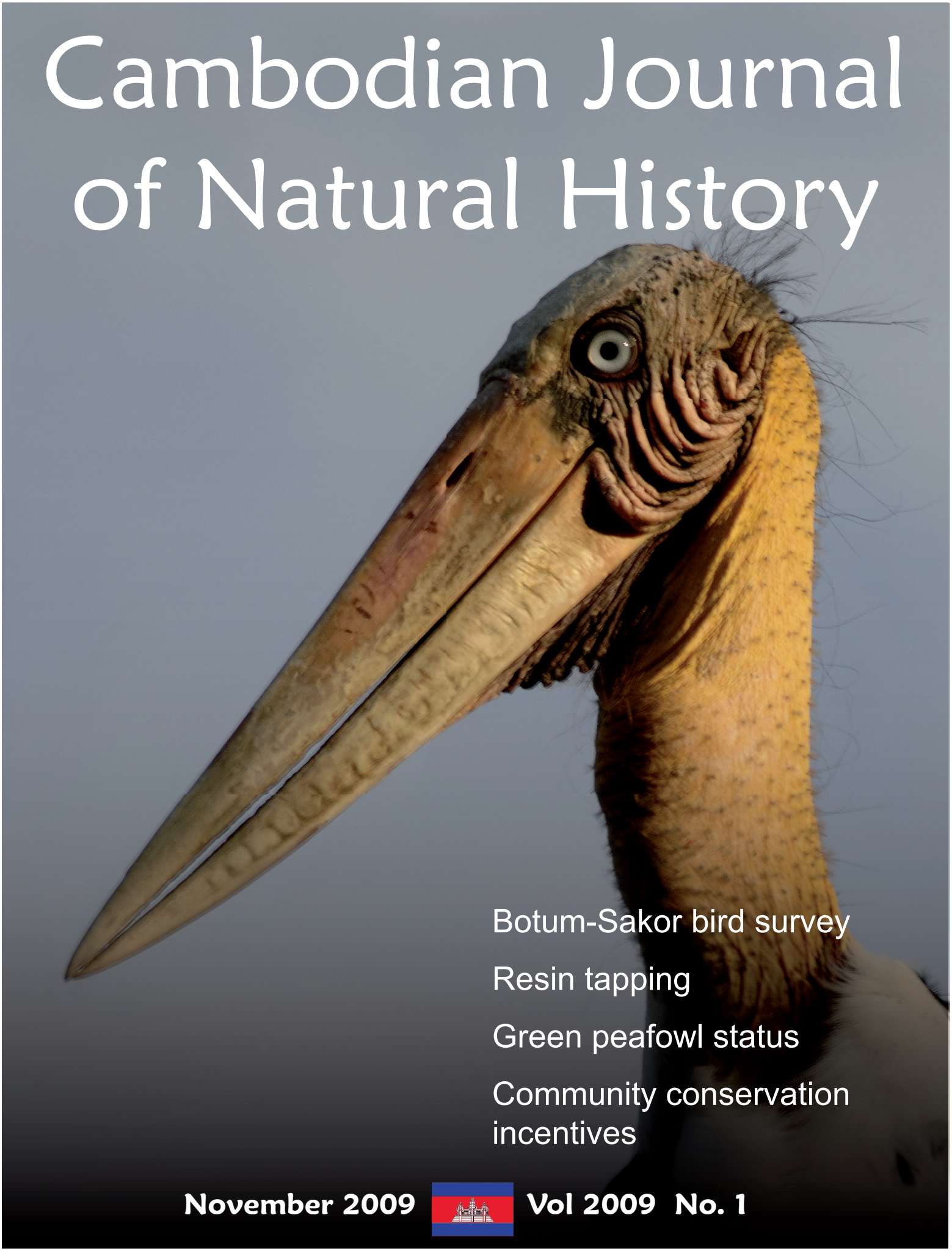
Cambodian Journal of Natural History



Botum-Sakor bird survey

Resin tapping

Green peafowl status

Community conservation incentives

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Cover photo: (© J Holden) The lesser adjutant *Leptoptilos javanicus* typically inhabits mangroves and small wetlands within dry forest (see Royan, this volume). It has a large distribution range throughout South and Southeast Asia, but has become scarce in many areas due to hunting, destruction of wetlands and the loss of big trees suitable for nesting. Cambodia now holds one of the largest populations, with an estimated 1,870 pairs. This is a globally threatened species, listed as Vulnerable by BirdLife International and IUCN.

Guest Editorial - Lessons learnt in establishing a Masters Programme in Biodiversity Conservation at the Royal University of Phnom Penh

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Cambodia is one of the richest countries in the region in terms of its biodiversity (MoE, 2004). More than 30 years of civil war, however, meant that baseline surveys of Cambodia's biodiversity did not begin in earnest until 1997 and, therefore, most plants and wild animal species are not well understood or documented (Daltry, 2008). Increasingly, Cambodia's natural resources are being destroyed by both internal and external forces, which is resulting in plants and wild animals becoming rare and threatened with extinction (MoE, 2004).

Cambodia suffers from a lack of skilled human resources to manage and conserve biodiversity in a more sustainable manner. More qualified Cambodian managers, planners and researchers are considered indispensable. In response to this need, the Royal University of Phnom Penh (RUPP), in conjunction with Fauna & Flora International (FFI), decided to establish a Masters of Science programme in Biodiversity Conservation in 2005. The MSc course covers a wide range of subjects including *Integrated Natural Resources Management, Research Analysis, Environmental Impact Assessment and Environmental Law, Project Cycle Management, Protected Areas Management, Data Presentation and Scientific Report Writing, Species Conservation, Research Methods and Applied Statistics, Geographical Information Systems*, and *Ecological Field Techniques*.

Since 2005, 120 students have enrolled in this programme, including staff from the government agencies, NGOs and private sector. The students have found this programme to be very useful, and have especially benefited from the diverse experience and perspectives of the international professors who deliver many of the lectures. By applying very strict grading and examination rules and regulations, the students have learned to work hard and become more proficient in self-study and practical research. Consequently, this programme has produced high quality students who have quickly found good jobs with higher salaries or gained promotion within their institutions. Some of our students have won scholarships to pursue their further studies abroad.

Even though our programme has had many indications of success, however, it has faced some challenges. The first is that some of our students have low proficiency in English and therefore struggle with lectures and reading materials in this language. The second challenge is that the majority of modules are taught by international lecturers who are not permanently based in Cambodia, which gives students fewer opportunities to benefit from their ongoing instruction and one-to-one mentoring. The shortage of qualified people in Cambodia can also make it difficult to find external supervisors to assist the students with their thesis projects. Finally, most students have other work to attend to and therefore have limited time to study. Consequently, some students fail their examinations and assignments, and it can take them longer than the intended two years to gain their degrees.

To overcome some of these challenges, Dr Neil Furey was appointed as Head of Academic Development in 2009 to work permanently with the programme. This has helped the programme to run more smoothly because Dr Furey can give additional mentoring and tuition to students while

they conduct their course assignments and thesis research. Another important strategy is to gradually transfer teaching duties to Cambodian nationals as more suitably qualified people become available. The immediate benefits of doing this will be to further increase the frequency of personal tutorials for students, to enable more lectures to be delivered in Khmer language, and to make the programme more sustainable.

We hope this course will continue forever and that the Centre for Biodiversity Conservation will become a research centre of excellence. We are now establishing an applied research programme to assist graduate students to pursue doctoral studies on biodiversity conservation themes in Cambodia. Alongside this, scholarships are being made available to assist good students from disadvantaged backgrounds to enrol on the Masters programme.

In my opinion, the Masters course is having a positive impact within the RUPP itself because graduate students can demonstrate the capacity to conduct research independently, offer lectures, and supervise graduate and undergraduate students in both the Department of Environmental Science and Department of Biology. This "multiplier effect" will enable even more Cambodians to understand and care for our natural heritage.

References

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MoE - Ministry of Environment (2004) *State of Environment Report.* Ministry of Environment, Government of Cambodia, Phnom Penh, Cambodia.

Editor's note:- Rath Sethik and some of the recent graduates from this programme can be seen in Fig. 1 below, and the abstracts from several recent Masters theses can be found on pages 58 to 62. In addition, graduate Oum Sony is the lead author of a full paper on pages 40-57, which was based on his MSc research thesis.

Fig. 1 Rath Sethik (far right) and Callum McCulloch with MSc graduates in 2009 (© J. Holden, FFI-RUPP).

Progress in breaking the link between narcotics crime and rainforest loss in Cambodia

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One of the least publicised causes of rainforest destruction in recent years has been the production of amphetamine-type stimulants, including methylenedioxymethamphetamine (MDMA), commonly known as ecstasy. An important precursor of MDMA is safrole oil, refined from sassafras oil from the lower trunk and roots of various trees, including the Lauraceae genera *Ocotea* and *Cinnamomum*.

In the densely forested Cardamom Mountains, Southwest Cambodia, Fauna & Flora International (FFI) staff observed a dramatic escalation in sassafras oil production around 2004, soon after stricter controls had been placed on this industry in neighbouring Vietnam. Sassafras is illegally refined in Cambodia from the uncommon 'mreah prew phnom' tree, tentatively identified by local biologists as the Data Deficient *Cinnamomum parthenoxylon*. The trees are felled and their roots cut into pieces and boiled in huge cauldrons over wood fires for five-to-eight days. The distillation process consumes an enormous quantity of other trees for fuel, and the factory waste is typically discarded into streams, causing severe pollution. It takes an estimated 100 kg of oil-rich material to produce 1 kg of safrole.

The oil is carried out of the jungle in 35-litre containers by local labourers, earning a monthly wage of around $ 25, before being smuggled to Vietnam, China or Thailand, where it fetches upwards of US$ 1,725 per litre, according to research by the FFI team in Cambodia. In 2005, the United Nations Office on Drugs and Crime sent a mission to Cambodia to investigate the source of a large quantity of oil found in Vietnam. They reported that international efforts to track and control the production of ecstasy were complicated by the fact that safrole has other, legitimate uses, including the production of degreasants, tooth paste and paints. The felling and processing of mreah prew phnom trees, however, is unequivocally illegal in Cambodia.

Besides mreah prew phnom trees, the Cardamom Mountins support an exceptionally rich biodiversity, with many endemic animals and plants and well over 60 globally threatened species. Nearly 30,000 people live in and around the mountains, including indigenous forest-based minorities. Considerable efforts have been made to close the illegal distilleries that threaten these forests and hence these communities. In Phnom Samkos Wildlife Sanctuary, for example, FFI supports 49 locally-recruited Ministry of Environment rangers who has successfully raided dozens of distilleries over the past four years, and destroyed or confiscated many tens of tonnes of safrole oil and the equipment to produce it. The distilleries are usually guarded by men armed with AK47 assault rifles and some are booby-trapped with antipersonnel mines.

Local people frequently come forward to report these and other threats to the forests they depend upon. Villagers in O'Som Commune, in the Central Cardamom Mountains, for example, earn most of their annual income from harvesting wild cardamoms (*Amomum krevanh*), and consider virgin mreah prew phnom forests to provide the optimal conditions for cardamoms to grow. In 2006, the villagers alerted FFI to the presence of 16 Vietnamese-owned sassafras distilleries in and around their 11,000-hectare 'cardamom forest', where cutting

trees is forbidden. FFI responded by organising a successful joint operation in collaboration with Conservation International, Ministry of Environment, Forestry Administration, Military Police and Royal Cambodian Armed Forces to close the distilleries and arrest the owners.

On 20 June 2008, 33 tonnes of sassafras oil were burned in Cambodia at a public ceremony organized by the Cambodian Ministry of Interior, the National Authority for Combating Drugs in Cambodia and the Australian Federal Police (AFP). Although this was only part of the oil seized and destroyed in recent years, the AFP Border and International unit calculated that it could have produced 245 million ecstasy tablets, with a street value of over US$ 7 billion. Even in their raw form, the 33 tonnes would have fetched over $ 69 million in Thailand.

The enforcement operations appear to have been highly effective to date. While there were an estimated 75 active distilleries in the western Cardamom Mountains in 2006, aerial searches in late 2007 and 2008 found none. Given the exceptionally high value of safrole, however, this highly destructive industry could re-appear at any time, and Cambodia's rangers are few in number and often underpaid.

Consequently, even though the sassafras industry is just one of many crimes that rangers must address, we hope that organisations concerned with halting the narcotics trade will consider contributing financial or technical support to continue their vital role to protect Cambodia's forests.

Fig. 1 (left) A ranger destroys a giant sassafras cauldron in the Cardamom Mountains (© David Bradfield); (right) Thorn Kim Hong and David Bradfield attend a ceremonial burning of sassafras oil.