Wilcox, D., Visal S. & Mahood, S.P. (2016) The conservation status of otters in Prek Toal Core Area, Tonle Sap Lake, Cambodia. *IUCN Otter Specialist Group Bulletin*, **33**, 18–31.

Identification and protection of sites that support sizeable populations of otters in Southeast Asia is important because regional populations face many threats and are declining. This study presents the results of a rapid camera trap survey in 2014 along one stream in the Prek Toal Core Area, an area of flooded forest in Tonle Sap Lake. Thirty-four photographs were obtained of otters, 24 of which could be identified as smooth-coated otter and four as hairy-nosed otter. Author: smahood@wcs.org

Coasts, wetlands and aquatic resources

Chap S., Touch P. & Diepart, J.-C. (2016) *Fisheries Reforms and Right-based Fisheries: Insights from Community Fisheries across Cambodia*. The Learning Institute, Phnom Penh, Cambodia.

This working paper uses a right-based approach to examine the recent wave of reforms in the Cambodian fisheries sector and what these reforms mean for community fisheries management.

Kong S. (2016) *An estimation of the production function of fisheries in Peam Krasaob Wildlife Sanctuary in Koh Kong Province, Cambodia*. EEPSEA Research Report, Economy and Environment Program for Southeast Asia, Philippines.

This report presents an economic analysis of the different uses and values of mangroves in supporting nurseries and breeding grounds for commercially important finfish in the Koh Kong, Kep, Kampot, and Preah Sihanouk provinces. Results show that direct and indirect values derived from mangrove forests are very high and that failure to conserve mangroves will result in serious or irreversible ecological degradation and substantial economic losses. Author: kong.sopheak@rupp.edu.kh

Pervin, R. (2016) *Identifying changes in mangroves in Trat Province, Thailand and Koh Kong Province, Cambodia*. MSc thesis, San Francisco State University, California, USA.

This study explores changes in the extent of mangroves from 1996 to 2015 in the coastal areas of Trat Province,

Thailand and Koh Kong Province, Cambodia. Results indicate that mangroves decreased from 7.5% to 27.8% over this period in both areas, although they increased by 7.7% in Koh Kong between 2009 and 2015.

Sáenz, L., Farrell, T., Olsson, A., Turner, W., Mulligan, M., Acero, N., Neugarten, R., Wright, M., McKinnon, M., Ruiz, C. & Guerrero, J. (2016) Mapping potential freshwater services, and their representation within Protected Areas (PAs), under conditions of sparse data. Pilot implementation for Cambodia. *Global Ecology and Conservation*, **7**, 107–121.

Little is known about the effectiveness of conservation responses such as protected areas (PAs) in protecting freshwater ecosystems and their services. This paper proposes a freshwater services metrics framework to quantify the representation of freshwater services in PAs and pilots this in Cambodia. Results indicate that conservation actions have more effectively represented freshwater regulation services than freshwater provisioning services, with major rivers remaining generally unprotected. Author: lsaenz@conservation.org

Savage, J.M., Osborne, P.E. & Hudson, M.D. (2016) Effectiveness of community and volunteer based coral reef monitoring in Cambodia. *Aquatic Conservation: Marine and Freshwater Ecosystems*. doi:10.1002/aqc.2690

This study investigates the ability of surveyors with different levels of experience to conduct underwater surveys using a simple coral reef survey methodology. Results indicate that experience, rather than cultural background, influences survey ability and thus suggest that locally based programmes can fill gaps in knowledge with suitable training and assessment. Author: j.savage@soton.ac.uk

Tangdamrongsub, N., Ditmar, P.G., Steele-Dunne, S.C., Gunter, B.C. & Sutanudjaja, E.H. (2016) Assessing total water storage and identifying flood events over Tonlé Sap basin in Cambodia using GRACE and MODIS satellite observations combined with hydrological models. *Remote Sensing of Environment*, **181**, 162–173.

This article uses a variety of remote sensing and hydrological data to generate monthly and sub-monthly terrestrial water storage estimates and quantify flood events in the Tonle Sap basin between 2002 and 2014. Results suggest that the approach is an effective tool for monitoring small-scale (82,000 km²) hydrological basins. Author: N.Tangdamrongsub@tudelft.nl

Forests and forest resources

Chassagne, F., Hul S., Deharo, E. & Bourdy, G. (2016) Natural remedies used by Bunong people in Monduliri province (Northeast Cambodia) with special reference to the treatment

of 11 most common ailments. *Journal of Ethnopharmacology*, **191**, 41–70.

This paper investigates traditional knowledge about natural medicine (plants, animals, and mushrooms) in Cambodia's largest indigenous community. Bunong people in Monduliri Province use a total of 214 plants, one mushroom, and 22 animal species in their traditional practices to treat 51 different ailments. Most of the species reported for the treatment of the 11 most frequent ailments have already been proven to be efficient and safe. While undergoing considerable changes, Bunong people retain extensive traditional medicine knowledge and depend mainly on natural remedies for their health-care. Author: francois.chassagne@ird.fr

Mermoz, S. & Thuy L.T. (2016) Forest disturbances and regrowth assessment using ALOS PALSAR data from 2007 to 2010 in Vietnam, Cambodia and Lao PDR. *Remote Sensing*, **8**, 217. doi:10.3390/rs803021

The deforestation rate in Vietnam is among the highest in the tropics in recent decades and is also increasing rapidly in Cambodia and Laos. This paper develops a new methodology for monitoring forest disturbances and regrowth using ALOS PALSAR data in tropical regions. The results indicate disturbance rates of -1.07% in Vietnam, -1.22% in Cambodia, and -0.94% in Laos between 2007 and 2010, with corresponding aboveground biomass losses of 60.7 Tg, 59.2 Tg and 83.8 Tg, respectively.

Monda Y., Ito E., Kiyono Y., Sato T., Toriyama J., Sokh H., Chann S., Tith B., Keth S., Phallaphearaoth O. & Bounthabandit, S. (2016) Allometric equations for tropical seasonal deciduous forests in Cambodia: a method of estimating belowground tree biomass with reduced sampling loss of roots. *Japan Agricultural Research Quarterly*, **50**, 369–377.

Appropriate and simple methods of estimating the biomass of tropical seasonal forests in central Indochina, such as allometric equations, are needed to support initiatives such as REDD+. This study destructively sampled 28 trees in a deciduous forest in Kratie Province, and develops new allometric equations for estimating the tree-level biomass of aboveground woody parts, leaves, total aboveground parts, and belowground parts. A new sampling method is also presented to reduce sampling loss of belowground parts. Author: monda.yukako.2m@kyoto-u.ac.jp

Sasaki N., Chheng K., Mizoue N., Abe I. & Lowe, A.J. (2016) Forest reference emission level and carbon sequestration in Cambodia. *Global Ecology and Conservation*, **7**, 82–96.

Adoption of the Paris Agreement suggests that developing countries urgently need to establish a forest reference emission level (FREL) if they wish to seek financial support to reduce carbon emissions from deforestation and forest degradation. This study analyzes forest

cover and carbon stock changes for seven forest types in Cambodia between 2002 and 2006 and estimates stocks in four carbon pools (aboveground, belowground, litter, and deadwood pools). Author: nopheas@ait.asia

Singh, M., Evans, D., Coomes, D.A., Friess, D.A., Suy T.B. & Samean N.C. (2016) Incorporating canopy cover for airborne-derived assessments of forest biomass in the tropical forests of Cambodia. *PLoS ONE*, **11**, e0154307. doi:10.1371/journal.pone.0154307

This study examines the role of canopy cover in influencing above ground biomass (AGB) dynamics of an open canopied forest and evaluates the efficacy of individual-based and plot-scale height metrics in predicting AGB variation in the tropical forests of Angkor Thom, Cambodia. Author: ms2127@cam.ac.uk

Toyama H., Kajisa T., Tagane S., Mase K., Chhang P., Samreth V., Ma V., Sokh H., Ichihashi R., Onoda Y., Mizoue N. & Yahara T. (2015) Effects of logging and recruitment on community phylogenetic structure in 32 permanent forest plots of Kampong Thom, Cambodia. *Philosophical Transactions of the Royal Society B: Biological Sciences*, **370**, 20140008. doi:10.1098/rstb.2014.0008.

This paper explores the effects of logging, mortality and recruitment of trees on phylogenetic community structure in 32 plots in primary evergreen forest and secondary dry deciduous forest in Kampong Thom Province. Within communities, logging decreased phylogenetic diversity, and increased overall phylogenetic clustering and terminal phylogenetic evenness. Between communities, logging increased phylogenetic similarity between evergreen and deciduous plots. Recruitment had opposite effects. Author: httohyscb@kyushu-u.org

Yeang D., Eam S.U., Shercan, K. & McKerrow, L. (2016) *Local community participation in biodiversity monitoring and its implication for REDD+: a case study of Changkrans Roy Community Forest in Cambodia*. The 7th International Conference on Environment and Rural Development, Phnom Penh, Cambodia.

A significant part of the Reducing Emissions from Deforestation and Forest Degradation (REDD+) scheme depends on the participation of local communities in monitoring carbon and biodiversity. This paper presents evidence on how local communities are engaging in monitoring activities at a community forest in Siem Reap Province and concludes that this approach is important to engage and empower local community members in REDD+. Author: yeangdonal@gmail.com

Zhang M., Tagane S., Toyama H., Kajisa T., Chhang P. & Yahara T. (2016) Constant tree species richness along an elevational gradient of Mt. Bokor, a table-shaped mountain in southwestern Cambodia. *Ecological Research*, **31**, 495–504.

Previous research on tropical mountains has suggested that plant species richness declines with increasing elevation. This study determined tree species richness along an elevational gradient on Mt. Bokor and explores relationships between species richness and environmental factors. Unlike previous studies, tree species richness was nearly constant along the elevation gradient where temperature and precipitation were expected to vary. Author: tet.yahara@gmail.com

Environmental policy & practice

Baird, I.G. (2016) Non-government organizations, villagers, political culture and the Lower Sesan 2 dam in north-eastern Cambodia. *Critical Asian Studies*, **48**, 257–277.

As the largest dam to ever be built in Cambodia, the Lower Sesan 2 (LS2) project is expected to cause serious environmental and social impacts. This article analyzes relationships between Cambodian NGOs and villagers that will be negatively impacted by the LS2, as well as relations between NGOs and the Cambodian state. It suggests that while development actors often attempt to construct narratives to control development trajectories, such attempts can meet with resistance from local people, even when facing powerful opponents. Author: ibaird@wisc.edu

Walther, B.A., Boëte, C., Binot, A., By Y., Cappelle, J., Carrique-Mas, J.J., Chou M., Furey, N., Kim S., Lajaunie, C., Lek S., Méral, P., Neang M., Tan B-H., Walton, C. & Morand, S. (2016) Biodiversity and health: lessons and recommendations from an interdisciplinary conference to advise Southeast Asian research, society and policy. *Infection, Genetics and Evolution*, **40**, 29–46.

Southeast Asia is an economic, biodiverse, cultural and disease hotspot. Due to rapid socio-economic and environmental changes, the role of biodiversity and ecosystems for human health ought to be examined and communicated to decision-makers and the public. This review paper summarizes the lessons and recommendations from an interdisciplinary conference convened in Cambodia in 2014 to advise Southeast Asian societies on current research efforts, future research needs, and to provide suggestions for improved education, training and science–policy interactions. Case-studies from Cambodia are included. Author: bawalther2009@gmail.com

The Recent Literature section was compiled by Neil M. Furey, with contributions from Tagane Shuichiro.