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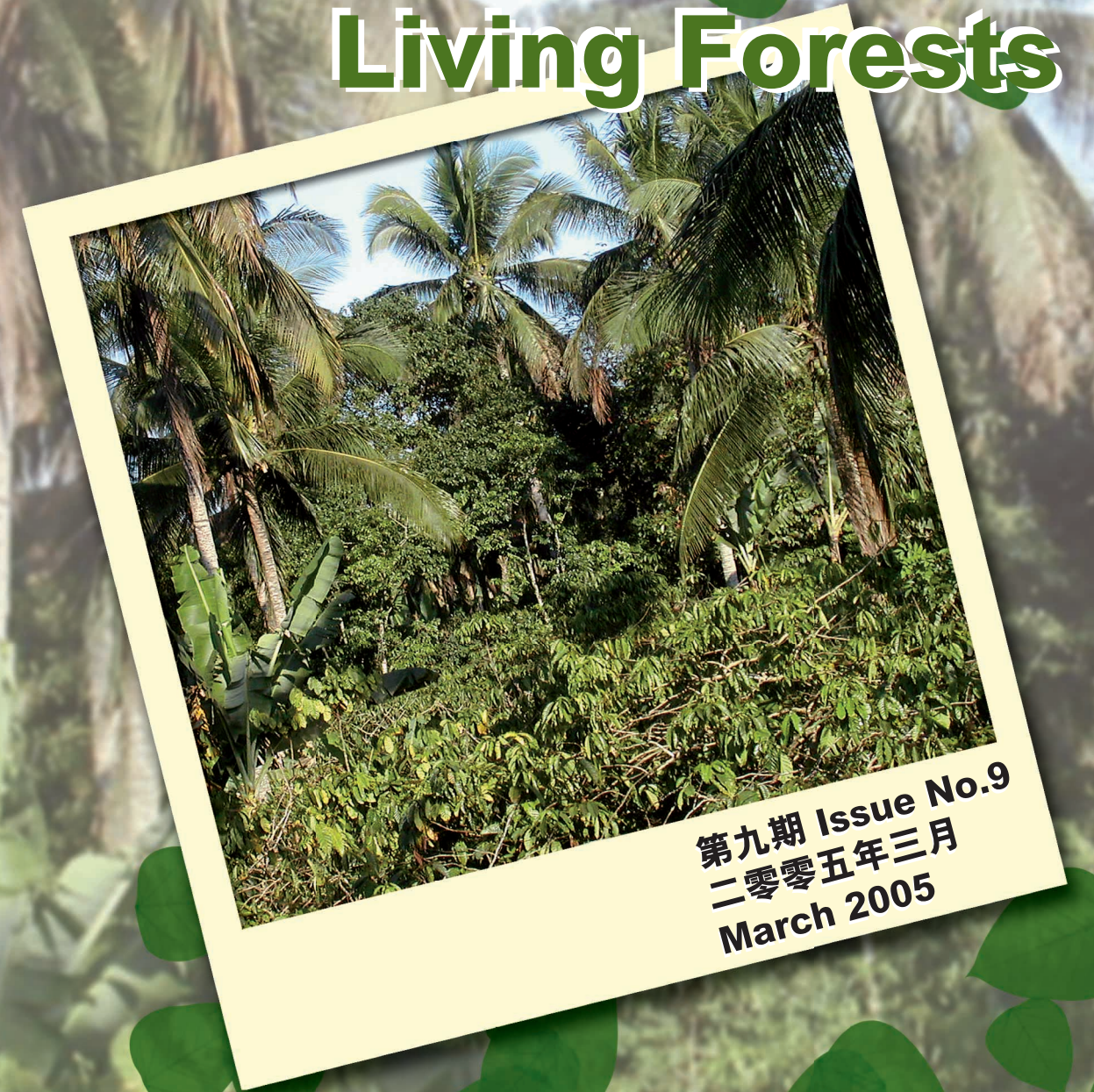
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本期主题
Inside this issue

称心的农获——
合符生物多样性保育的农业活动
Benign harvests-Bringing agriculture
in line with biodiversity conservation



嘉道理农场暨植物园简介

Introduction to Kadoorie Farm & Botanic Garden

嘉道理农场暨植物园是香港的一所慈善机构，早在1951年，嘉道理家族的两兄弟，罗兰士与贺理士，创办本园以推行农业辅助计划，帮助从大陆移民来的贫困农户自力更生。该计划帮助了超过三十万名香港农民改善生活。两兄弟于九十年代先后辞世，但其家族的慈善活动仍延续下来。嘉道理慈善基金会为中国境内及东南亚地区服务贫困社群的计划提供资助，而嘉道理农场暨植物园则因应香港社会的转型，现已建成为一所自然教育与保育中心，并根据1995年通过的香港法例成为一家公益事业公司。我们的任务是「提高大众对人与环境关系的认识，透过保育与教育，积极改善世界」。本园现推行的计划有野生动植物保育、可持续农业和环境教育等等。

Kadoorie Farm & Botanic Garden (KFBG) is a charity based in Hong Kong, with a tradition of agricultural aid dating back to 1951, when the two brothers Lawrence and Horace Kadoorie began a self-help scheme for poor immigrant farmers from China. This scheme was to help over 300,000 Hong Kong farmers to achieve a good standard of living. Both brothers died in 1990s, but the family's philanthropic activities continue. The Kadoorie Charities fund projects throughout China and the South East Asia region. KFBG, in response to changing priorities in Hong Kong, has become a centre for environmental education and conservation, enshrined by a Government Ordinance in 1995 as a public corporation. The Mission Statement of KFBG is "TO INCREASE THE AWARENESS OF OUR RELATIONSHIP WITH THE ENVIRONMENT AND BRING ABOUT POSITIVE CHANGE IN THE WORLD THROUGH CONSERVATION AND EDUCATION". KFBG now has thriving programmes in wild plant and animal conservation, sustainable agriculture, environmental education and other areas.

于《森林脉搏》内刊登之文章，其内容纯属作者之个人意见，与本园立场无关。

The articles in *Living Forests* represent the personal views of the authors which are not necessarily shared by the editors or by KFBG.



菲律宾的凯维特林场
Forest-farm in Cavite, Philippines

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编辑的话

Editorial

我们开始认同食物生产与生物多样性保育之间的冲突。世界各地的土地划分作不同用途，有农业的、林业的，也有一丁点是留给保育的。当某个领域僭越别的领域时，会被看成是偶发的事件，甚至使人混淆。

在今天的社会里，这种极端的情况分类似乎是无可避免。随著人口日益膨胀及其需求不断增加，有些地方无奈地需要用作高度集约生产，生态考虑只能局限于保存当地未来的生产力。在保护区等地区，我们却不能许保存重要生物多样性的宗旨被妥协。但那界乎两者之间的土地又应如何自处？

幅员辽阔的土地，必须从开发与保育中取得平衡。若天然林与集约单一农业地域毗连，其存活会因而受威胁——动植物种群并不仅仅需要孤立破碎的小生境，它们更需要健全完整的地貌才能长远的存活下去。再者，每每出现生物多样性受损的地方，农民生计也是首当其冲。显然，我们有必要成立更有效的缓冲区，从而使当地住客(人类及动植物)能持续受惠。所谓「边缘地区」则是探求协同增效的核心。

本期刊载的文章，都有著正面的启示：全球日渐认受农业与生物多样性间的联系、区内生态农业的革新与探究，及模拟亚洲天然林的农业系统的存留和应用在生产上。若得到适当的支持，这些整合的系统可能展现意想不到的经济活力及社区利益。若我们把农业产业牵涉的?含成本计算在内，如对日益衰竭的化石燃料的依赖、生产过程的衍生物化学对全球造成的庞大负面影响以及牺牲多数人的福祉以服务小撮人的经济利益等。公众的环保呼声日高，发展日趋成熟的生态农业理应可在未来的日子里茁壮成长。

We have come to accept a conflict between food production and biodiversity conservation. Around the world, land is parcelled: some for agriculture, some for forestry, some (very little) for conservation. Where one element sneaks into another's domain, it seems incidental, and even confusing.

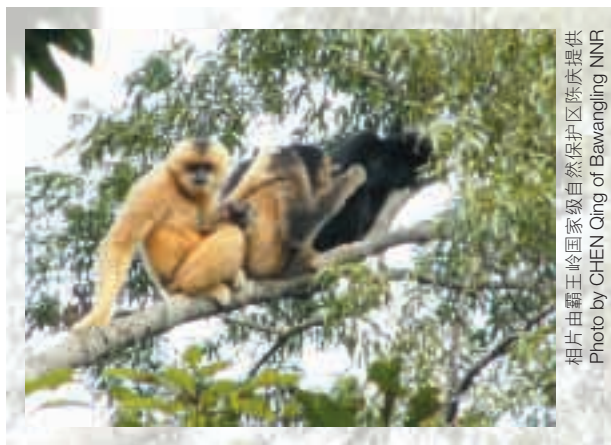
At present, some such polarisation seems inevitable. With our current swollen population and its growing appetite, some areas must be given over to intensive production, where ecological considerations are directed, at most, toward safeguarding future capacity. Other areas, such as nature reserves, cannot afford to compromise their vital biodiversity conservation objectives. But what of the space between?

For extensive areas of land, a balance must be sought. Where natural forest abuts intensive monoculture, its own viability is threatened? in the long run animal and plant populations need healthy landscapes, not isolated habitat fragments, to survive. Meanwhile wherever biodiversity is impoverished, so too are farmers' options. There is obvious need for more effective buffer areas, providing enduring benefits to residents (human and non-human). So-called "marginal lands" are central to the search for synergy.

As the articles in this issue show, there are many promising signs: deepening global recognition that agriculture and biodiversity are linked; innovation and inquiry into ecological farming within our region; persistence and adaptation of systems modelled on Asia's natural forests. Given due support such integrated systems may surprise us with their economic viability, and community benefits. As we factor-in the hidden costs of industrial agriculture ? dependence on dwindling fossil fuels, the massive global impact of its by-products, the sacrifice of overall majority wellbeing for minority financial profit? public support seems set to increase. This maturing ecological agriculture may yet find fertile ground to prosper.

海南长臂猿喜添幼仔

去年十二月，海南西部霸王岭国家级自然保护区工作人员拍摄到由已知猿群诞下的初生婴猿一只。极度濒危的海南长臂猿仅分布于霸王岭，最近一次于2003年末进行的调查只发现13只个体。



相片由霸王岭国家级自然保护区陈庆提供
Photo by CHEN Qing of Bawangling NNR

幼猿正在母亲怀中
A female Hainan gibbon is carrying a new born baby in her arms

Good news for the Hainan Gibbon

Last December, staff of Bawangling National Nature Reserve in west Hainan photographed a new-born baby in one of the two known groups of Hainan Gibbon *Nomascus nasutus hainanus*. Bawangling holds the only confirmed population of the Critically Endangered gibbon, and the latest population census in late 2003 could find only 13 individuals.

广西市场发现两只海南鵞

本年一月，本国从广西合作伙伴口中得知南宁市场贩卖全球濒危的海南鵞，迄今共发现两只幼鵞，其中一只幸能逃出生天，被两名广西体育大学的学生送到南宁动物园跟两只于去年获救的海南鵞生活，另一只却逃不了被屠宰的厄运。海南鵞的偷捕及贸易不断引起广泛关注，另边厢，南宁动物园及当地市民已积极把这鸟从市场拯救出来，如此热心实在使人快慰。



相片由南宁动物园提供
Photo by Nanning Zoo

学生及动物园职员正在拯救海南鵞
Students and zoo staff tend injured White-eared Night Heron

Two White-eared Night Herons found in markets of Guangxi

This January, KFBG received news about the globally Endangered White-eared Night Heron *Gorsachius magnificus* from Guangxi. Our partners saw two young birds in markets of Nanning. One bird was rescued by two students of Guangxi Physical Education University and sent to Nanning Zoo, joining two others admitted last year. Another one, unfortunately, couldn't be saved and ended up in the cooking pot. Although the continuous poaching and trade of this species are causes for great concern, the fact that general public and Nanning Zoo are taking initiatives to rescue market animals is something of a consolation.

嘉道理生物多样性奖学金消息

二零零五年嘉道理生物多样性奖学金将于本年五月开始接受申请。欢迎各位在华南地区从事野生动植物及可持续生活模式研究的博士及硕士研究生申请。详情请浏览本网页 www.kfbg.org 公布的最新消息。

KFBG Biodiversity Studentships news

An invitation for applications for the 2005 KFBG Biodiversity Studentships will be issued in May 2005. Application from M.Phil. or Ph.D. students conducting research on wild fauna and flora, and sustainable living in South China are welcome. Please visit the KFBG website www.kfbg.org for the latest announcements and details.

悼念高育仁先生

华南濒危动物研究所的高育仁先生刚于二月过世，相信很多读者对他有不少的认识。对于高教授的离去，我们与其他同业都感到悲痛万分。在本园华南生物多样性研究队成立之初，我们曾与他合作，从他身上领悟到不少知识与其献身保育的热诚，亦感受到他的和蔼与诚恳。

「他积极推动了广东省观鸟活动的兴起，并促进港粤两地民间观鸟者的交流。」香港观鸟会的林超英先生写道。「每当鸟类的生存受到威胁，我们都见到高教授奔波劳碌、四出呼吁的身影。当大众都被利欲薰心之际，高教授却处处表现风高亮节，挺身宣扬保育大自然的重要性，他的远见和勇气实在令人钦佩。」

我们亦邀请同样来自华南濒危动物研究所，跟高教授亦师亦友的袁喜才教授在此缅怀故人情怀。

悼念我的同事好朋友 高育仁研究员

高育仁同志于2005年2月6日，因病不幸逝世，得知这一噩耗，十分悲痛。我失去了一位良师益友，中国鸟类界失去了一位十分敬业，成绩卓著的科学家，对野生动物研究事业是个极大的损失。我在悲痛之余，回忆我同高育仁相处的点滴往事，以寄托我的哀思。

我认识高育仁是在1981年，他从上海华东师范大学硕士研究生毕业后，分配到广东省昆虫研究所，当时我们正好在一个课题组。他是研究鸟类的，我是研究兽类的。我们经常一起出差到野外进行调查研究工作。随著时间的推移，彼此相处，在为人做事、对待工作、科学研究态度等方面有许多共同的想法和语言，我们也就成了好朋友。20多年来，高育仁为鸟类的研究作出了突出贡献，他严谨的治学态度是我永远学习的榜样。

从热爱中国共产党到为共产主义事业奋斗终身，是高育仁人生道路上的真实写照，我记得在我们一起

A tribute to Professor Gao Yuren

Many readers will have known Gao Yuren, of the South China Institute of Endangered Animals (SCIEA), who died this February. Like others we are greatly saddened by the loss. From the first days of the South China Biodiversity Conservation Programme we worked with Professor Gao, gaining from his knowledge and dedication to conservation since 1997. We gained too from his great warmth of personality and honesty.

"He was instrumental in initiating the bird-watching movement in Guangdong and in facilitating the interaction among bird-watchers in Hong Kong and the province," wrote C.Y. Lam of the Hong Kong Bird Watching Society. "Whenever the survival of bird species was threatened, we would find Professor Gao campaigning relentlessly. He had to stand up and be an advocate for the cause of conservation in an atmosphere where most people cared about nothing but "development" and making money. In him we found foresight and courage."

We invited Professor Yuan Xicai of SCIEA to say a few words about his longtime colleague and friend.

In memory of my dear friend, Professor Gao Yuren

Professor Gao Yuren died on 6 February 2005, depriving me of a beloved friend and a caring mentor. Gao not only made major contributions to ornithology in China, but played an active role in wildlife research in general. His death is a tragic loss to the scientific world. I am left with fragments of memories to console me.

It was in 1981 that I first met Gao, who had just finished his M.Phil. studies at Shanghai's East China Normal University and was assigned to work for the same Task Force as me in Guangdong Institute of Entomology. He and I specialized in bird and mammal research respectively. We often had the chance to conduct field trips together. As time went by we became good friends, as we had many common thoughts about work, about life and about scientific research.



高育仁先生（左）参与广东从化鸟类资源调查
Prof. Gao Yuren (Left) participating bird survey in Conghua, Guangdong

海星海摄 Photo by HUANG Xinghai

出差到鼎湖山自然保护区观察白鹇时，他向我表白了要加入中国共产党的愿望（我当时任党支部书记），希望党组织能考验他。经过高育仁的个人努力和党组织的培养和严格考验，他实现了加入中国共产党的愿望。入党后高育仁对自己要求更加严格，工作更加努力，在科学研究方面取得了丰硕成果。

自鼎湖山驯化野生白鹇时起，就开始了他人工驯养繁殖白鹇的艰辛历程。工夫不负有心人，通过多年努力，不仅白鹇在野外环境条件下，能按时来投食点采食，而且还能听从驯化人员的呼叫。在掌握白鹇野外生态习性的基础上，高育仁经过反复研究，突破了不少难关，终于取得了人工条件下成功地繁殖白鹇的科研成果。

在海南岛霸王岭林区，他研究鸟类，我观察海南长臂猿。经常交换意见，探索相互间可以借鉴的地方。高育仁在孔雀雉、海南山鹧鸪研究方面，继白鹇之后，同样实现了人工驯化繁殖的成功，作出了显著的贡献。

我在海南大田自然保护区进行科研时他几次去大田保护区，认真地帮助我认鸟，非常耐心，告诉我很多有关鸟类的知识。有一次他邀我去鼎湖山拍摄白鹇的录影，我们事先在预定地点架好摄像机，等了很长时间没见白鹇来，我有些急，怀疑白鹇不来。老高告诉我，要耐心点，不要急。果然我们等了一个多钟头之后，一群白鹇，有大有小，来到我们面前，我一边拍摄，老高一边散玉米，白鹇跑来跑去吃玉米。我们两个人真是高兴极了，一直到天黑时才回住处去。在工作上有什为问题，在生活中有什为事情，他都愿意和我交流意见。每当想起这些往事，心里感到非常遗憾，因为不会再有机会相互在一起交流了。

在高育仁病重期间我和所领导及同事们看望他时，他仍然那么坚强，那么充满希望，还在惦记著工作，惦记著引进人才。我知道他手上有很多事情等待他去完成，他十分渴望再回到工作岗位。病魔无情，我的好朋友高育仁同志，最终没能回到他向往的工作岗位，与我们永别了。我能告慰高育仁同志的是，你没完成的事业，后人会继续努力的。

我的同事好朋友高育仁同志，安息吧。

A renowned ornithologist for more than 20 years, Gao is my lifelong example in his diligent attitude towards study and research.

Out of patriotism, Gao was determined to devote himself to the Communist Party. When we studied Silver Pheasants in Dinghushan, he expressed his will to join the Communist Party (at that time I was a secretary for the Party branch). His dream ultimately came true by passing all tests from the Party organization, due to his personal efforts and the supervision of the organization. Since then he judged his work by ever higher standards, working even harder in his research, and winning great recognition from other practitioners.

Gao's quest to breed Silver Pheasants in captivity began with the need to tame these birds in the wild at Dinghushan. Through his tireless effort for years, the birds came to the feeding points regularly and responded to the feeders' call. On the basis of their ecological habits in the wild, and after repeated attempts, Gao finally overcame the difficulties to succeed in breeding the pheasants.

While Gao and I were engaged in the study of birds and Hainan Gibbons in the forests of Bawangling, we would exchange our views and draw on each other's strengths. After domesticating and breeding Silver Pheasant, he went on to achieve the same for Hainan Peacock Pheasant as well as Hainan Partridge. When I was conducting research at Datian Nature Reserve, Gao visited me several times to help identify birds. He was so attentive and patient to enrich my bird knowledge.

Once, I accepted his invitation to video Silver Pheasants in Dinghushan. We set the video cameras and after waiting for some time I was a bit anxious, and doubted whether the pheasants would come. Gao asked me to be patience and wait a bit longer. An hour later a flock of pheasants stopped over as expected, and I was excited to video them, while Gao kept feeding them with corn to lure them to stay longer. We spent the whole day there until dusk. It was a valuable chance to develop our friendship, and he would share anything in life with me afterwards. When these memories come to mind, it is hard to accept I will have no more chance to chat with him.

His enthusiasm for work was not weakened by his illness. When the directors of South China Institute of Endangered Animals, my colleagues and I visited him; he was still very optimistic, and never forgot to recruit and support young conservationists. He was eager to get back to work and finish all the tasks in hand. Regrettably, my dear friend failed to defeat his illness and left us. Gao, rest in peace! We will be sure to continue your work.

《中国两栖动物检索及图解》出版

由中国科学院成都生物研究所费梁研究员等撰著的《中国两栖动物检索及图解》一书已于2005年1月由四川科学技术出版社出版。作者在原著《中国两栖动物检索》(1990)和《中国两栖动物图鉴》(1999)的基础上进行了较多的修订和补充撰写成该书。

本书对两栖动物的蚓螈目、有尾目、无尾目及其所隶各科(亚科)、属(亚属)的特征作了概述;同时将我国迄今发现的336种(其中11个亚种),分隶于59属(包含9个亚属)、11科(含8个亚科)、3目的成体、蝌蚪和卵分别编制成检索表,其中包括2个新种、1个新亚属、1个新亚科;并对一些科、属、种的分类地位作了较大的修订和讨论;还对叙用分类学术语作了解释;书中附有精美特征图片共900多幅。该书图文并茂有助读者鉴别种类。书末还附有中国两栖动物名录和地理分布表、野外采集知识简介、中文名和拉丁名索引及主要参考文献,是目前记载中国两栖类物种最全面系统、图文并茂的工具书。

该书可供从事动物学研究的科技人员、大专院校师生、农、林、牧业及野生动物资源调查、保护、养殖、卫生防疫、海关等部门的有关人员参考。

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Publication of "An Illustrated Key to Chinese Amphibians"

The book "An Illustrated Key to Chinese Amphibians" by Fei Liang *et al.* was published in January 2005 by Sichuan Science and Technology Press. It is a refined version of "A key to Chinese Amphibians" (1990) and "Atlas of Amphibians of China" (1999).



General features of Gymnophiona, Caudata, Anura and their respective families (sub-families) and genera (sub-genera) are briefly described. Adults, tadpoles and eggs of some 336 amphibian species, belonging to 59 genera (including 9 sub-species) in 11 families (including 8 sub-families) of 3 orders are indexed, including 2 new species, a new sub-species and a new sub-family. For particular families, genera and species, their taxonomical status are reassessed and discussed. Some general terminologies are added with explanatory notes and distinguishing features are shown in some 900 illustrations. To be user-friendly, the text is keyed with relevant illustrations. The appendices include a checklist of Chinese Amphibians and their geographical distribution, basic knowledge of wild collection, an index of scientific, English and Chinese names and major references, making this guidebook comprehensive both in terms of classification and illustration.

The book can offer much aid to scientific researchers engaged in animal studies, university teachers and students in agriculture, forestry, animal husbandry and also relevant staff involved in survey, conservation, breeding, quarantine control and customs of wildlife resources.

The book is A4 in size with 362 pages, of which 12 are color plates. With 550,000 words in total, it's priced at RMB¥88. Interested parties may send payment to the following address and state clearly your delivery address, or contact the following person(s) for further queries:

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红火蚁肆虐华南

现正肆虐于广东及香港的红火蚁 (*Solenopsis invicta* Buren) 源自南美。一度令美国南部及加勒比海生态及经济蒙受损失的红火蚁, 早前曾在澳纽及台湾出没, 现已席卷雷州半岛、深圳及香港大部份栽种进口植物的地区。根据《中华人民共和国进出境动植物检疫法》和《植物检疫条例》, 红火蚁已被定为有害生物。许多华南地区的气温与雨量均适合红火蚁的入侵, 不过, 有森林覆盖(因红火蚁较喜欢在开阔生境栖息)或保存完好且复杂多样的本土热带蚁群的地方或可幸免于难。

资料来源: 中国农业部令公告第453号, 17.01.2005, http://www.agri.gov.cn/blgg/t20050118_307965.htm; Morrison LW, Porter SD, Daniels E & Korzukhin MD, 2004. Potential range expansion of the invasive fire ant, *Solenopsis invicta*. *Biological Invasions* 6, 183-191及香港渔农自然护理处

最新濒危物种红色名录…

世界自然保护联盟(IUCN)发布的《2004年濒危物种红色名录》丰富了全球两栖类及兰花等群组层级的物种资料, 并再次或最新评估了数百个华南种的状况。广东蕨类粤铁线蕨 *Adiantum lianxianense* 现列为灭绝, 下列植物如海南槭 *Acer hainanense*、香港马兜铃 *Aristolochia westlandii*、短轴省藤 *Calamus compsostachys*、铁皮石斛 *Dendrobium officinale*、保亭树参 *Dendropanax oligodontus*、东方

瓜馥木 *Fissistigma tungfangense*、长圆叶冬青 *Ilex maclurei*、海南节毛蕨 *Lastreopsis subrecedens*、白花兜兰 *Paphiopedilum emersonii* 及白水藤 *Pentastelma auritum* 则为极危种。两栖类是全球最受危的脊椎动物, 单是极危或濒危种已占全球总数的至少21%。据红皮书指数(RLIs)显示, 鸟类及两栖类的状况自上世纪80年代已逐步下降。从上世纪已知及怀疑的脊椎动物灭种来看, 它们的灭绝率要比于世上自然消失的速度超出100至1,000倍, 更有可能高于这个保守估计。全球190万个描述种中, 只有少于3%被评级。大陆物种相对于海岛物种的灭绝比例亦升高。澳洲、巴西、中国、印尼及墨西哥是拥有最多受危物种及受危特有种的国家。是次评估指出生境破坏及相关的退化及破碎化是地栖物种面对的主要威胁。鸟类、哺乳动物及两栖类亦特别容易受到过度猎捕所威胁。

资料来源: 中国网 <http://www.china.org.cn/chinese/huanjing/727294.htm> 原载《京华时报》2004年12月13日

…中国物种红色名录面世

同年, 由19位中国科学家组成的核心专家小组, 参照2001年出版的IUCN评级标准, 评核了物种在本国的状况, 亦修订了中国红皮书等的物种濒危等级。获重新评级的包括5,803个动物物种及4,408个植物物种。中国物种红色名录第一卷经已出版, 书中载有物种最新的国

内状况评估。这些资料将载于中国生物多样性网站(www.chinabiodiversity.com) 供网上查阅。

资料来源: 中国物种信息服务(CSIS) <http://www.chinabiodiversity.com/index-new/redlist.htm>

加大气候变化的研究力度

经中国科学院批准, 国际全球环境变化人文因素计划中国国家委员会(CNC-IHDP)已正式成立, 旨在促进中国科学家多参与全球环境变化的国际研究会, 协调自然科学、人文学及社会科学的专才互动交流。该会副秘书长张雪芹表示, 学者们在研究时往往有欠全面, 如中国社会科学家常忽略都市对环境造成的负面影响, 同样地, 研究气候变化的时候也没有考虑相关的社会或历史因素。该委员会也亦会积极推动国内外各有关单位开展这方面的研究和学术交流。

资料来源: 全球暖化研究信息中心 <http://www.globalchange.ac.cn/news-CNC-IHDP.htm>

亚洲森林复修成泡影

国际林业研究中心的研究人员表示, 虽然许多于亚洲退化土地进行的植林项目得到大量资金投入, 却难以使当地经济得益或有利于全球环境保育。导致计划失败的部份原因是欠缺清晰具体的目标, 和没有在事前与利益相关各方达成共识。笔者强调天然的孑遗植被林块及生态坡度对森林修复所起的

积极作用。

资料来源：Sayer J, Chokkalingham U & Poulsen J, 2004. *The restoration of forest biodiversity and ecological values.* Forest Ecology and Management 201, 3-11.

在一个于2004年12月印尼茂物举行，由倡议取代刀耕火种耕作模式的组织「Alternatives to Slash-and-Burn Consortium (ASB)」召集的「热带森林与水」公开科学会议上亦谈到植林的问题。国际混农林业中心 (ICRAF) 的 ASB 国际统筹员 Thomas Tomich 指植林使河水不再暴发，但澳洲联邦科学与工业研究组织 (CSIRO) 的科学家 Albert van Dijk 则指植林使用水量增加，造成河溪流量减少，植林可能使枯水期的流量增加，但只有在下渗泥土的雨水抵销树木用水，并有正确的地下水系统才可。他强调施工前需要确认植林目标，为种植树种、土壤及森林管理、种植方法及当地的气候、地质、泥土、地型及集水区类型的影响，作出明智抉择。

资料来源：International Institute for Sustainable Development (IISD), 2004. *Sustainable Developments* 98 (1), 2004 年 12 月
<http://www.iisd.ca/sd/tfw>; <http://www.asb.cgiar.org/water/>.

对中国稻米的关注

2004年10月，思力农药替代技术中心、中国绿色和平、生物多样性与传统知识研究会及中国行动援助举办了云南生态农业之旅的活动，考察稻米的生

物多样性。此行主要是希望中国政府停止引入转基因稻米，因为它会对生态造成不可预测的后果。元阳是巡游地点之一，当地的哈尼族从事稻米耕作源远流长，已有逾2,300年的历史，族民更使用适合于不同气候和海拔的水稻品种近60个。他们对本土种子的特徵都很有认识，到访者也趁机与他们交流一番。

资料来源：绿色和平 <http://www.foodsafety.org.cn/special/ricetour/photo.htm>

人与植物的新夥伴

成立于2004年的人类与植物国际 (PPI)，是一个建基于「人与植物行动计划」12年来工作成果上的民族生态网络。人与植物行动计划成立于1992年，由世界自然基金会、联合国科教文组织和英国皇家植物园邱园联合组成。人类与植物国际计划把传统知识与生物科学相互结合，套用在发展、保育及教育的综合项目之中。昆明植物研



究所及中国民族植物学会都是 PPI 在中国的主要成员。项目正为西南林业学院的学生筹办一个民族植物学及可持续资源管理的课程。

资料来源：<http://info.kib.ac.cn/soft/3043.htm> 联络 PPI: lputzel@nybg.org

由生态学家来支配生物多样性资金用途

生态学家在热带生物多样性保育中应担当甚么角色为三位国际研究员对就社区为本的自然资源管理项目提供意见的成效均表质疑。他们更提出有力证据，显示传统及当地做法往往不可持续，部分原因是由于当地没因应现时天然系统受到的干扰而作出改变。此外，自然保护区除了使人享受到生态系统提供在资源及功能上的短期利益外，亦提升了区内生态的复原力(遇到突如其来的巨大干扰仍能持续运作)与适应力(指人类适应环境变化的能力)，这些作用在没有外来资金投入的情况下通常是不会被奖赏的。研究员们总括说只要生态学家识别出生态复原能力临界值，把维持适应力的价值量化，生态学家才能帮助引导款项直接用在有利于当地、国家以至全球利益的事上。

资料来源：du Toit JT, Walker BH & Campbell BM, 2004. *Conserving tropical nature: current challenges for ecologists.* Trends in Ecology and Evolution 19, 12-17.

瑶族植物知识备受冷落

一项对云南金平县红头瑶族人民的研究显示，27种瑶民常用的草药原来一直被中医学界忽略，另发现有23种草药的疗效和以往的记录有别。草药医生们向来都会保育药用植物及其生境，民间医师多由老妪出任，她们都担心草药医术早晚 would 失传。

资料来源：Long C-I & Li R, 2004. *Ethnobotanical studies on medicinal plants used by the Red-headed Yao People in Jinping, Yunnan Province, China*. *Journal of Ethnopharmacology* 90, 389-395.

破解黄额盒龟身世之谜

近日接受了线粒体脱氧核糖核酸研究的黄额闭壳龟，身世之谜终于解开。昔日以 *Cuora galbinifrons* 命名的黄额盒龟原来是由 *galbinifrons*、*bourreti* 和 *picturata* 三个独立种组成（以往被认为是亚种）。这项资料对保育有重要影响，而这三个种全被世界自然保护联盟列为极危种。该项研究还指出海南闭壳龟 *C. g. hainanensis* 与其母种十分相似。金头闭壳龟 *Cuora aurocapitata*、潘氏闭壳龟 *C. pani* 和三线闭壳龟 *C. trifasciata* 虽然外型迥异，但它们线粒体的差别则不大。

资料来源：Stuart BL & Parham JP, 2004. *Molecular phylogeny of the critically endangered Indochinese box turtle (Cuora galbinifrons)*. *Molecular Phylogenetics and Evolution* 31, 164-177.

Fire ants in South China

The South American invasive fire ant species, *Solenopsis invicta* Buren (often known as the Red Imported Fire Ant), has arrived in Guangdong and Hong Kong. The species, which has caused ecological and economic devastation in invaded areas including the southern USA and the Caribbean, has recently been found in Australia, New Zealand and Taiwan, and in China has so far been reported from the Leizhou Peninsula, Shenzhen, and many parts of Hong Kong where imported vegetation has been planted. It has been declared a pest according to the "Law of the People's Republic of China on the Entry and Exit Animal and Plant Quarantine" and the "Regulation of Plant Quarantine". Most of southern China falls within the potential invasion range of *S. invicta* based on temperature and rainfall, though it is possible that invasion would be limited, in places, by both forest cover (the species prefers open habitats) and resistance from diverse native tropical ant communities where these have not been disrupted.

Sources: Ministry of Agriculture of the People's Republic of China, Notice no. 453, 17 January 2005; Morrison LW, Porter SD, Daniels E & Korzukhin MD, 2004. *Potential range expansion of the invasive fire ant, Solenopsis invicta*. *Biological Invasions* 6, 183-191; Agriculture, Fisheries & Conservation Department, Hong Kong SAR.

Global Red List updated...

The 2004 Red List from IUCN includes results of some global group-level assessments, including those on amphibians

and orchids. Status of several hundred South China species has been newly assessed or reassessed. The Guangdong fern *Adiantum lianxianense* is now considered Extinct (EX). *Andrias davidianus* (Chinese Giant Salamander) and a number of plants (including *Acer hainanense*, *Aristolochia westlandii*, *Calamus compsoctachys*, *Dendrobium officinale*, *Dendropanax oligodontus*, *Fissistigma tungfangense*, *Ilex maclurei*, *Lastreopsis subrecedens*, *Paphiopedilum emersonii* and *Pentastelma auritum*) are Critically Endangered (CR). Amphibians are the most threatened vertebrate group globally, with at least 21% of species Critically Endangered or Endangered. As shown by Red List Indices (RLIs), the status of birds and amphibians has steadily declined since the 1980s. From known and suspected vertebrate extinctions in the past century, current extinction rates are at least 100 to 1,000 times natural (background) extinction rates, and possibly much more; less than 3% of the world's 1.9 million described species have been evaluated for extinction risk. The proportion of extinctions on continents, as opposed to oceanic islands, has also increased. The countries with the highest number of threatened species, and of threatened endemic species, include Australia, Brazil, China, Indonesia, and Mexico. The assessments reveal that habitat destruction and associated degradation and fragmentation are the greatest threats to assessed terrestrial species. Birds, mammals and amphibians

are also particularly vulnerable to over-exploitation.

Sources: <http://www.redlist.org> and http://www.iucn.org/themes/ssc/red_list_2004/GSAexecsumm_EN.htm.

...and China gets its own

Also in 2004, results were published of a national status assessment in China. The China Red List, conducted by a core group of 19 Chinese scientists using the latest (2001) IUCN criteria, replaces earlier assessments such as the China Red Books. In all 5,803 animal species and 4,408 plant species were evaluated for their status within the country. Results will eventually be available on the Internet (www.chinabiodiversity.com).

Sources: Wang S & Xie Y (eds.), 2004. China Species Red List Vol. 1 Red List. Higher Education Press, Beijing, 468 + 224 pp..

Increased research on impact of climate change

The Chinese Academy of Sciences has launched a new body to increase China's involvement in international discussions on the impact of global climate change. The China National Council of International Human Dimensions Programme on Global Environmental Change (CNC-IHDP) will aim to coordinate the efforts of natural scientists with those of researchers in the humanities and social sciences. The council will be administered by Zhang Xueqin, who noted that social scientists in China seldom consider the impact of cities on the natural environment, while

climate change researchers frequently ignore relevant social or historical factors. The CNC-IHDP should also provide incentive and opportunity for Chinese researchers to exchange ideas with overseas counterparts.

Sources: SciDev.Net, 3 Sep 2004, <http://www.scidev.net/News/index.cfm?fuseaction=readNews&itemid=1583&language=1>

Missed opportunities in Asian forest restoration

Despite large investments, many tree plantations on degraded land in Asia may be failing to yield either local economic or global environmental benefits, according to a review by scientists from the Center for International Forestry Research. This is partly due to a lack of clarity about the precise objectives of the schemes, and a failure to negotiate with all concerned stakeholders. The authors highlight the value of remnant natural vegetation patches and ecological gradients in successful restoration efforts.

Sources: Sayer J, Chokkalingham U & Poulsen J, 2004. The restoration of forest biodiversity and ecological values. Forest Ecology and Management 201, 3-11.

Reforestation was also discussed at an Open Science meeting in December 2004 on Tropical Forests and Water, convened by the Alternatives to Slash-and-Burn Consortium (ASB) in Bogor, Indonesia. Thomas Tomich, ASB Global Coordinator at The International Centre for Research in Agroforestry (ICRAF), noted reforestation does not cause

rivers to flow again. Albert van Dijk of the Commonwealth Scientific and Industrial Research Organization, Australia (CSIRO), argued that reforestation always increases water use and therefore reduces stream-flow; reforestation may boost low-flows but only if water use is offset by increased rain infiltration into soil and the right type of groundwater system. He stressed the need to clarify the objectives of reforestation before it is initiated, and to make informed choices regarding species planted, soil and forest management, planting methods and the influence of local climate, geology, soil, terrain and catchment type.

Sources: International Institute for Sustainable Development (IISD), 2004. Sustainable Developments 98 (1), December 2004, <http://www.iisd.ca/sd/tfw>; <http://www.asb.cgiar.org/water/>.

Concern for China's native rice

In October 2004 several NGOs including Pesticide Eco-Alternatives Center (PEAC), Greenpeace China, Action Aid and the Center for Biodiversity and Indigenous Knowledge (CBIK) conducted a study tour of Yunnan focusing on rice biodiversity. The tour was aimed at influencing the China Government against allowing introduction of genetically-engineered rice throughout the country, which will have unpredictable ecological consequences. Sites visited included Yuanyang, where the Hani people have farmed rice on terraces for over 2,300 years, and where nearly 60 rice varieties are used according to season and elevation. Farmers' extensive

knowledge of native seed properties was also discussed.

Sources: PEAC Community News 2(4), 1 & 5 and www.ricetour.cn.

New partnership for People and Plants

2004 saw the launch of People and Plants International (PPI), an ethnoecological network which builds on the work of the 12-year People and Plants Initiative — a partnership between World Wide Fund for Nature, UNESCO and the Royal Botanic Gardens, Kew. PPI seeks to combine traditional knowledge and biological sciences, in integrated projects for development, conservation and education. Contacts in China are strong, especially through Kunming Institute of Botany (CAS) and the Chinese Society for Ethnobotany. A current project seeks to develop a curriculum in ethnoecology and sustainable resource management for forestry students at Southwest Forestry College.



Sources: www.peopleandplants.org and Louis Putzel, PPI Coordinator, lputzel@nybg.org.

Ecologists should be directing biodiversity payments

Discussing the optimal role of ecologists in conserving tropical biodiversity, three international researchers question the effectiveness of advising community-based natural resource management projects. They note mounting evidence that traditional and local practices are often unsustainable, partly because they are not adapted to contemporary scales of disturbance to natural systems. Besides providing short-term benefits of ecosystem goods and services, nature reserves contribute to a region's resilience (ability to continue functioning following big shocks and disturbances) and its adaptive capacity (ability of people to innovate and adapt to changed conditions) — roles that are typically not rewarded without payment from outside. They conclude that by identifying thresholds to ecological resilience, and quantifying values related to maintaining adaptive capacity, ecologists can help guide direct payments to serve local, regional and global interests.

Sources: du Toit JT, Walker BH & Campbell BM, 2004. *Conserving tropical nature: current challenges for ecologists*. Trends in Ecology and Evolution 19, 12-17.

Unappreciated botanical knowledge of the Yao

A study of the 'Red-headed' Yao people in Jinping County,

Yunnan has revealed medicinal uses of 27 plant species not previously known to be used as medicine, and 23 species with medicinal functions different from those previously recorded. The medicinal herb doctors have conserved medicinal plants and their habitats over the years. Most of the folk healers are old women, who fear the loss of herbal traditions.

Sources: Long C-l & Li R, 2004. *Ethnobotanical studies on medicinal plants used by the Red-headed Yao People in Jinping, Yunnan Province, China*. Journal of Ethnopharmacology 90, 389-395.

Turtle species limits revised

Studies of the mitochondrial DNA of the turtle previously known as *Cuora galbinifrons* have revealed it to comprise three recognisable species, corresponding with the previous subspecies *galbinifrons*, *bourreti* and *picturata*. The finding has important consequences for conservation; all three are Critically Endangered by IUCN criteria. The Hainan population *C. g. hainanensis* has diverged rather little from the parent species. Little mitochondrial DNA variation was found among the morphologically distinct species *Cuora aurocapitata*, *C. pani* and *C. trifasciata*.

Sources: Stuart BL & Parham JP, 2004. *Molecular phylogeny of the critically endangered Indochinese box turtle (Cuora galbinifrons)*. Molecular Phylogenetics and Evolution 31, 164-177.

生物多样性保育与农业的结合

The coming-together of biodiversity conservation and agriculture

乐小山及费乐思 (嘉道理农场暨植物园)

Hil PADILLA and John FELLOWES (KFBG)

生物多样性与农业：拉锯的局面

很多国家负责自然保育与农业生产的部门往往都是各自为政的，甚至在农业生产内部也会细分为林业、农业及渔业等。随著天然生态系统的萎缩，在已砍伐地上所进行的农业生产与有益的天然生物群渐见远离。同时，正是由于农业生产行业未能持续利用资源，而需要保育部门解决问题。

然而，这人为的分野并未令这两个范畴真正分隔。全球17,000个主要目的为保护野生动植物免于灭绝的自然保护区中，有半数被大规模地用作农业用途¹。保育国际的研究指出，全球25个重要的生物多样性热点中，最少有16个点的居民都是过著饥肠辘辘，营养严重不足的日子。随著全球人口增多及生活渐趋富裕，人类对食物的需求不断增加，农业将进一步入侵原始生态系统，这将无可避免地对生物多样性产生更多负面影响²。肉类消耗量增加对生物多样性的破坏尤其惊人³。中国对猪只及家禽的需求从1980至1994年间分别飙升3及4倍，现时更须用上约20%的谷物生产来喂饲牲口⁴。为满足全球对牛肉不断增加的需求⁵，亚马逊越来越多的原始林被开垦以种植牲畜的饲料。

现时农业及牧草用地约占全球土地面积的三分之一⁶，但保护区面积却只占11%⁷。从这个格局来看，许多野生物种会与农业主导的地貌相互影响。因此，农业系统的适当管理，足以大大影响生物多样性的整体水平。正如《Common Future, Common Ground》的研究报告指出：「很多人都以为要保护生物多样性，只须把它隔离。然而，农业与生物多样性是唇齿相依的。许多物种濒危率高企的国家，它们的农村及保护区都处于同一地域上。要遏止物种广泛灭绝，和令人民得到饱足，我们必须把生物多样性保育融入包括放牧地、人工咖啡林以至稻田的所有地貌中。研究显示全球六大洲

Biodiversity and agriculture: strained relations

In most countries there is a division between the sectors responsible for natural production and nature conservation. There is even division *within* production sectors, for example between forestry, agriculture and fisheries. As natural ecosystems shrink, agriculture, or production on deforested land, operates further and further from sources of beneficial native biota. Meanwhile the very need for a conservation sector stems from the failure of these production sectors to use resources sustainably.

This artificial separation was never going to last. Almost half of the world's 17,000 major nature reserves, which are intended to protect wildlife from extinction, are being heavily used for agriculture¹. Extreme malnutrition and hunger are pervasive among people living in at least 16 of the world's 25 key biodiversity "hotspots" identified by Conservation International. The growing food demand from a wealthier and larger global population is expected to further induce encroachment of agriculture into unmodified ecosystems, with an inevitable negative impact on biodiversity². The increase in meat consumption is particularly destructive³; China's demand for pigs and poultry rose three and four times respectively between 1980 and 1994, with 20% of its grain now used for feed⁴. More and more pristine forest in the Amazon is being cleared for livestock grain production to meet the world's increasing beef demand⁵.

Currently, about one third of the global land surface is occupied by crops and managed pasture lands⁶ while protected areas cover only 11% of the earth's surface⁷. Given this pattern, there is increasing recognition that many wild species interact with agriculture-dominated landscapes, even if their primary habitat is in natural areas. Thus, proper management of these agricultural systems could dramatically affect overall levels of biodiversity. As the *Common Future, Common Ground* report says: "Many people believe that biodiversity can be preserved simply by fencing it off. Our report shows that agriculture and biodiversity are inextricably linked. In fact, farms and nature reserves are actually sharing common ground in many countries where species are most at risk. To avert widespread extinctions and feed the world, we must integrate biodiversity preservation into all landscapes - from grazing

都成功推行了生态农业。」

生物多样性保育与农业：凝聚力量

有机农业、生态农业、可持续农业、天然农业、再生农业及永续农业等都是利用农业与生物多样性之间协同关系的农耕方式。它们以维持生态系统的平衡及优化生态过程为基础（见框图一美国农场联盟采用的指引）。它们主要依靠养分循环及天然生态防治虫害，减少依赖农药及外来肥料的投入，务求把污染尽量降低。此外，在设计耕作系统时亦尝试仿效天然生态系统的模式。例如，在实践永续农业时（见本期第18-25页章家恩及Morag Gamble文章），会种植不同的多年生植物及树木，模拟天然林内的多层结构。

框图一：农地管理的生物多样性核心原则

美国农场联盟提倡的生态可持续农场管理指引如下：

- * 在分水岭及生态系统的层面上考虑农地用途；
- * 避免把敏感生境转为农业生产或发展用途；
- * 保护受危及濒危、具特别关注的物种及关键种；
- * 保育及恢复与农产相关的乡土动植物，包括水生及栖息在水体周边的生物；
- * 维持及重新连接大片生境及生态廊道，强化保育区域网络；
- * 防止非乡土及入侵种的引入及扩散；
- * 利用自然生态系统提供的服务，如授粉、虫害防治、有利生态的捕食及山火、水灾及侵蚀防治、养分循环、流水总量及质量。

摘录自JA Baumgartner, 2004. *Wildlife and ecologically-sustainable farmland management*. IFOAM 会议，肯雅奈洛比

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1999年5月，国际有机农业运动联合会 (IFOAM) 及世界自然保护联盟 (IUCN) 于义大利维利奥拉召开国际会议，会后参与者都同意「有机农业是生物多样性与自然保育的必要条件」（见框图二），并承诺会劝吁政府及国际组织把高投入农业的经费重新

lands to coffee plantations to rice paddies. Our research shows that eco-agriculture is being successfully used on six continents around the globe."

Biodiversity conservation and agriculture: friends reunited

Organic farming, eco-agriculture, sustainable agriculture, natural farming, regenerative agriculture and permaculture all explore the synergistic links between agriculture and biodiversity. They rely upon maintaining ecosystem balances and developing ecological processes to their optimum (see Box 1 for the principles applied by one group, the US-based Wild Farm Alliance). They reduce reliance on agrochemicals and external inputs by putting emphasis on nutrient recycling and natural pest control and consequently minimizing pollution. In the design of cropping systems, they try to mimic natural ecosystems. In Permaculture (or permanent agriculture; see article by Zhang & Gamble, p.18-25), they have placed strong emphasis on diverse perennials and tree crops stacked in a multi-layer structure similar to a forest system in their farm design.

Box 1: Core biodiversity principles in farmland management

The US-based Wild Farm Alliance advocates the following principles to help to guide ecologically sustainable farm management:

- * Consider farmland within a watershed or ecosystem context;
- * Avoid conversion of sensitive habitats to agricultural production or development;
- * Protect threatened and endangered species, species of special concern, and keystone species;
- * Conserve and restore native plants and animals of the production operation, including in and around water bodies;
- * Maintain and restore linkages and connectivity including large blocks of habitat and wildlife corridors to strengthen regional networks of conservation areas;
- * Prevent introduction and spread of non-native, invasive species;
- * Take advantage of nature's ecosystem services, such as pollination, pest control, beneficial predation and fire, flood and erosion control, nutrient cycling, and improved water quality and quantity.

From JA Baumgartner, 2004. *Wildlife and ecologically-sustainable farmland management*. IFOAM conference, Nairobi, Kenya.

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In May 1999 an international meeting was convened in Vignola, Italy, by the International Federation of Organic Agriculture Movements (IFOAM) and The World Conservation Union (IUCN). Participants concluded, "Organic agriculture is

分配到结合有机农业与生物多样性保育上。自此，联合国环境规划署、国际自然保护联盟、国际有机农业运动联合会及德国自然保护同盟会 (BfN) 便成了国际间关注生物多样性及可持续农业的沟通桥梁。

框图二：维利奥拉宣言

「有机农业是生物多样性与自然保育的必要条件。」

- 有机农业是把多功能理论实践，包括生物多样性、动物福利、食品安全、市场导向的食物生产、农村发展、社会与公平贸易等方面。有机农业是可持续农村发展的根本，对农业的未来发展及全球食物供应保障都起了重要作用。
- 不完善及过分依赖化学物及其他合成物品投入的农业操作方式，加速了自然生态系统的退化。其负面影响反映在物种及栽培品种的多样性下降及消失。全地上原有的丰富生物多样性景观地貌，都因为这类农业操作方式而变成单一种植的沙漠。
- 我们信守生物多样性公约 (CBD) 的目标，确保生物资源的保育和持续利用，公平享用基因资源带来的利益，这些目标适用于农林及其他生态系统中。
- 我们促请支援有机及自然保育行动的组织能更加紧密合作，汇聚力量。我们同时呼吁从事环境保护、农耕、政治、工业及国际组织的人士支持，把有机农业发展成一个生态上最健全的农业系统。
- 我们邀请消费者向应有机农业，使用高素质的有机认证产品，如食物、纺织品、水产及木材制品。
- 我们总结有机农业是生物多样性及自然保育的必要条件。

国际有机农业运动联合会的「第三届生物多样性及有机农业国际大会」已于2004年9月24-26日假肯尼亚洛比举行，120位参加者分别来自30个国家。

该会的行政总裁Gerald A. Hermann称：「有机农业在食物链的各个营养级都会提升生物多样性造成正面的影响。若我们丰富的生物多样性继续按现

essential for conserving biodiversity and nature" (see Box 2), and undertook to persuade governments and international organizations to reallocate public funds from high-input agriculture to integrated organic agriculture and biodiversity conservation. Since then, international attention to biodiversity and sustainable agriculture has merged through such organizations as the United Nations Environmental Programme (UNEP), IUCN, IFOAM and the German Federal Agency for Nature Conservation (BfN).

Box 2: The Vignola Declaration

"Organic agriculture is essential for conserving biodiversity and nature."

- * Organic agriculture puts the concept of multi-functionality into practice, including biodiversity, animal welfare, food safety, market-oriented production, rural development, social and fair trade aspects. Organic farming is fundamental to sustainable rural development and crucial for the future development of agriculture and global food security.
- * Agriculture that is not based on sound practices and is dependent on heavy inputs of chemicals and other synthetic products has accelerated the degradation of our natural ecosystems. This negative impact can be seen in the decline and disappearance in the diversity of species and cultivars. The impact of such agriculture can also be seen world-wide in landscapes where it has contributed to transforming rich biological and landscape diversity into deserts of monoculture.
- * We embrace the objectives of the Convention on Biological Diversity (CBD) to conserve biological diversity, to ensure the sustainable use of biological resources, and to share equitably the benefits arising from the use of genetic resources. These objectives apply to agro-ecosystems as well as to other types of ecosystems.
- * We urge the organic and nature conservation movements to work much more closely and more intensively together. We ask environmentalists, farmers, politicians, industry and international institutions to support and develop organic agriculture as the most ecologically-sound agriculture system.
- * We invite consumers to support organic agriculture by using certified organic products of high quality, such as food, textiles, aquaculture and wooden products.
- * We conclude that organic agriculture is essential for conserving biodiversity and nature.

On September 24-26, 2004 the "Third International IFOAM Conference on Biodiversity and Organic Agriculture" was held in Nairobi, Kenya. Some 120 participants from 30 countries attended.

IFOAM Executive Director Gerald A. Hermann declared, "Organic farming has a positive impact by increasing biodiversity at every level of the food chain. If we continue

时的速度消失，全人类将面临严峻的粮食短缺危机。」有机农业须依赖天然过程才能使有机农业管理系统较「传统/工业化」的农业以生物学上来得复杂多样。

会议上其中一组参加者讨论了如何透过有机标准及有机认证制度加强生物多样性的保育。一份报告以巴西的农业为例，种植甘蔗的农民，获当地信誉良好的保育机构发出的「支援生物多样性」认证后，便能以高价出售其出产的蔗糖及酒精汽油。大学研究员会监测这些农场的运作是否遵照支援生物多样性保育的准则。种植区的生物多样性评估准则仍然有待进一步发展。

另一份报告⁸是关于菲律宾、斯里兰卡及厄瓜多尔林业的「类似林业」项目，即模拟原始森林生态系统的建筑结构及生态功能来栽种树木。要了解这个系统，请参阅本期第26-30页乐小山的文章。

会议总结了不少给予UNEP及IUCN的建议，并促请IFOAM踊跃与这些组织合作。

2004年9月27日至10月1日，国际生态农业会议便紧随IFOAM国际大会结束后于奈洛比召开。共有46个国家派员出席，会上通过了奈洛比宣言，并提出工作框架，希望人们能在地貌层面同时达到改善生计、实践生物多样性保育(包括基因资源、生态系统服务与动植物)及可持续生产的目标。宣言中的其中一个重点呼吁是推动包含多元化农业系统及生产模式的生态农业，把生产与生物多样性在地域上联系在一起。生态农业策略如下：

1. 提升已开发耕地的生产力以减少生境破坏；
2. 建立野生生境网络，连接非耕作空间；
3. 于农、牧、渔场附近成立保护区；
4. 于农业系统中加入种植多年生植物，模拟天然生境；
5. 采用产生最少污染的农耕方式；
6. 改善资源管理，提高生产用地的生境价值。

这些策略在近期出版的*Ecoagriculture*⁹中有更详尽的例证解说。

食物生产的反思

虽然当地作业的改变可直接增强农业的可持续性，在全球食物系统中还牵涉更广泛的议题。「生态足印」是一个环境审计系统，以可供出产生物品的土

losing our rich biodiversity at the same rate as today we will face severe problems in producing enough food for the world's population." Organic farming relies on natural processes that make organically managed systems biologically much more complex than "conventional/industrial" agriculture systems.

One working group during the conference discussed how to enhance biodiversity conservation through the organic standards and organic certification system. An interesting paper reported the experience from Brazil, where some sugar cane farmers get a premium price for their sugar and alcohol gasoline through their "biodiversity-friendly certification" issued by a local reputable conservation organization. The biodiversity-friendly compliance of these farms is monitored in cooperation with researchers from the universities. Biodiversity assessment criteria in cultivated landscapes are an aspect that still needs to be developed.

Another interesting paper⁸ was about a project in the Philippines, Sri Lanka and Ecuador on "Analog Forestry", meaning tree farming analogous in architectural structure and ecological function to the original forest ecosystem. Such systems are further discussed by Hil Padilla (p.26-30).

The conference closed with a formulation of recommendations for UNEP and IUCN, and called on IFOAM to collaborate actively with these organizations.


The IFOAM conference was followed by the International Eco-agriculture Conference on September 27 - October 1, 2004 also in Nairobi, where 46 countries were represented and the Nairobi Declaration was formulated. It sought a framework to simultaneously achieve improvement in livelihoods, conservation of biodiversity (genetic resources, ecosystem services, flora and fauna), and sustainable production at a landscape scale. One major call of the declaration is to promote eco-agriculture that embraces diverse systems and practices linking production with biodiversity across landscapes. The eco-agriculture strategies identified are:

1. Reduce habitat destruction by increasing productivity on land already farmed;
2. Develop a network of wildlife habitats that link non-cultivated spaces;
3. Establish protected reserves near farming areas, ranchlands and fisheries;
4. Integrate perennial plants into farming systems to mimic natural habitat;
5. Use farming methods that minimize agricultural pollution;
6. Modify resource management to enhance habitat value of productive lands.

They are further developed, with illustrative examples, in the recent book *Ecoagriculture*⁹.

Rethinking food production

While local changes can make direct improvements to agricultural sustainability, there are broader issues in the global food system. "Ecological Footprinting" is an environmental



地及水源面积，计算要维持人类消耗及吸纳其所产生的废物¹⁰⁻¹¹所需的资源。据Agriculture Footprint Brief (2003)¹²的评估，农业占了人类生态足印的很大部分。全球的食物系统，配以耗用大量资源的生产及运输方式，几近消耗了地球半数的生态承载力，并逐渐削弱地球天然资源的根基。

与空气及水源一样，食物是人类赖以维生的最重要资源。它们都来自包围地球表面的一薄层相互联系的生物，亦即生物圈。然而，食物的生产方式却经常透过诸如土壤及蓄水层损耗、伐林、大量使用农业化学物、渔场枯竭、牲畜作物及野生物种的多样性消失等，严重破坏著生物圈的健康。我们可以从多方面摆脱这个困局，如提供更多符合能源效益的食物和种植系统的选择、减少全球性贸易以促进生态区域主义、加强社区参与及农民支援¹³。其中最大的难处在于如何向农民提供资讯及技术协助¹⁴。我们发现农业系统越「原始」，农民对知识及技能的掌握却越熟练¹⁵，可是传统农业累积下来的科学化经验却往往被忽略¹⁶。引用日本的农业先驱者Masanobu Fukuoka的话，「按照现时的经济观念，天然农业的其中一个缺点是需要花很长时间才有收成。也许，在这个分秒必争的年代，这种生产方式看来较其他的逊色，但只要农地能被正确理解为世世代代的遗产，公众便会对天然农业改观。」¹⁷

有人争辩不需依靠科技改进以增加农业产出，食物供应也能满足现时及不断膨胀的人口需求¹⁸⁻¹⁹。但增加粮食供应的目的，是要提供时间，把人口控制在环境可持续的限制下²⁰。邓肯布朗列出三个基本条件，以避免严重的生态崩溃。第一，恢复生态平衡，回复植物生物量及生长足以维持的动物生物量；意即从今起控制人口数目和/或限制有害的食物生产以拯救将来的生命（及生态系统）。第二，改变农业的操作，确保泥土与人类之间的养分流动是循环的—使例如磷等有限的养分不会陆续损耗。第三，管理全球生态系统，确保陆地及水生生态系统的基因多样性不会进一步降低。

虽然生物多样性及人类粮食供应系统时常被描述成对峙的局面，但两者的未来实际上是互相依赖的。要在未来的日子里达到稳定的粮食供应与保护生物多样性，人类非把它们融合作优先处理不可。正如来自印度的另类诺贝尔奖的得主Vandana Shiva女士于1996年所言：「只有以多样性为生产的基础，才能保育多样性！若生产是以均一、不变的理念为基础，那多样性势必被逐步取代。」

accounting system that tracks the biologically productive land and water needed to produce the resources consumed by a given population and to absorb its waste¹⁰⁻¹¹. According to the Agriculture Footprint Brief (2003)¹², agriculture makes up a big chunk of humans' ecological footprint. Our global food system, with its resource-intensive production and distribution, is using almost half of the planet's ecological capacity and is steadily degrading our natural resource base.

With air and water, food is the most essential resource people require. These resources are provided by the layer of interconnected life that covers our planet: the biosphere. Yet the way the food system provides food often severely damages the health of the biosphere through soil and aquifer depletion, deforestation, aggressive use of agrochemicals, fishery collapses, and the loss of biodiversity in crops, livestock, and wild species. There are many aspects to reversing this damage, including choices of food and growing systems for energy efficiency, a reduction in globalised trade in favour of bioregionalism, and improved community involvement and farmer support¹³. A particular challenge will be supplying information and technical assistance to farmers¹⁴; it has been noted that the more "primitive" a farming system is, the more knowledgeable and skilful the farmer must be¹⁵, and the extent of accumulated scientific experimentation in traditional systems is often overlooked¹⁶. In the words of Japanese farming pioneer Masanobu Fukuoka, "To current economic perceptions, one disadvantage of natural farming methods is that they take too long. Perhaps these appear inferior in a world pressed for time, but if farmland were to be correctly understood as a legacy to be preserved for future generations, the general opinion of natural farming would improve."¹⁷

It is sometimes disputed that the food needs of the world's existing and projected population can be met without further intensification through technological improvements in yield¹⁸¹⁹. But the only point in trying to increase food supply is to buy the time needed to bring the population within environmentally-sustainable limits²⁰. Duncan Brown lists three primary conditions to avoid a major ecological collapse. The first entails a return to ecological balance - animal biomass kept within a level that can be sustained by plant biomass and growth; this means controlling human population size and/or capping harmful food production now, to save lives (and ecosystems) later. The second is changing agriculture to ensure that the flow of nutrients between the soil and the human population is cyclical - so that the limiting nutrients, such as phosphorus, are not being steadily exhausted. The third is managing the global ecosystem to ensure no further reduction in the genetic diversity of terrestrial or aquatic ecosystems.

While they are often portrayed as being in conflict, the secure future of both biodiversity and human food supply are linked, and depend on present human priorities today. As Vandana Shiva (Alternative Nobel Prize Laureate from India) said in 1996, "Not till diversity is made the basis of production can diversity be conserved. If production continues to be based on the logic of uniformity and homogenization, uniformity will continue to displace diversity".

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华南地区生态农业及永续农业之来临

Ecological farming in South China and the coming of permaculture

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改变刻不容缓

地球正面临生物多样性减少、生境破坏、气候变化、污染和水土流失日益加剧等问题。无论是发展中国家还是发达国家都受到严重的贫困、营养不良和健康问题等困扰。虽然对全球或地区面临的许多相关问题都了如指掌，发达国家过度耗用自然资源的速度依然在加快，发展中国家也正在迅速跟上发达国家的步伐。尽管全球在1970年代起在发展和科技上有很大的进步，生活质素整体上却在下跌。

发展生态农业的必要性

农业上化肥和农药等化学品的不合理使用，大规模的单一种植和集约化生产，导致了一系列的生态环境问题，如环境污染、生物多样性下降、土地退化，农业生产力和农产品品质下降等，已严重影响到人类社会的可持续发展。为了解决「石油农业」带来的巨大生态环境问题和食物安全问题，从20世纪70年代起，一些发达国家的有识之士开始探索能替代「石油农业」的新型可持续农业发展道路，如自然农业 (Natural agriculture)、生物动力学农业 (Bio-dynamic agriculture)、有机农业 (Organic agriculture)、低投入持续农业 (Low-input sustainable agriculture)、生态农业 (Eco-agriculture) 等等。到20世纪80年代末，随著可持续发展概念的提出，可持续农业也日益得到世界各国的认同和接受。生态农业是兼具生产粮食及保护生物多样性等生态系统功能的土地利用方法。目前，许多国家都在积极开展这方面的理论与实践研究。

The need for change

The earth is suffering from loss of biodiversity, habitat destruction, climate change, increasing pollution and soil erosion. Both developing and developed nations are experiencing high levels of poverty, malnutrition and poor health. Despite clear articulation of the interconnected problems being faced both locally and globally, developed nations continue to over-consume natural resources at an increasing rate, and developing nations are moving quickly in this direction. Even with all the development and technological advances in the world since the 1970s, there has been an overall decline in quality of life.

The importance of ecological farming

The extensive use of chemical fertilizers and pesticides, large-scale monoculture and intensive production have brought about a great deal of adverse effects on the natural environment, for instance pollution, biodiversity loss, land degradation, and declines in productivity and quality of crops, which have adversely affected progress towards sustainable human development. To solve these problems of ecological damage and food security, since the 1970s some people in developed countries have explored sustainable alternatives, such as natural agriculture, bio-dynamic agriculture, low-input sustainable agriculture and eco-agriculture. In the late 1980s, as ideas of sustainable development evolved, sustainable agriculture gained worldwide recognition and acceptance. Ecological farming, an approach to land use designed to produce both human food and ecosystem services including biodiversity conservation, has been increasingly advocated. For many countries, it has become a focus of scientific research and practical implementation.

With roots in Chinese traditional farming practices and the socioeconomic situation, ecological farming in China has some differences from that in other developed countries, both

生态农业及永续农业

中国生态农业具有其深厚的传统农业及社会经济基础，其理论与实践均有别于其他发展国家的模式。中国生态农业讲求生态、经济与社会利益的整合与实践，著重物质的循环与外在能源投入（如有机肥、有机及无机复合物、适量化肥、机器、人力及其它能源补助），集天然与人工管治于一身，兼具保护环境与生物多样性的功能，从而保护生态环境与生物多样性。中国生态农业不但承袭了传统的农业技术，更融合集约式农业的先进科技。全国已发展不同规模的生态农业试点，如生态户、村、镇、发展到县、市及生态农业省。

为达到生态建设（恢复）及保护环境的目标，中国从20世纪80年代开始进行生态农业试点建设工作，经过20多年的发展，全国已有不同类型、不同规模的生态农业试点2,000多个，其中有160多个县级规模、10多个地（市）级规模，当中有7个生态农业试点单位先后被联合国环境规划署授予「全球500佳」称号，由此可见，这项新实施已取得一定的成效。2000年，全国又启动了第2批100个生态农业试点县的建设工作。目前，生态农业已成为国家政府鼓励、倡导和支持的发展方向。

华南地区生态农业发展现状及问题

华南地区地貌类型复杂多样，降雨充沛，热量丰富，气候条件优越，生物多样性丰富，具有发展生态农业的优越条件；在长期的农业生产实践中，逐步形成了许多具有热带亚热带特色的生态农业模式。

在华南地区的丘陵山区，为了充分而有效地利用自然资源，通常采用农林复合（Agroforestry）、农林牧复合（Agro-sylvo-pastoral）、农林牧渔复合（Agro-sylvo-pastoral-fishery）等几大类生态农业模式。在平原地区，则大多以水稻为基础的水旱作物轮作模式（Paddy—dry-farming rotations）、间种及作套种模式（Intercropping and relay cropping system）、农田复合种养殖模式（如鸭稻共作模式，Integrated rice and duck farming system）、基塘生态农业模式（Dike-pond farming system）以及农田防护林生态农业模式（Farmland protective shelterbelts）等为主。

当前，华南地区在生态农业发展过程中也存在一些问题，主要表现以下几个方面：（1）消费者对生态农业认知不足，虽然生态农业具有较好的生态效益和环境效益，但是生态产品未能在市场上体

theoretically and practically. Chinese ecological farming pursues the integration and realization of ecological, economic and social benefits, emphasizes material recycling and reuse, external energy input (including a combination of organic fertilizers, organic-inorganic compounds and optimal amounts of chemical fertilizers, machines and manpower, along with other energy subsidies), a combination of natural regulation and artificial management, and environmental and biodiversity protection. It not only inherits many useful techniques and models from Chinese traditional agriculture, but also absorbs advanced technology from intensive agriculture. It can be operated and managed at different levels such as eco-farms, eco-villages, eco-towns, eco-counties, eco-cities and eco-provinces.

To meet the needs of "ecological construction" (restoration) and environmental protection, China began ecological farming in the 1980s. In these first 20 years over 2,000 pilot sites of various scales and types were established, of which about 160 are at county-level and 10 more are at prefecture-level. Of these, seven pilot sites have received United Nations Environment Programme (UNEP) "Global 500 Awards"; this shows the preliminary success of the newly evolved practices. In 2000, another 100 sites were chosen as the second batch of examples. With the State's advocacy and support, ecological farming is becoming a key development direction.

Current situation and problems of ecological farming in South China

South China has various landforms, abundant rainfall, a moderate climate and rich biodiversity, which favour the gradual development of diverse tropical and subtropical ecological farming systems through long-term practice. Farming practices like agroforestry, agro-sylvo-pastoral systems and agro-sylvo-pastoral-fishery systems are widely applicable on hilly areas of South China to fully and effectively utilize natural resources, whereas more common on flat lands are paddy-dry-farming rotations, intercropping, relay cropping systems, Integrated rice and duck farming systems, dike-pond farming systems and farmland protective shelterbelts.

However, a number of problems exist regarding the implementation of ecological farming. First, consumers' consciousness of ecological farming is low; no matter how environmentally and ecologically beneficial such practice is, its comparative economic advantage and benefit are sometimes lower than that of conventional farming at present. Without favourable market potential, most farmers are thus unwilling to be involved. Second, the existing market economy limits the growth of small-scale ecological farming. Third, the mistaken beliefs that ecological farming requires complicated management and technological and capital investments constrain farmers from further development. Fourth, rapid development and the impact of urbanization and

现其价格优势，其经济效益往往低于常规农业的作物，在缺乏有利的销售市场情况下，许多农民不愿意采用生态农业模式进行生产；(2) 现代化市场经济发展令小规模生态农业产业化滞后；(3) 生态农业模式往往被误认为是一个复杂的系统工程，涉及生产环节多，日常管理复杂，投入的技术和资金相对要高，令小农户却步(4) 由于城市化和工业化的快速发展和影响，在城市周边地区发展生态农业具有一定的难度；(5) 一些高效的、关键性的生态农业技术还处于研究阶段，如病虫害的控制技术、水土保持技术、农业生物多样性保护技术等，因而也影响了生态农业的表现；(6) 目前，许多地区生态农业的发展大多以政府实施为主，农民参与性不够。

华南地区生态农业系统模式设计培训

2004年，由香港嘉道理农场资助，并由华南农业大学和国际小母牛组织/中国办事处(成都)联合主办，的「华南地区生态农业系统模式设计培训会议」先后于6月13~15日和8月9~14日在广东清远银盏温泉和广东佛山市高明区霭雯教育农庄举行。来自广东、广西、福建、海南、湖南、贵州、江

西、浙江、四川、湖北、云南、河北、北京、安徽、上海、香港等地的科研人员、政府官员、非政府组织人员、企业家和农民参加了会议。同时，大会也邀请了澳大利亚专家、香港地区专家以及中国专家对参会者进行了系统地培训，参加两次会议共140多人。通过这两次培训会，让农业基层工作者，特别是农民，学会应用永续农业(Permaculture)生态系统模式设计的基本理论、原理、技术和方法，因地制宜，利用自然规律及传统智慧把农业生产与环境、经济发展与生态环境保护很好地协调起来，著重建立整合系统，加强资源循环以减少倚赖高科技或外来投入，以推动本土的可持续农业。

industrialization pose certain difficulties for promoting ecological farming in suburban areas. Fifth, a lack of highly effective and key techniques, such as those for pest and disease control, soil and water conservation and agrobiodiversity conservation, hinder the performance of ecological farming. Sixth, ecological farming is mainly administered by the State, with inactive community participation.

Training on ecological farming system design in South China

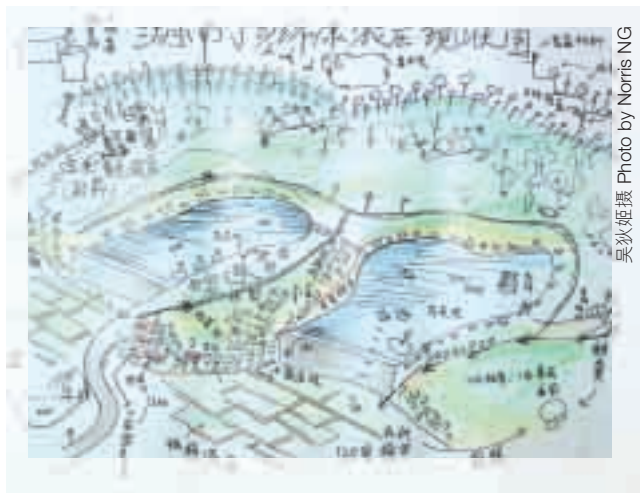
In 2004 two "Training workshops on ecological farming system design in South China," funded by KFBG, were co-organized in Guangdong by SCAU and Heifer China (Chengdu Office). The first workshop was held in Yinshan Spring, Qingyuan during 13-15 June and the second in Aiwon Teaching Farm, Gaoming, Foshan during 9-14 September. Over 140 attendees including scientific researchers, government officials, NGO representatives, entrepreneurs and

farmers from Guangdong, Guangxi, Fujian, Hainan, Hunan, Guizhou, Jiangxi, Zhejiang, Sichuan, Hubei, Yunnan, Hebei, Beijing, Anhui, Shanghai and Hong Kong were involved in the two workshops. The basic concepts, principles and methodologies of ecological farming presented by experts from Australia, China and Hong Kong deeply impressed the farmers and members of the grass-root units. They learned Permaculture with which to achieve a well-coordinated

relationship between agricultural production, environmental and economic development, as well as how to achieve ecological protection through practice, following laws of nature and traditional wisdom, with emphasis on building an integrated system, enhancing resource recycling so as to reduce reliance on external or advanced technology input, and thus promoting local sustainable agriculture.

PERMACULTURE - practical design for sustainability

Permaculture is a sophisticated approach to sustainable development and ecological agriculture - one which creates a high quality of life while also supporting the protection and restoration of the earth's ecological systems. It is one of the most integrated and practical approaches that has emerged to enable local communities to address these global



A participant's farm plan design with permaculture principles
一位参加者把永续农业概念注入其农场设计图中

吴狄妮摄 Photo by Norris NG

生态农业及永续农业

永续农业——可持续发展总体规划 and 设计

永续农业是一种迈进可持续发展及生态农业的方式，它既能维持高水准生活质素又有助于保护和恢复地球生态系统。它是根据最完整及实际的方法这种受欢迎的、易取得的设计系统是30年前在澳大利亚开发，目前在全球120多个国家实施和传播。

永续农业是以自然为中心，设计出适用于城市或乡村的可再生或可持续人类生活模式，以恢复自然和社会的平衡。永续农业针对我们的生活方式对当地社区、经济及环境的影响，亦关注我们是否影响其他人、其他物种以至整个地球的环境。

永续农业支持社区、农业、本地贸易和分销模式的可持续发展。通过鼓励当地生产和当地销售，当地的食品网路不仅能使小规模的多元种植农场和可持续农村社区存在，还能促使这些农场和社区蓬勃发展。通过尽量减少食品运输、存放、加工、包装；降低农药、污染物质、二氧化碳排放量；促进合理的土壤管理以保持生态的再生能力等，一个完善的当地食品网路能够明显降低人类的生态足印（亦即对生态系统的影响），振兴本土经济，同时在区内以及城乡之间建构积极互助的关系。当地食品网路能保证人们可买到既价廉、新鲜又健康的食品——这些食品不仅营养丰富，而且有利于我们的环境。

永续农业一词的英语——Permaculture 是由两个词汇所组成：PERMANent（永久、持续的）和 AgriCULTURE（农业），反映建立可持续食品系统和恢复乡村环境和生计。但是，现在永续农业一词的含义更广泛，包含可持续生活方式的设计等内容。

永续农业所提倡的其实都不尽是新的思想，而是人们通过观察大自然并结合传统文化（特别是亚洲的文化）的智慧总结出来的。随著社会发展，全球各地许多传统知识，如关于当地、植物和环境的透彻认识正在失传。永续农业正是重新给予这些知识价值并了解这些可持续的生存方式，以缔造当代的可持续文化。

永续农业设计目的

永续农业著眼于培养人们和社区的生态知识（ecoliteracy）、提高生态设计技巧（ecodesign skills），

challenges. This popular and accessible design system, developed in Australia 30 years ago, is now practiced and taught in over 120 countries.

Permaculture seeks to restore the balance between nature and society by working with nature to design human systems, both urban and rural, that are regenerative and sustainable. Permaculture addresses the impact our ways of life have on local communities, economies and environments, but also considers the global environment and the effects our actions have on other peoples and other species.

Permaculture supports the development of sustainable human settlements, sustainable agriculture and re-localised trade and distribution patterns. Local food networks enable small-scale polycultural farms and sustainable rural communities to not only survive, but prosper. Strong local food networks significantly reduce ecological footprints (by minimising transportation, storage, processing, and packaging; reducing the quantity of chemicals and pollutants released into the environment; cutting carbon dioxide emissions; and supporting ecologically-regenerative land management). They also contribute to the strengthening of local economies and the building of positive and mutually-supportive relationships within and between urban and rural communities. Local food networks ensure access to fresh, affordable and healthy food - food which nourishes far more than our bodies.

The name permaculture was derived originally from the two words, PERMANent AgriCULTURE, to reflect the focus on sustainable food systems and the restoration of rural environments and livelihoods. But permaculture has come also to be described as design for PERMANent CULTURE, representing the broader context of its purpose - design for sustainable living.

Many of the ideas presented in permaculture are not new. It is inspired by both observation of nature and the wisdom of traditional cultures - particularly from Asia. Around the world traditional knowledge is being lost in the process of development - deep knowledge of place, plants and environment. Permaculture is helping to revalue and learn from these sustainable practices and ways of knowing to create a contemporary culture of sustainability.

Aims of permaculture design

Permaculture aims to assist people and communities to develop ecoliteracy (ecological literacy) and ecodesign skills to work towards this more sustainable way of living. It teaches, amongst other things, how to:

1. Observe nature and become more ecologically aware and responsible;
2. Restore the land, forests, watersheds and local ecologies,

从而引导人们采取更加可持续的生活方式。它提倡：

1. 观察大自然，提高生态意识和培养责任感；
2. 恢复土地、森林、流域和当地生态，保护重要的生境和生物多样性区域；
3. 种植多元、新鲜、健康、不含化学物的农产品，建立当地食品网路，联系生产者 and 消费者，从而减少污染、降低成本和废弃物量；
4. 保持和改善土质、防止土壤侵蚀及避免优质农地被开发作其他用途；
5. 节约用水—通过减少水的消耗和蒸发、收集屋顶雨水、在种植地修建和使用储水设施、让水储藏在泥土内、循环再用灌溉水、让净水重返自然等；
6. 减少对自然资源的污染、浪费和消耗；
7. 基于可持续概念规划和设计居所（包括房屋和居住区域），并须符合节能和规模适度，缔造一个和谐健康的生活环境；
8. 强化地方经济的复原能力和自主能力，创造当地就业机会，为当地社区提供合适生计，支援公平交易，促进合作；
9. 发挥各个生物区、当地文化中的优势，并利用它们的丰富产物；
10. 与他人分享这些知识和经验。

永续农业设计

永续农业设计的原则以生态学原理为基础，强调以自然为设计重心。这些原则的适用范围由规划发达地区与发展中地区的城市、乡村、乾带至热带地区、并可用在阳台或农庄等各种规模的设计中。

永续农业承认解决目前困境需要不同方法，其设计原则可被广泛应用，但是各地方和社区采用的设计和解决问题的方式都是独一无二、因地制宜的，必须充分考虑当地的具体环境和需求。因此，永续农业提供的不是一条万应的方程式，而

and protect significant habitats and areas of biodiversity;

3. Grow fresh healthy chemical-free food in polycultural systems, and develop local food networks which directly link producers and consumers and reduce pollution, cost and waste;
4. Maintain and improve soil structure and fertility, and prevent erosion - also protect best agricultural land from being paved or built on;
5. Use water wisely - reduce consumption and evaporation, harvest rainwater from rooftops, manage and store water on-site and in the soil, reuse water as many times as possible on-site, return clean water to the natural landscape;
6. Reduce pollution, waste and the consumption of natural resources;
7. Plan and design sustainable houses and human settlements that are energy-efficient, human-scale and healthy living environments;
8. Strengthen the resilience and self-determination of local economies, create local employment in ethical/meaningful enterprises (right livelihoods), support fair trade practices, and work co-operatively;
9. Build on strengths and abundances within each bioregion and local culture; and
10. Share this knowledge and experience with others.

Principles of permaculture design

The principles of permaculture design are firmly grounded in the principles of ecology to facilitate designing with nature. These principles are applicable in the city and the countryside,



在昆士兰 Beerwah CSA 农场内的永续农业设计图
Permaculture Design Plans, Beerwah CSA Farm, Queensland

生态农业及永续农业

是着重培养人们融会贯通、设计整合的人类系统能力。永续农业设计的十大核心原则是：

- 能源规划 (ENERGY PLANNING)：重点在于提高能源效率，尽量减少化石燃料的使用；
- 营养循环 (NUTRIENT CYCLING)：提高对营养物质和资源的循环和重复使用，提倡零废物系统（废物 = 食物）；
- 生物资源 (BIOLOGICAL RESOURCES)：用自然和可再生资源来代替化石燃料；
- 相对位置 (RELATIVE LOCATION)：贯穿设计的各个组成部分，建立互惠合作的关系；
- 多功能 (MULTIPLE FUNCTIONS)：通过拓宽系统各组成部分的功能，优化资源利用；
- 复原能力 (RESILIENCE)：多重保护系统的关键组成部分，从而减少系统的脆弱性和不稳定性；
- 规模 (SCALE)：提高空间使用率，创造适合人类的规模，采用恰当的技术；
- 多样性 (DIVERSITY)：保护和恢复生物多样性，创造整合多元种植，避免单一种植。
- 边缘现象 (EDGE EFFECT)：不同生态系统的交界处，因同时拥有水及陆地的资源，生机较为蓬勃。（如河塘边—水陆交汇处）
- 自然演替 (NATURAL SUCCESSION)：顺应自然规律及自然系统进程的动态发展，促进植物自然生长，加速其演替速度，如利用先驱植物（通常为豆科乔灌木）建构有利主要植物生长的环境。

永续农业教育

永续农业设计证书 (Permaculture Design Certificate) 是一门得到国际公认的课程。这个跨学科的强化课程为期两周，相当于全日制大学的一个学期课程，缺乏这方面知识的人士也可以参加学习。自1981年以来，该课程曾在120多个国家举办，培训了成千上万的人员。课程会根据当地实际情况和最新研究成果不断补充内容，使其得到充实和完善。课程目的是培养有志者把永续农业设计原则应用到本身的社区和环境，并学以致用地传授给他人。国际可持续发展教育与生态设计中心 (SEED International) 开设的各项永续农业课程的目的是

- 增强对生态认知，提倡思考大自然的相互关系；

from arid to tropical regions, in developed and developing nations, and to any scale of design from the balcony to the farm.

Permaculture acknowledges that there is not one single solution to the challenges we face. The principles are universally applicable but the design and solutions for each place and community are unique - specific to context and need. Permaculture therefore does not present 'fix-all' recipes but focuses on cultivating connected thinking, and designing integrated human systems. The ten core permaculture design principles are:

ENERGY PLANNING: design for energy efficiency and minimise the use of fossil fuel energy;

NUTRIENT CYCLING: design to recycle and reuse nutrients and resources as many times as possible, and aspire to a zero-waste system (waste = food);

BIOLOGICAL RESOURCES: use natural and renewable resources instead of fossil fuels;

RELATIVE LOCATION: create mutually beneficial and cooperative relationships between elements of the design;

MULTIPLE FUNCTIONS: optimise use of resources by designing each element to have many functions;

RESILIENCE: support each vital need in more than one way to reduce vulnerability and system instability;

SCALE: design for space-efficiency and create human-scale systems. Use appropriate technologies;

DIVERSITY: protect and restore biodiversity and create integrated polycultures (not monocultures).

EDGE EFFECT: use the benefits of the edges. There is more life on the edge where two systems overlap and where systems can access the resources of both (e.g. pond edge - where land meets water).

NATURAL SUCCESSION: Work with nature and the processes of natural systems. Facilitate natural growth and help to accelerate it naturally, e.g. using pioneer plants (often legume shrubs and trees) to create a beneficial environment for the main planting.

Permaculture education programmes

The Permaculture Design Certificate (PDC) is an internationally recognised course. The intensive two-week programme of interdisciplinary study is equivalent to a semester-long university subject, but requires no prior knowledge. Since 1981, this course has been taught in over 120 countries to hundreds of thousands of people, and has been modified to meet local contexts and incorporate new research. The course aims to cultivate new practitioners who will experiment with

- 为可持续人类生活环境和可持续社区食品系统的生态设计提供一个明确和整体的指引方向；
- 作为实践永续农业设计的工具和策略；
- 作为永续农业在世界各地的应用范例；
- 创造整合和健康的学习环境，使学员能亲身体验永续农业的生活；
- 为学员提供有关资料、资源和资讯，建立有关网路以帮助学员实践永续农业的工作和继续学习；
- 利用参与式过程支援跨文化和跨学科的交流；
- 培养新一代从事永续农业设计和培训人员；
- 加强建立从事生态可持续工作的个人和团体网路，促进交流；
- 收集新思想、创意和方法，继续改进永续农业
- 深化人与自然和社区之间的联系；
- 在不危及后代或其他物种生存机会（生态设计或绿色设计）的情况下，加强社区能力，使能满足吃、住、能源及其它物质和非物质的需求和冀望。

尽管自70年代以来，全球在社会发展和技术进步等方面取得了很大的成绩，但是人们的总体生活质量却在不断下降。我们已到了一个关键时刻，全球人口对生态系统造成的负担已超于地球的自我更新能力。我们过份著眼于短期经济利益已经损害了我们的社会和自然资源——对维持我们生存的生态系统造成了不可逆转的损害。我们正在摧毁地球的生命网。但只要通过各科研学术机关、非政府组织及农民等积极参与，再加上中央及地方政府的支持及推动，生态农业必有助华南地区推行可持续发展。



在澳洲 Crystal Waters 永续农业村内的花园
Permaculture Garden at Crystal Waters Permaculture Village in Australia

相片由 Morag GAMBLE 提供 photo by Morag GAMBLE

the local application of permaculture design principles in their own community and environment and then teach others. The objectives of the permaculture courses offered by SEED International are to:

- Strengthen ecoliteracy skills and engage in systems thinking;
- Provide a clear and holistic framework for the ecological design of sustainable human habitats and sustainable community food systems;
- Offer practical tools and strategies for the implementation of permaculture design;
- Provide examples of how permaculture is applied in a variety of contexts around the world;
- Create an integrated and healthy learning environment in which permaculture living can be experienced first-hand;
- Facilitate access of materials, resources, information and networks required by course participants to undertake permaculture work and continued learning;
- Support cross-cultural and cross-disciplinary exchange through participatory and inclusive processes;
- Support the emergence of new permaculture designers and teachers;
- Strengthen the networking and communication between individuals and groups working toward ecological sustainability;
- Continue to develop and evolve permaculture with the input of new ideas, innovations and methodologies;
- Facilitate a deeper connection/reconnection between people, nature and community;
- Strengthen community capacity to meet needs and aspirations (food, shelter, energy and other material and non-material needs) without diminishing the chances of future generations or other species to do so (ecodesign).

Besides the decline in quality of life in recent decades, we have reached a point where the ecological footprint of the global population exceeds the Earth's capacity to replenish itself. Too much importance has been placed on short-term economic gains to the detriment of social and natural capital - causing irreversible damage to the ecological systems which support us. We are unravelling the web of life. With central and local government advocacy and support, through the efforts of related organizations including universities, institutes and NGOs and with farmers' participation, ecological farming has good prospects of growing to meet the demands of sustainable development in South China.

参加者培训后感

安金磊 自然之子农场

河北枣强县流常乡马屯镇东紫龙村 053101

我从1995年开始走有机农业的路子，一直想找到一条真正的可持续的路，从对无公害食品的欢迎和有机农业的追随，一段时间下来，看到听到许多关于有机食品背后的问题，发现有机农业也不是真正的环保的路，陷入到迷惑之中，这次华南可持续农业的培训，真正的让我明白了农业的真正含义。

这次永续农业的培训，从整体上来把握农业的十大原则，非常完整很具有操作性，讲座中所讲到的共生、捕食、热带植物和温带植物的生物量的问题都给我留下了很深的印象，总的来说生态整体性及人与自然环境的和谐统一是农业的最终目标。

实际生态农业模式的案例分析让参加培训的每一位学员都能够把握十大原则对农业的重要性，野外的考察对不同土壤植被情况的调查，让同学们有了实践的机会。

永续农业的十大原则，体现了人与自然的和谐，也包含了人与人之间的关爱和人与人之间的平等，能够解决现阶段农业那种以为工业化来发展的模式，使得那些单纯以大的资本投入或经济收入看成是发展的观念有了新的认识，使得小农有了发展自己的空间，还了劳动者的尊严，使得人们认识到经济增长不一定等于社会发展。

这次培训引入了对农业更新的思考，农业的功能到底是什么，怎样在农业有序中把握生产的功能，而又不离十大原则，怎样从工业化生产中转到永续农业的保育者。

永续农业不仅仅是一个技术层面的问题，还设计到人文、道德、以及对自然的认识，这也是我们发展永续农业应当注意到的。生产者、市场和消费者的关系应在可持续农业的思想下探讨。

去年9月份，中国农科院棉花专家来我这里了解棉花病虫害的问题看到几十亩地健壮的棉花感到非常惊讶，因为今年中国从南到北棉花产区都发生了很严重的枯黄萎病，化学农药也没有奈何。我们从事生态农业每一步都是和自然相和谐的，植株的健康当然是很正常的，这也说明了生态农业有强大的生命力，下一步工作根据永续农业十大原则做好节水、非转基因种子保育和引导当地农民自发地把生产引领到持续农业路子上去。

永续和自然的和谐是人们生产生活的根本，愿和更多的专家朋友们一起来探索农业中未知的领域。

A participant's impressions of the workshop

AN Jinlei, "Son of Nature" Farm

Zilong Village, Matun Town, Liuchang Township, Zaoqiang County, Hebei 053101

I have been engaged in organic farming since 1995, and have long been searching for ways to achieve sustainability. In the pursuit of pollution-free food and organic farming, I have been puzzled by a number of problems concerning organic food, and noticed that organic farming could not contribute directly to environmental protection. Thankfully, all my anxieties vanished after attending this workshop, in which speakers unveiled the real meaning of farming.

This workshop was linked up with ten agricultural principles, which are highly comprehensive and operational. Concepts like species co-existence and predation as well as biomass increment of tropical and temperate plants impressed me deeply. In a nutshell, the ultimate goals of farming are to realize ecological integrity and harmony between man and nature.

Case studies of hands-on ecological farming patterns were analyzed to alert participants to the importance of these principles, whereas field studies provided us with some practical training, such as conducting soil quality analysis and testing the water retaining capacity and nutrition levels of different soils.

The principles remind people to live in harmony with nature, and to love and make everyone equal; if they were implemented, it would gradually alter the existing profit-oriented operational pattern which equates development solely with huge capital inputs and economic returns. Sharing of new farming concepts would surely help people to reflect on the current mode of development and in turn could help small householders reclaim their dignity by offering them more self-development opportunities. These principles let participants recognize that economic growth is not the only way to social development.

New agricultural thoughts were injected into the training, including how to explore farming without violating these principles and how to transform the industrial farming system into a sustainable one.

Sustainable agriculture entails not only sound farming techniques, but also elements of humanity, ethics and awareness of nature. The relationship between producers and the market as well as the consumers should be addressed within the context of sustainable agriculture.

This September, a cotton specialist from the Chinese Academy of Agriculture visited our farm here in Hebei Province to observe cotton pest damage, which was severe elsewhere in China. He was astonished to see cotton fields of dozens of mu growing healthily, as elsewhere in China it has suffered from a complex of lepidopteran pests, which cause roots to decay, and whose damage has been incurable even by spraying pesticides. If we take every farming step in harmony with nature, plant health is maintained. This example also shows that ecological farming is now expanding with great vitality. In the coming years, we will focus on water conservation, conservation of non-GM (genetically-modified) seeds and encouraging farmers to take spontaneous action in carrying out sustainable agriculture.

Agricultural production must function in harmony with nature and sustainability and I would like to further explore some fresh ideas of agriculture with other agricultural experts.



南亚的森林农场 - 顺应自然的作物管理体制

The forest farms of South Asia: cropping systems patterned from nature

乐小山 (嘉道理农场植物园)

Hil PADILLA (KFBG)

易绍良 译

在斯里兰卡的堪第 (Kandy) 岛和菲律宾的凯维特 (Cavite) 地区 (马尼拉以南60公里)，是当地原住民因应热带环境而创造的农林作物系统的成功范例。这些模式模仿热带森林的结构及其大部分的生态功能。当地湿热的气候造就了丰富的水果，多样的树种形成了天然林似的生态系统。

斯里兰卡堪第 (Kandy) 岛的格瓦塔 (Gewatta) 系统

在斯里兰卡，村民在自己住屋周围修建的类似森林的园地称为「格瓦塔 (Gewatta)」。

在 Sinhalese 语中，Ge 的意思是「家」，watta 的意思是「园地」或「植林」。这种方式又称可持续农业或「顺应自然的耕作方式」，在这种农业模式下，农民的生产生活似乎与自然法则相依而不相悖。在潜移默化中，当地村民从天然林的结构、物种多样性和动态变化中，掌握保持农业生产力和可持续性的原则。各园地的物种产量大同小异，区别仅在于村民随个别的要求和喜好而作出不同种类作物的搭配。¹

这类顺应自然耕作的园地约占该岛总面积14.5%，许多作家和科学家都对这类园地进行过描述和研究。1884年，Haeckel 提到「锡兰 (斯里兰卡旧称) 中海拔山地有一种美妙的景观，既像花园又像森林，人类文化与自然和谐并存。人们置身其中，会有一种置身于美丽森林中的感觉，四周都是参天大树，树上蔓生著各种攀缘植物。但当人们发现被树木半遮半露的农舍或玩闹嬉戏的儿童才会使我们醒觉到这里是锡兰人的园地。人与自然间这样独特的和谐也可以在这些的森林般花园内的居民体现出来。²

据考证，斯里兰卡的堪第 (Kandyan) 式园地或森林花园这种以多年生作物为基础的耕作传统已有几个世纪的历史。这实际上是一个以具有经济价值的木

The indigenous agro-forestry systems in Kandy, Sri Lanka, and Cavite, the Philippines (60km south of Manila), are successful adaptations to the tropical environment. They mimic the structure of the tropical forest and most of its ecosystem functions. The hot and humid climate favours a large variety of fruits and the diversity of trees forms a forest-like ecosystem.

The Gewatta System of Kandy, Sri Lanka

The forest-like gardens, surrounding villagers' homes in Sri Lanka are called, gewatta. In Sinhalese, Ge means home and watta refers to garden or plantation. It can be called sustainable agriculture or "farming in nature's image", a kind of agriculture where the farmer seems to go with nature rather than against it. From the structure, diversity and dynamics of natural forest the farmers have instinctively followed the principles for productivity and sustainability. The gardens differ only in the combination of species, due to selection according to human requirements.¹

These forest gardens, which cover 14.5% of the island's total land area, have been described by several writers and scientists. In 1884, Haeckel reported, "the beautiful effect of the landscape found in the mid-elevation hills of Ceylon (former name of Sri Lanka), is that it takes on a role somewhere between a garden and forest, between culture and nature. Sometimes one might have the impression of being inside a beautiful forest, surrounded by tall and splendid trees which are overgrown by various climbers. A small hut, however, partly covered by a breadfruit tree, or playing children, will remind us that we are inside a Ceylonese garden. The distinctive harmony between nature and culture is also revealed in the human component of these forest-like gardens".²

It has been noted that the "Kandyan gardens or Kandyan forest gardens of Sri Lanka represent a

本作物如香料、水果、药用植物和用材树种的混合耕作系统。³

格瓦塔并不细意追求作物在布局上的整齐，而是呈现出不假修饰的野生天然林的特征。乔木和灌木的布局非常随意、分布不均，年龄各异。依赖乔木生长的攀缘植物枝叶横生，遍布整片园地。高耸的树冠笼罩园地上空，只有丝丝阳光可渗透树冠层，在地面形成零星的光照斑块。由于光照条件、微气候和管理手段及目的不同，林下植物的异质性非常高，地上形也布满枯枝落叶。⁴

在堪第岛，夹在陡坡之间的小狭谷通常都被开垦成水稻梯田。谷上的坡地采用的就是这种格瓦塔系统，因而在稻田上方形成一个类似天然林的绿色植被带。有些格瓦塔相互连接，成为野生动物的森林走廊带。这些园地像小集水区般，向坡下的稻田输送水分和养分，增加土壤的肥力。

菲律宾凯维特的多层作物系统

菲律宾凯维特的多层作物管理系统同样是模仿热带雨林的结构特点，那里的农民多年来通过实践向人们展示了如何在不损害资源基础的前提下优化农业生产。他们那些类似森林的农场也是多层结构，与斯里兰卡堪第的模式不同的是，在这里所种的是多产经济作物。



种植凤梨及番木瓜为主的经济作物管理系统，为农民营造较高收入
A less diverse cropping system dominated by pineapple and papaya, influenced by higher income from these cash crops

位于最上层的是椰子树 (*Cocos nucifera*)，椰子青果的经济效益比成熟椰子制成的肉乾高。椰子树以下是中等高度的果树，如波萝蜜 (*Artocarpus heterophyllus*)、芒果 (*Mangifera indica*)、油梨 (*Persea americana*)、星苹果 (*Chrysophyllum cainito*)、仙都果 (*Sandoricum indicum*)、泰国黄皮 (*Lansium*

traditional system of perennial cropping which has been in practice for several centuries. It is essentially a system of mixed cropping with a variety of economically valuable tree crops such as spices, fruits, medicinal and timber species".³

The gewatta is not carefully organized or planted and has a wild, forest-like character. Trees and shrubs occur apparently at random, unevenly distributed and of different age. Climbers using support trees to extend their leaves are abundantly distributed throughout the garden. The high crowns of trees shade the area. Small patches of sunlight will occur here and there. The undergrowth is highly heterogeneous depending on light, micro-climate and management. A layer of litter covers the ground.⁴

In Kandy, the small valley floors between steep slopes are usually occupied by terraced rice paddy fields. Above these valley floors are the gewatta systems that vegetate the slopes forming a green forest-like belt above the paddy fields. Some of the gewattas are interconnected forming forest corridors for wildlife. They act as small watershed catchments, and runoff from them goes to the rice fields, contributing to soil fertility.

The multi-storey systems of Cavite, Philippines

Also copying the structure of the tropical rainforest, the farmers of Cavite, Philippines have shown over the years how agricultural production can be optimized while conserving the resource base. The forest-like farms also have several storeys of cultivated plants but the difference from the Kandyan model is that most of them are cash crops.

Coconut trees (*Cocos nucifera*) occupy the upper-most layers. Coconuts harvested as young nuts give a better income than copra (dried mature coconut meat). Beneath the coconuts are medium-tall fruit trees such as jackfruit (*Artocarpus heterophyllus*), mangoes (*Mangifera indica*), avocado (*Persea americana*), star apple (*Chrysophyllum cainito*), santol (*Sandoricum indicum*), lanzone (*Lansium domesticum*), rambutan (*Nephelium lappaceum*), and guava (*Psidium guajava*).

At a lower level, a canopy of leaves is formed by banana plants (*Musa* spp.), coffee (*Coffea* spp.) and papaya (*Carica papaya*), which are the main cash crops. Multi-purpose legume trees like madre de cacao (*Gliricidia sepium*), and ipil-ipil (*Leucaena leucocephala*) which are cut 5-6 feet in height act as twining support for vine crops such as black pepper (*Piper nigrum*), yams



domesticum)、红毛丹 (*Nephelium lappaceum*) 和番石榴 (*Psidium guajava*) 等。

再往下则是一些主要的经济作物如香蕉 (*Musa* sp.)、咖啡 (*Coffea* sp.) 和番木瓜 (*Carica papaya*) 等构成的叶冠层。此外，还有一些豆科木本植物如格力豆 (*Gliricidia sepium*) 和银合欢 (*Leucaena leucocephala*) 等，这些植物有多种用途。例如，农民把这些植物的枝干砍掉5至6尺作为黑胡椒 (*Piper nigrum*)、薯蓣 (*Dioscorea* sp.)、佛手瓜 (*Sechium edule*)、西番莲 (*Passiflora* sp.) 和瓜类 (葫芦属科植物等) 等藤蔓植物的支柱。这些木本豆科植物又可作为胡椒和咖啡等的荫蔽树。此外，还可以充当绿篱，其叶子更可用来喂饲牲畜。

最底的一层，也就是在各种木本植物下面，种植的是喜阴植物如芋 (*Calocasia esculenta*)、竹芋 (*Maranta arundinacea*)、甘薯 (*Ipomea batatas*) 和木薯 (*Manihot esculenta*)。这些植物的布局比较随意，是很好的食物和饲料来源。其他根茎植物如姜 (*Zingiber officinale*) 等也被栽种以增加经济收入。最下层的主要经济作物还有菠萝 (*Ananas comosus*)，是当咖啡在生长时种的，菠萝是咖啡还未收成以前的主要经济作物。菠萝比较耐旱，也能抵抗台风的影响。

从这种类型的作物管理系统所得的收入是同样面积的水田的6至8倍。同时，由于作物的收获期维持整年，从而降低了自然灾害带来的经济风险。在出现台风的时候，香蕉和番木瓜很容易受到影响，但是，村民还可以从凤梨、椰子和咖啡等不太易受台风影响的作物中获得收入。目前，咖啡极受市场价格波动的影响，但是，农民依然可以从其他作物中获取一定收入。与季节性的单一种植模式相比，这种多层作物管理模式还有利于村民在全年平均分配劳动力和收入。由于这种种植方式模仿了自然模式，将土地平整的工作量降到最少，农活主要集中在栽种和收获。同时，丰富的植物多样性还大大减少了病虫害。这种作物管理模式生产力非常高，而且有利于保护环境。⁵

由于植物物种多样化，食物来源丰富，这种类似森

(*Dioscorea* sp.), chayote (*Sechium edule*), passion fruit (*Passiflora* sp.) and gourds (*Cucurbita* spp, *Lagenaria* sp., *Luffa* sp., etc.). They provide shade for the coffee and black pepper. They are also planted on the borders to serve as live fence. Their leaves are fed to livestock.

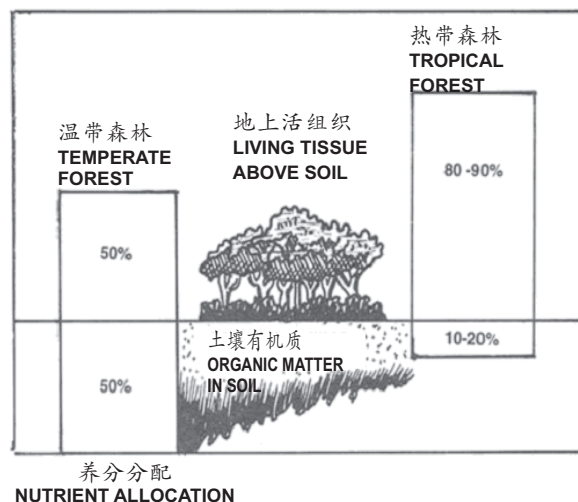
In the lowest layer, beneath the diverse tree layer, grow shade-loving crops such as taro (*Calocasia esculenta*), arrowroot (*Maranta arundinacea*), sweet potato (*Ipomea batatas*) and cassava (*Manihot esculenta*). They are haphazardly planted as good sources of food and animal feed. Other root crops like ginger (*Zingiber officinale*) are also added as additional sources of cash. Pineapple (*Ananas comosus*) is one of the main cash crops that occupy the lowest layer. It is usually planted when the coffee is still establishing itself. It is the main source of cash when coffee is not yet bearing fruits. Pineapple is drought-tolerant and typhoon-resistant.

The income from this type of cropping system is six to eight times that from a similar area of irrigated rice field. The economic risk associated with natural calamities is reduced, as the harvest is spread over the year. During typhoons, the bananas and papayas are easily affected but farmers can still get income from pineapple, coconut and coffee which are more typhoon-resistant. Nowadays, coffee is very much affected by market price fluctuations but the sales from other crops keeps the farmers afloat. There is also an even distribution of labour and income throughout the year, unlike in mono-cropping which is very seasonal. There is less work, as land preparation is minimal and work is mainly planting and harvesting. Pest infestation is minimal as a result of the high diversity of plants. It is highly productive, and yet, protective of the environment.⁵

These forest-like farms attract insects, birds and other wild animals because of the diversity of plant species and higher availability of food. While their precise functions in terms of wildlife biodiversity conservation have not been studied, the ecological basis of these ingenious indigenous systems is well known.

Ecological basis

In the tropical forest around 80% of the nutrients are in living tissues. This is in contrast with the temperate zone where 50-80% of the nutrients are in



温带和热带土壤的养分分配 (Murakami, 1991)
Nutrient allocation in temperate and tropical soils. From Murakami (1991)

林的农场吸引了不少昆虫、鸟类和其他野生生物。虽然有关这种作物方式对于野生生物多样性保护的具体作用的研究还没有开展，但这种传统的、别出心裁的管理方式的生态基础则是很明显。

生态基础

在热带森林生态系统内，80%的养分存在于植物的活组织内，而温带地区则相反，50至80%的养分分布在土壤的表层⁶。当森林被砍伐开垦成为农地时，大部分的养分便会从系统中被带走。如果把砍掉的生物量就地烧毁或任由得它们在土壤中腐化，作物产量会大大增加。但是，这种效果只能维持持续一段时间，一般不超过2至3年，从事刀耕火种的农民对这一点有亲身体会。由于热带的环境条件极端，植被受到破坏往往导致严重的土壤退化。当季风雨来临倾盆降雨的时候，裸露的土壤就会受到严重冲刷。养分含量最丰富的表土被冲走，这种情况在没有植被覆盖的土壤上最为明显。土壤侵蚀使表土层变薄，从而削弱土壤的保水能力。结果，尽管当地降雨量很多，但是可供作物有效利用的降水却很少。季风雨过后随之而来的是酷热的旱季出现，这对维持土壤肥力的微生物种群产生极不利影响。这就是热带地区实行刀耕火种或陡坡耕作时，土壤生产力迅速降低的原因。

热带森林的生产力可以很高，可是也很脆弱，容易受到不良影响。从这里我们可以得出两个重要的教训：(i) 应该设法将系统的养分保持在活体植物中，也就是说我们应该尽量多种植多年生作物；(ii) 应该利用、枯枝落叶或活植被等保持土壤覆盖。

传统的农林系统将不同作物结合在一个多层结构中，因此：

- 落叶和修剪物形成一层厚厚的枯枝落叶层。即使在陡坡上，亦能大大降低土壤侵蚀的机会、又可保持土壤肥力、提高土壤保水能力，有利积聚土壤有机质和涵蓄水份。
- 尽量利用光照资源，土壤保护也得到改善。在辐射较强的旱季里，叶片会阻挡部分阳光，避免土壤受直接照射。同样，冠层植物以及地表的落叶减少了雨水对土壤的直接冲刷。
- 植物多样性增加也降低了病虫害爆发的可能性。

是昔日黄花还是后世的榜样？

随著斯里兰卡天然林的减少，各式各样的森林园地

the soil.⁶ When the trees are cut to make a clearing for agriculture, the bulk of the nutrients are taken away from the system. If the cut biomass is burned or left to rot in the soil, it will give a good crop yield. But the effect lasts only for a short period, around 2-3 years, as experienced by swidden (slash-and-burn) farmers. Due to the extreme environmental conditions in the tropics, devegetation is usually followed by a very high rate of soil degradation. When heavy monsoon rain comes, the exposed soil is eroded. The topsoil, which contains most of the nutrients, is washed away, and this is most pronounced in plots with no soil cover. Soil moisture retention is also negatively affected because of the resulting thin topsoil. As a result, the effective rainfall for crop use becomes minimal despite the high amount of rain. The monsoon rains are then followed by the scorching sun of the dry months, adversely affecting the microbial population that aids in maintaining soil fertility. This is the reason swidden farms and farms on sloping lands in the tropics become very unproductive in a very short period of time.

The tropical forest can be highly productive, yet fragile and vulnerable. Two major lessons can be derived from this: (a) nutrients should be tied up in living plants, meaning the planting of more perennial crops; and (b) the soil should always be covered either by mulch/litter or living cover.

An indigenous agro-forestry system combining different crops in a multi-storey structure results in:

- thick litter, provided by fallen leaves and prunings. This tremendously reduces soil erosion even on steep slopes, maintains soil fertility and increases the water-holding capacity of the soil. There is consequently high organic matter build-up and rain-water conservation.
- maximum utilization of sunlight. Soil conservation is also improved. Strong sunlight during the dry months is filtered by the leaves which prevent it from striking the soil directly. The same is true with rainfall, whose soil beating effect is moderated by the canopy leaves and leaf litter.
- reduced pest outbreak because of the high diversity of plants.

Remnant of the past or hopeful model for the future?

After the decline of the natural forests in Sri Lanka, the diverse forest gardens are the last strongholds of biodiversity, the last refuge of its diminishing wild flora and fauna. Despite its ecological value, the gewatta is



成了生物多样性的最后据点，也是所剩无几的野生动植物资源仅存的避难所。尽管格瓦塔具有很高的生态价值，可是这种模式主张结构松散的粗放耕作，不能给农民带来快速和较高的经济回报，在今天经已受到威胁。随著生活方式和生活需求的改变，传统的农业管理方式很难适应现代的发展趋势。因此，很多不同的部门正在提议将集约化管理的理念引入这种「不合时宜」的作物管理体制中。⁷但是，正如 Bompard 等 (1980) 提出的警告那样：「如果不考虑维系这种作物管理系统的生态原则 (生物多样性、复层结构和养分循环系统等) 和其中的经济、社会和文化因素的话，对该系统进行所谓改进的努力只会令其加快消失。」⁸菲律宾许多以市场为导向的与格瓦塔相类似的作物管理系统证明上述担忧是不无道理的。为了迎合专业化的市场需求，这些农场上的物种多样性在逐渐减少。

总的来说，自给自足的混合性农业对国民生产总值的贡献较低。但是，如果把它的环境服务功能也纳入社会经济利益的核算中，情况会大不相同。我们不能再像以前一样只短视地着眼于经济利益，因为森林各种生态功能的正常运作才是最值得我们关注的。说到底，这实际上是关乎发展观的问题：究竟我们需要的是西方和富裕国家所支配的：获取无限经济增长、全球贸易、单一种植为特点的「传统」发展模式呢；还是将可持续性作为首要标准、著重生物区域或地方经济和促进多元文化的「另类」发展模式？我们应该紧记：多样性是所有生命的根源。

endangered today because its extensive and unorganized method of cultivation does not bring rapid and high monetary rewards for the farmer. As lifestyle and demands are changing, traditional methods of agriculture can hardly withstand modern trends. Hence, intensification of this "archaic" system is being proposed by many different authorities.⁷ But as Bompard et al., (1980) warned, "Improvement without consideration of the ecological principles underlying the maintenance of the system (features of biodiversity, layered vegetation, recycling system) as well as economic and socio-cultural factors may entail its disappearance".⁸ And support for this apprehension can already be seen in the market-oriented gewattalike systems in the Philippines that are becoming less and less diverse as they slowly try to adapt to specialized markets.

In general, a mixed, subsistence-type of agriculture makes a low contribution to Gross National Product (GNP). But if environmental services were factored into the calculation of socio-economic benefit, the situation would be completely different. Instead of myopically looking only into conventional economic benefits, the manifold ecological functions of forests should be given utmost attention. In the end, it will actually be a question of development perspectives - between the "conventional" development model of unlimited economic growth, transcontinental trade and monoculture systems dominated by the West and rich nations and the "alternative" development model putting sustainability as the primary criterion, emphasis on the bio-regional and local economy and the promotion of diverse culture. We should always remember that biodiversity is the basis of all life.

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恢复生态平衡

恢复保护区周边的生态平衡：刻板问题 灵活处理

Restoring ecological balance around nature reserves: black-and-white problems, colour solutions

费乐思 (嘉道理农场暨植物园)
John FELLOWES (KFBG)

「不管黑猫白猫，能抓到老鼠的就是好猫！」，这是中国传颂一时的处世哲学。听闻近日云南一个保护区引入大量家猫（颜色不详），目的为邻近地区的村民解决鼠患，并作为当地保育及社区发展专案的工作之一。鼠患爆发不难理解，归根究底也是农林生态系统结构过度简化、资源开发过度，使生物多样性消失及天然虫害防治作用瓦解。采用上述的短期措施也是可以理解的，鼠患一则引致饥荒，二则妨碍农业进一步扩展。但长远的治本方法为何？家猫又会对栖息于这个生态敏感区域的其他物种带来什么影响？


缓冲区是自然保护区设计理念的一部分（由联合国教科文组织及其它单位倡议），使区内的自然生物群免受外界破坏生态系统活动的影响。这个理念虽然得到不少国内人士一致认同，然而实践时情况却十分参差。不少保护区内的整全生态系统，甚至是核心区，都与不适合区内物种生活的农地为邻。这类农田生境往往没有树木和大型野兽、广泛的受农药和化肥污染的单一种植区。它们的生态功能，例如泥土的保水、抵抗侵蚀能力、养分及能量循环等均受损甚至完全丧失。这些受干扰的生境为外来种入侵造就了有利条件。即使人类与牲畜对自然生态的直接干扰得以遏止，这种由不适合生境围绕著破碎化自然生态系统的地貌仍会令华南一带的保护区生物多样性继续大量消失¹。

农民同样也需要为生态整全性的下降而付出代价。与天然生态系统为邻的农民可以享用清澈可靠的水源作饮用和灌溉用途，天然生态系统更可提供植物授粉及防治虫害的生态功能²。而住得较远的农民则无缘享用这些优惠了，因为一个地方的生态整全性与植被的天然程度和与整全性高地区的距离有密切关系。以控制著陆地上及其附近昆虫的蚂蚁为例，依赖林地的捕食性蚂蚁在林缘数米

In China there is a commendable philosophy not to discriminate against cats on the basis of their colour, so long as they catch rats. I was intrigued to hear recently of a nature reserve in Yunnan that had, as part of a conservation and community development project, introduced large numbers of domestic cats (colour unspecified) to the adjacent area to help villagers control their rodent pests. The pest outbreaks are easy to understand - unrelenting simplification of agro-ecosystems, together with over-exploitation, having led to the loss of local biodiversity and the collapse of natural pest-control. The short-term remedy too is understandable - lost grain makes for hungry people and hinders further agricultural expansion. But what's the long-term solution? And what impact will the cats have on other species in this ecologically-sensitive area?

The theory of nature reserve design (as promulgated by UNESCO and others) calls for a buffer area, where the reserve's natural biota is buffered from the negative impacts of ecosystem damage outside. The theory is widely accepted in China, but the practice is often different. In most reserves intact natural ecosystems - even "core areas" - come face-to-face with agricultural land that is uninhabitable to the vast majority of their species. It is typically devoid of trees and large animals, often monoculture, often polluted by fertilizers and pesticides; a whole suite of ecosystem functions, such as water retention, erosion control, nutrient and energy cycling, are lost or impaired; disturbed conditions seem tailor-made for invasive alien species. This hostile matrix surrounding fragmented natural ecosystems is one of the major reasons to expect continued significant biodiversity loss within the protected-areas system of southern China¹, even if direct intrusion into natural ecosystems (by people and their animals) can be controlled.

The reduced ecological integrity also has a cost to farmers. Those living close to natural ecosystems receive many benefits, from clean and dependable water for drinking and irrigation to pollination and pest control². Those a little further off are



以外的农林生态系统可能仍是非常丰富多样，但它们的丰富度很快便会随和树林的距离增加而逐渐减退，尤其是在退化较严重的农地³，农夫喷洒的杀虫剂不单削弱了捕食性昆虫种群，同时也增强虫害的抵御能力及它们的数量⁴。连带猫头鹰、蛇、果子狸及蜜蜂等对帮助农业生产的动物也会受影响，因为这些种群的损耗并非局限于森林的边陲，而是会因被人类肆意采捕而向森林深处延伸。

捕猎活动一旦得到有效控制，住在森林不远处的农民便经常抱怨野生动物破坏他们的农作物。人与动物的冲突在云南的自然保护区便很普遍，野猪 *Sus scrofa*、獼猴 *Macaca mulatta* 及亚洲黑熊 *Ursus thibetanus* 都教农夫们头痛不已。这些动物能迅速的恢复至为患的程度正好说明了它们有不错的回弹力，当然它们在这方面并不能代表其他较为敏感的物种。有时候，生态补偿固然合理和可行，但却不是唯一的办法。农林生态系统的最大挑战就是要灵活地排解野生动物与人类的纠纷⁵。「永续农业技术」可助生态敏感区域转危为机。「分区规划」是整个策略的中心思想，即把土地按用途划分，由高度集约经营（村旁用地），以至禁止人类干扰等⁶（事实上很多未受「现代化」改变的传统农村也是这样划分土地的）。

要减低野生动物造成的影响，必须了解它们的基本需要。对一些活动能力较低的物种，可令指定地区不适合其养息或繁衍，从而直接控制它们。对于其他物种，我们可以利用其天敌与之抗衡、或减低土地对动物的吸引力（即改变生境），如增加其获取资源的难度。以云南的例子，单一种植可能是当地农业问题之一，作物在同一时间收成，产量之多无疑吸引了食物有限的兽类。直觉地，混合种植及一些更复杂的农业系统应不如单一种植那般脆弱。

农林生态系统虽提供了比一年生单一种植更理想的生境，可是在生物多样性保育方面仍有不少限制。印尼一项研究显示鸟类的丰富度在天然林、次生幼林、农林生态系统及一年生单一种植地区呈下降趋势，而鸟类的物种组成亦会因应不同的植被类型而有所差别⁷。次生幼林的鸟类特有种较天然林为少，而农林生态系统只能支援数种吃果性或吃花蜜的小型鸟类物种。因此以有利生物多样性保育的生产系统来改善景观基质是值得做的，以扩大森林种分布范围，但仍然需要把保护及重新连贯天然林区放在优先的位置。生态廊道被广

deprived; ecological integrity is related to both the naturalness of vegetation and its distance from high-integrity sites. Judging by one group, the ants, that voraciously control insects on and near the ground, forest invertebrate predators may still be diverse and abundant in agro-ecosystems a few metres from the forest edge, but richness soon tails off, especially in more degraded fields³, and insecticides have been shown to destabilise predator populations while strengthening those of pests⁴. The same is true for a host of species - owls, snakes, civets, bees - that could be doing a lot of the farmers' work for them; for these population depletion does not start at the forest edge, but often deep inside where human exploitation has its impact.

Where hunting inside forests has been effectively controlled, neighbouring farmers often complain of damage by wild animals. Around many Yunnan nature reserves such wildlife-human conflict includes damage to crops by Wild Boar *Sus scrofa*, Rhesus Monkeys *Macaca mulatta*, and Asiatic Black Bears *Ursus thibetanus*. Their recovery to pest status speaks well for the resilience of these animals (though not for their representativeness of more sensitive species). Compensation is sometimes both reasonable and feasible, but it is not the only solution. A major challenge for agroforestry is to address wildlife-human conflict more creatively⁵. A "permaculture" approach offers great potential for turning problems into solutions in ecologically sensitive areas. A central idea is zoning, with areas along a rough continuum from intensively managed land (near dwellings) to areas of minimal disturbance⁶ (in practice most traditional villages have such a system if they have not been disrupted by 'modernisation'). Attempts to control the impact of wild animals might best involve understanding their core requirements; for some relatively immobile species this might lead to direct control by limiting a site's suitability for resting or breeding. For others their activity may better be influenced by manipulating their enemies, or by reducing the attraction or accessibility of the resource (e.g. by habitat alteration). In the Yunnan case again part of the problem may be uniformity, as large areas of a crop, ripening at the same time, are a magnet for food-stretched mammals. Intuitively it seems unlikely that mixed crops, and more complex systems, would be so vulnerable.

While agroforestry systems provide better habitat than annual monocultures, they do have their limitations in biodiversity conservation. Research in Indonesia has revealed decreases in bird species richness from natural forest and young secondary forest to agroforestry systems and annual cultures, and differences in species composition across the different vegetation types⁷. While secondary forest had fewer endemic bird species than natural forest, nearby agroforestry systems supported only a few small frugivorous-nectarivorous bird species. Thus while improving the landscape matrix through biodiversity-friendly productive systems is clearly desirable to enlarge the ranges of forest species, the protection and re-

恢复生态平衡

泛建议为有助改善生境破碎化，同时亦被认为是实践生态农业的主要策略之一⁸。然而，只有在空间设计得宜的情况下，天然林生态廊道比植林区才能更能发挥保护生物多样性的作用。印尼的灵长类只会利用连接了较大天然林块的生态廊道，天然林面积须占总面积约25%，才能维持一半或以上的原灵长类种群密度⁹。景观联系亦很重要，但必须有全面的生态知识才能成事。

生物多样性要达到那一个水平才能为农民等提供比较重要的生态功能呢？对此，学者们亦众说纷纭。在较小的样地或农地的规模而言，生物多样性丰富的好处并不明显——虽然更多的物种可能提供较高的全年效益，但在正常的情况下，只需要有一个或数个物种就能够提供数种不同的生态功能^{10 11}。而且现在对泥土生物功能群的中多样性仍然所知甚少¹²。在景观层面上，生物多样性消失的后果反而明显，因为农林生态系统中随著与其他组成部分的联系消失，便会失去它们原有的应变力及适应力¹³。同时，在景观层面上亦缺乏能维持生境多样性的机制，因此适当的政策干预及建议尤为重要。

发展常常把保育学家陷于两难——改善生活状况是每个人，包括住在生物多样性重要价值地区的人的愿望，生态保育与社区发展的重迭是有限制的，可是「经济发展」的道路并无尽头（有人更认为是走错了方向）。然而人与自然保育的冲突并不是必然的。有不少学者都重新界定了人类真正的生活需要，如斯里兰卡籍的A.T. Ariyaratne提倡的全面觉醒义工运动提出：美丽洁净的环境、清澈充足的水源、基本的衣物需要、均衡的膳食、简朴的居所、基本的医疗设施、简单的通讯设备、最少的能源需求、全面的教育及文化与灵性需要¹⁴。上述一切都不会与自然保育发生抵触，还会起到正面的作用。

要是农民理解存护自然整全性的好处——如多样化的生产系统有利于限制害虫食物的供应、捕食者有助虫害防治、本土植物可预防土壤流失、本土动物则有助植物授粉及散播种子、健康的天然土壤可确保生态系统功能正常运作——他们只需要支援生物多样性保育的政治环境，及成立外展组织，以帮助应付在与自然相处时所面对的挑战与机遇。一群具生态触觉的自然保护区工作人员及县政府官员可能帮上这个忙。若他们不能成功，农民们将被锁进越来越倚赖科技来解决问题，但同时科技却越来越束手无策的局面里。

connection of natural forest areas remains the highest priority. Ecological corridors are widely proposed as a remedy against fragmentation, and an important ecoagricultural strategy⁸. Natural forest corridors are far superior to plantation stands in harbouring biodiversity, but only if spatial design is right; in Indonesia primates only used such corridors if connected to larger natural forest tracts, and some 25% of the total area had to be under natural forest to maintain at least 50% of original primate densities⁹. The landscape-level connections are vital - to work, they will require the pooling of all available ecological knowledge.

There is some debate over how much biodiversity is needed to ensure the ecosystem functions important to farmers and other residents. At the scale of plots or fields, the advantages of high biodiversity are not always obvious - in normal conditions many functions might be covered by one or a few species^{10 11}, although extra species may give better year-round efficacy, and the diversity within functional groups of soil organisms is poorly understood¹². At the landscape scale the results of biodiversity loss become more obvious, as agroecosystems lose the resilience and adaptive ability that accompany high connectivity between their components¹³. At the same time there are few mechanisms to uphold habitat diversity at the landscape scale; appropriate policy interventions and advice are thus of crucial importance.

Conservationists repeatedly get caught up in dilemmas of development - those living around sites of biodiversity importance are just as keen to improve their situation as anyone else. There is a limit to how much conservation and community development overlap; the cherished road to "economic development" is endless (and arguably misdirected). But the conflict need not arise. Real human needs have been defined by, for example, the Sri Lankan A.T. Ariyaratne, founder of the Sarvodaya Shramadana community development movement: a clean and beautiful environment; a clean and adequate supply of water; minimum clothing requirements; a balanced diet; a simple house to live in; basic health care; simple communication facilities; minimum energy requirements; total education; and cultural and spiritual needs¹⁴. None of these aims need conflict with nature conservation; on the contrary, they could help.

If farmers see benefits from retaining natural integrity - more diversified production systems to limit pest food supplies, predators to control pests, native plants to control soil loss, native animals to pollinate and disperse plants, healthy natural soil to ensure retention of ecosystem function - they require only a supportive policy environment to encourage that biodiversity, and an extension system that helps them deal with the opportunities and challenges of working with nature. They could be helped by nature reserve and county officials, as centres of ecological sense. If they don't succeed, they will be locked into a spiral of increasing reliance on technological fixes, and decreasing likelihood that the fixes will work.

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二零零四年具保育价值的野生动植物纪录

Wildlife Whereabouts—some recent records of conservation importance 2004

以下是2004年嘉道理农场暨植物园考察队在野外调查时所作的纪录。

The following records were made by specialist team members during KFBG surveys in 2004.

国际濒危等级是以世界自然保护联盟 (IUCN) 提供的濒危物种红色名录为准；国家濒危等级以中国物种红色名录为准。

Global status is based on IUCN Red List of Threatened Animals and Plants; national status is based on China Species Red List (2004).

注释Key：CR = 极危Critically Endangered；EN = 濒危Endangered；VU = 易危Vulnerable；NT = 接近受危Near Threatened；R = 稀有Rare；NR = 自然保护区Nature Reserves；NNR = 国家级自然保护区National Nature Reserves；一级Class I = 国家一级保护Class I National Protection；二级Class II = 国家二级保护Class II National Protection.

维管植物Plants

■ 海南苏铁 *Cycas hainanensis* (全球：濒危；中国：濒危，一级)

3月27日，于海南东方县俄贤岭山地石灰岩矮林(海拔900米)的石缝中长出一群5棵矮株。

Cycas hainanensis (Global: EN; China: EN, Class I)

A small population of five dwarf individuals was growing among rock crevices at E' xianling, Dongfang County, Hainan on 27 March in montane limestone dwarf forest at about 900m.

■ 海南粗榧 *Cephalotaxus hainanensis* (全球：濒危)

3月27日于海南东方县俄贤岭山地常绿石灰岩雨林(海拔800米)看到一个树桩，胸径40厘米。该树于近日才被砍伐，木头仍留在林中。

Cephalotaxus hainanensis (Global: EN)

One tree stump of 40cm dbh was seen at E' xianling, Dongfang County, Hainan on 27 March in montane evergreen limestone rainforest at about 800m. The tree had probably been felled only recently but the log was abandoned.

■ 短叶黄杉 *Pseudotsuga brevifolia* (中国：易危，二级)



短叶黄杉 *Pseudotsuga brevifolia*

吴世捷摄 Photo by NG Sai Chit

12月2日，于广西乐业县大石围天坑石灰岩崖上的亚热带常绿落叶混交林(海拔：1,200米)内看到逾10棵大树。12月4日，乐业县火卖石灰岩悬崖上的亚热带常绿落叶林(海拔1,200米)也看到逾20棵大树，该物种在当地很常见。

Pseudotsuga brevifolia (China: VU, Class II)

Locally common with more than 10 trees seen at Dashiwei Tiankeng, Leye County, Guangxi on 2 December in subtropical evergreen-deciduous mixed forest on limestone cliffs at about 1,200m. Also locally common with more than 20 trees seen at Huomai, Leye County on 4 December in subtropical evergreen-deciduous mixed forest on limestone hills at about 1,200m.



海南苏铁 *Cycas hainanensis*

吴世捷摄 Photo by NG Sai Chit

野生动植物记录

■ 囊瓣木 *Saccopetalum prolificum* (全球：易危；中国：易危)

3月27日于海南东方县俄贤岭山地常绿石灰岩雨林(海拔600米)看到10棵大树，胸径达60厘米。

Saccopetalum prolificum (Global: VU; China: VU)

More than 10 large trees up to 60cm dbh were seen at E' xianling, Dongfang County, Hainan on 27 March in montane evergreen limestone rainforest at about 600m.

■ 青梅 *Vatica mangachapoi* (全球：濒危；中国：濒危，二级)

3月27日于海南东方县俄贤岭的山地常绿石灰岩雨林(海拔800米)看到一根近日砍掉的木头。

Vatica mangachapoi (Global: EN; China: EN, Class II)

One felled log of 60cm dbh was seen at E' xianling, Dongfang County, Hainan on 27 March in montane evergreen limestone rainforest at about 800m. The tree was probably felled only recently.

■ 香木莲 *Manglietia aromatica* (全球：易危；中国：濒危，二级)

12月2日，于广西乐业县圣母天坑的亚热带常绿落叶混交林(海拔1,000米)看到两棵胸径20-40厘米的树。翌日于乐业县穿洞天坑的同类森林(海拔1,200米)看到三棵树，胸径15-20厘米。

Manglietia aromatica (Global: VU; China: EN, Class II)

Two trees about 20-40cm dbh were seen at Shenmu Tiankeng, Leye County, Guangxi on 2 December in subtropical evergreen-deciduous mixed forest at about 1,000m. Three trees about 15-20cm dbh were seen at Chuandong Tiankeng, Leye County, on 3 December in similar forest at about 1,200m.

■ 海南风吹楠 *Horsfieldia hainanensis* (全球：易危；中国：濒危，二级)

3月27日于海南东方县俄贤岭的山地常绿石灰岩雨林(海拔800米)内看到一个正萌芽的树桩，胸径约50厘米。

Horsfieldia hainanensis (Global: VU; China: EN, Class II)

One tree stump about 50cm dbh with resprouting shoots was seen at E' xianling, Dongfang County, Hainan on 27 March in montane evergreen limestone rainforest at about 800m.

哺乳类 Mammals

■ 海南缺齿鼯 *Mogera insularis hainanus* (中国：接近受危)

12月3日，海南昌江县霸王岭国家级自然保护区南叉河地区(海拔约500米)的村民于农地上捉到一只这种当地特有的物种的成年个体。另于南叉河的农田(海拔约600米)上也看到不少该物种挖掘的地道。

Hainan Lesser Mole *Mogera insularis hainanus* (China: NT)

An adult of this endemic mole was caught by villagers in a cultivated plot in the Nanchahe area (~500m) on 3 December. Many tunnels reportedly dug by this species were also seen in a cultivated area in the Nanchahe area (~600m), Bawangling NNR, Changjiang County, Hainan.

■ 猕猴 *Macaca mulatta* (全球：接近受危；中国：易危，二级)

12月1日早上，于海南昌江县霸王岭国家级自然保护区沿东二分站(海拔约800米)的主路看到一个数目最少有五只的小群。

Rhesus Macaque *Macaca mulatta* (Global: NT; China: VU, Class II)

A group of at least five individuals was seen in the morning of 1 December by the main road towards Dong'er substation (~800m), Bawangling NNR, Changjiang County, Hainan.

■ 豹猫 *Prionailurus bengalensis* (中国：易危，二级)

4月23日傍晚于广西大明山国家级自然保护区近渡假村地区(海拔约1,000米)的林间小路上看到一只。

Leopard Cat *Prionailurus bengalensis* (China: VU, Class II)

One adult was seen on a forest road near the resort area (~1,000m) before dusk in Damingshan NNR, Guangxi, on 23 April.

■ 水獭物种 *Otter* sp.

10月18日，于海南昌江县霸王岭国家级自然保护区南叉河地区(海拔约650米)的溪流石块上发现一新一旧的两堆水獭粪便。水獭 *Lutra lutra* (全球：易危；中国：濒危)及小爪水獭 *Amblonyx cinereus* (全球：接近受危；中国：濒危，二级)曾于海南岛上有记录，但我们并未能从粪便来鉴别是那一物种。

Otter sp.

Two otter spraints, one old and one fresh, were found on a stream rock in the Nanchahe area (~650m), Bawangling NNR, Changjiang County, Hainan on 18 October. Two species of otters, the Eurasian Otter *Lutra lutra* (Global: VU; China: EN, Class II) and Oriental Small-clawed Otter *Amblonyx cinereus* (Global: NT; China: EN, Class II) have been recorded on Hainan Island, but we were unable to identify the species from the spraints.

■ 鼬獾 *Melogale moschata* (中国：接近受危)

5月及11月的野生哺乳类调查中，于广西大明山国家级自然保护区用红外线自动照相机拍到三只。

Chinese Ferret Badger *Melogale moschata* (China: NT)

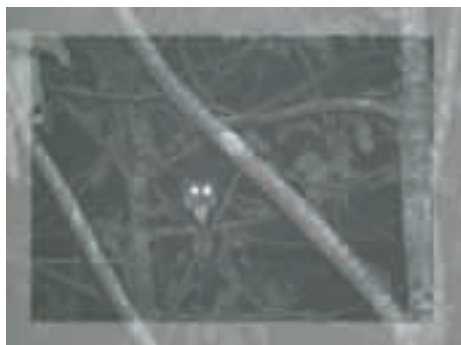
Three were photographed by infrared auto-trigger cameras at Damingshan NNR, Guangxi, during the wild mammal survey between May and November.

■ 巨松鼠 *Ratufa bicolor* (中国：易危，二级)

5月15日于海南昌江县霸王岭国家级自然保护区的南叉河地区的成熟林(海拔800米)及10月13及17日于东二地区(海拔900米)，看到数只。

Black Giant Squirrel *Ratufa bicolor* (China: VU, Class II)

Individuals were seen in mature forest in the Nanchahe area (800m) of Bawangling NNR, Changjiang County, Hainan, on 15 May and in the Dong'er area (900m) on 13 and 17 October.

■ 海南鼯鼠 *Petaurista hainana* (中国：易危)

海南鼯鼠 *Petaurista hainana*
Hainan Giant Flying Squirrel *Petaurista hainana*

陈肇乐摄 Photo By Bosco CHAN

12月4日傍晚，于海南昌江县霸王岭国家级自然保护区的东二往东五(海拔1,000米)的路上看到六只。[编者按：一些国际专家视之为 *P. philippensis* 的同种异名]

Hainan Giant Flying Squirrel *Petaurista hainana* (China: VU)

A total of six individuals were seen in the evening of 4 December along the road from Dong'er area towards Dongwu area (~1,000m), Bawangling NNR, Changjiang County, Hainan. [Editor's note: considered a synonym of *P. philippensis* by some international experts]

■ 扫尾豪猪 *Atherurus macrourus* (中国：易危)

5月及11月的野生哺乳类调查中，于广西大明山国家级自然保护区用红外线自动照相机拍到三只。

Asiatic Brush-tailed Porcupine *Atherurus macrourus* (China: VU)

Three were photographed by infrared auto-trigger cameras at Damingshan NNR, Guangxi, during the wild mammal survey between May and November.

鸟类 Birds

■ 海南山鹧鸪 *Arborophila ardens* (全球：易危；中国：濒危，一级)

5月16日，于海南昌江县霸王岭国家级自然保护区雅加地区的受干扰树林内(海拔700-900米)看到一些成鸟。

Hainan Partridge *Arborophila ardens* (Global: VU; China: EN, Class I)

Adults were seen in disturbed forest in the Yajia area (700 – 900m) of Bawangling NNR, Changjiang County, Hainan on 16 May.

■ 红原鸡 *Gallus gallus* (中国：二级)

10月12日，12月3日及5日，于海南昌江县霸王岭国家级自然保护区南叉河地区的次生林内(海拔约500米)共看到成鸟3只(两只雄鸟及一只雌鸟)。

Red Junglefowl *Gallus gallus* (China: Class II)

A total of three adults (two males and one female) were seen in secondary forest in the Nanchahe area (~500m) of Bawangling NNR, Changjiang County, Hainan on 12 October, 3 and 5 December.



鼬獾 *Melogale moschata*
Chinese Ferret Badger *Melogale moschata*

© 嘉道理农场暨植物园 KFBG

野生动植物记录

■ 白鹇 *Lophura nycthemera* (中国：二级)

10月12日，于海南昌江县霸王岭国家级自然保护区东一区(海拔500米)的受干扰树林内看到一个不少于3只的摄食群。12月4日，于海南东方县俄贤岭山地常绿石灰岩雨林(海拔500-600米)看到两个被捕捉的个体留下的羽毛。

Silver Pheasant *Lophura nycthemera* (China: Class II)

A feeding group of at least three birds was seen in disturbed forest in the Dongyi area (500m) of Bawangling NNR, Changjiang County, Hainan on 12 October. Feathers of two hunted individuals were seen at E' xianling, Dongfang County, Hainan on 4 December in montane evergreen limestone rainforest at 500m and 600m.



陈肇乐摄 Photo By Bosco CHAN

领鸺鹠 *Glaucidium brodiei*
Collared Owlet *Glaucidium brodiei*

■ 领鸺鹠 *Glaucidium brodiei* (中国：二级)

12月6日，于海南昌江县霸王岭国家级自然保护区雅加林区(海拔300米)内的受干扰树林内有一只成鸟。

Collared Owlet *Glaucidium brodiei* (China: Class II)

An adult was seen perched in disturbed forest in the Yajia area (300m) of Bawangling NNR, Changjiang County, Hainan on 6 December.

■ 山皇鸠 *Ducula badia* (中国：二级)

5月16日及17日分别于海南昌江县霸王岭国家级自然保护区雅加地区(海拔700米)及东二地区(海拔900米)看到(包括数量逾10只的鸟群)，10月及12月于南叉河地区(海拔800-1,000米)也不时听到叫声

Mountain Imperial Pigeons *Ducula badia* (China: Class II)

Seen (including flocks of over 10 individuals) in forested areas of Bawangling NNR, Changjiang County, Hainan, in the Yajia area (700m) on 16 May, in the Dong' er area (900m) on 17 May and regularly heard in the Nanchahe area (800-1,000m) in October and December.

■ 蓝背八色鸫 *Pitta soror* (中国：接近受危，二级)

于海南昌江县霸王岭国家级自然保护区的成熟林内见到数个个体。5月16日，于雅加地区(海拔900米)，看到成鸟及幼鸟各一只，幼鸟喙呈红色、胸有斑点。12月5日下午于葵叶岗地区(海拔约800米)看到一只成鸟。

Blue-rumped Pitta *Pitta soror* (China: NT, Class II)

A number of individuals were seen in mature forest in Bawangling NNR, Changjiang County, Hainan; one adult and one young bird, with reddish bill and streaked breast, were seen in the Yajia area (900m) on 16 May. An adult was seen in the afternoon of 5 December in the Kuiyegang area (~800m).

■ 凤头蜂鹰 *Pernis ptilorhynchus* (中国：二级)

12月6日，于海南昌江县霸王岭国家级自然保护区(海拔200米)看见一只飞来度冬的个体，于受干扰树林上滑翔。

Oriental Honey-buzzard *Pernis ptilorhynchus* (China: Class II)

An individual of this winter visitor was seen soaring over disturbed forest in the Yajia area (200m) of Bawangling NNR, Changjiang County, Hainan on 6 December.

■ 黑翅鸢 *Elanus caeruleus* (中国：二级)

5月14日于海南儋州市的高速公路(水平)边看到一只成鸟在农地上盘旋。

Black-shouldered Kite *Elanus caeruleus* (China: Class II)

One adult was seen hovering over agricultural fields by a highway (sea level) in Danzhou County, Hainan, on 14 May.

■ 黑冠鹃隼 *Aviceda leuphotes* (中国：二级)

4月27日于广西横县六景村甲江水库旁的灌林/植林区看到两只成鸟。

Black Baza *Aviceda leuphotes* (China: Class II)

Two adults were seen in shrubland/plantation area near the Jiajiang Reservoir (420m), Liujing Village, Heng County, Guangxi, on 27 April.

■ 白颈鸦 *Corvus torquatus*

9月23日于广西资源县中峰(海拔420米)的农地上看到一只。

Collared Crow *Corvus torquatus*

One was seen around agricultural fields at Zhongfeng (420m) in Ziyuan County, Guangxi, on 23 September.

■ 小灰山椒鸟 *Pericrocotus cantonensis* (全球：接近受危)

9月23日于广西资源县八坊村(海拔550米)看到一群15只。



陈肇乐摄 Photo By Bosco CHAN

睑虎 *Goniurosaurus bawanglingensis*

Swinhoe's Minivet *Pericrocotus cantonensis* (Global: NT)

A group of 15 was seen at Bafang Village (550m) of Ziyuan County, Guangxi, on 23 September.

■ 纹胸鹎 *Napothera epilepidota*

7月23日于海南霸王岭国家级自然保护区南叉河地区(海拔700米)的成熟林内看到两只正在对唱(它们可能在附近繁殖)。

Eyebrowed Wren Babbler *Napothera epilepidota*

A calling pair (may be breeding nearby) were seen in mature forest in the Nanchahe area (700m) of Bawangling NNR, Changjiang County, Hainan, on 23 July.

两栖爬行类 Amphibians & Reptiles

■ 睑虎 *Goniurosaurus bawanglingensis* (中国：易危)

5月17日傍晚于海南霸王岭国家级自然保护区雅地区，看到两只不同斑纹的个体于雨后沿旧砍伐路上(海拔550米)摄食。这个刚描述的新种仅于霸王岭有记录。

Goniurosaurus bawanglingensis (China: VU)

Two individuals of different colour patterns were seen foraging along an old logging track in the Yajia area (550m) after rain at Bawangling NNR, Changjiang County, Hainan, on the evening of 17 May. This species was recently described and is only known from the Bawangling area.

■ 眼斑龟 *Sacalia bealei* (全球：濒危；中国：濒危)

3月22日，于广东赤石村的市场上，有一只头上有红色花纹的成年雄龟出售。

Sacalia bealei (Global: EN; China: EN)

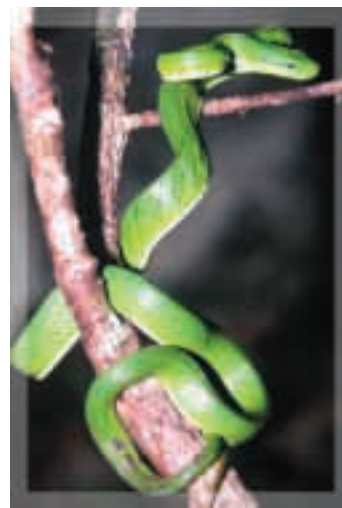
An adult male with characteristic red head markings was offered for sale in Chishi Village, Haifeng, Guangdong, on 22 March.

■ 绿锦蛇 *Elaphe prasina* (中国：易危)

10月13至17日，于海南霸王岭国家级自然保护区东二地区(海拔800-1,000米)的林间小路上看到一条活蛇及两条被辗毙了的蛇。

Elaphe prasina (China: VU)

One live and two road-killed individuals were seen along forested road around the Dong'er area 800 - 1,000m) at Bawangling NNR, Changjiang County, Hainan, on 13 and 17 October.



绿锦蛇 *Elaphe prasina*

刘惠宁摄 Photo By Micheal LAU

鱼类 Fishes

■ 斯氏波鱼 *Rasbora steineri*

3月22日，于广东海丰赤石河的支流里看到不少。该物种亦常见于海南昌江县霸王岭国家级自然保护区雅加地区的溪流中。

Rasbora steineri

This species was common in tributaries of the Chishi River, Haifeng, Guangdong on 22 March. The species is also commonly seen in streams of the Yajia area, Bawangling NNR, Changjiang County, Hainan.

广西金秀及资源县的传统捕鸟方式及对保育的影响

Traditional bird hunting methods and their conservation implications in Jinxiu and Ziyuan Counties, Guangxi

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利用「鸟盆」捕鸟是广西金秀大瑶山茶山瑶民的一种古老而独具特色的民族狩猎方式。这种捕鸟方式始于明代(约公元1500)中期,是长期以来当地瑶民对候鸟资源传统利用的现实反映。「打鸟界」亦是广西资源县传统的夜间捕鸟活动,这种大雾天上山烧火打鸟的活动亦已有几百上千年的历史。然而,这两种捕鸟方式的现状和传统却鲜为人知,笔者于2002年8月至2004年12月到资源县及金秀县多处进行实地调查,结果如下:

茶山瑶民的「鸟盆」的历史传说与现状

大瑶山投放鸟盆的区域主要在金秀县城附近的老山,少部分在罗汉山和莲花山,面积计约3,500公顷。大瑶山是广西境内候鸟迁徙的必经之地,而这一带是候鸟迁徙的重要路线之一,每年秋冬季节,大批候鸟飞来停歇和越冬。林区内有大量植物的果实让候鸟摄食,以补充长距离迁徙飞行所需的能量。利用鸟盆狩猎的瑶民90%以上是茶山瑶民,他们集中居住在大瑶山的中心地区,即如今的金秀县城金秀镇六拉村委的金秀、白沙、六拉、昔地四个自然屯,当地称「金秀四村」。

「鸟盆」捕鸟主要是使用多个水巢(即鸟盆),再用半开竹杆制成的竹笕连接及输送溪水至各个鸟盆,然后在盆中央纵向装上鸟漆棍供鸟站立喝水,鸟漆棍涂上用树皮加工制成的胶,鸟若站在棍上便会被粘著。瑶民常在山区溪流两侧沿山坡或山脊往下行布设约1至3公里之鸟盆线路,鸟盆大约每1至3米安装1个,1条(也称1堂)鸟盆路的鸟盆数量从少的100个到多的1,000个。最先茶山瑶民是在溪流安装鸟漆棍捕鸟,后来才发展到在山上用鸟盆捕鸟。新制的鸟盆一般要过两年以后,盆上长满青苔与周围环境

The use of "bird basins" to exploit the resource of migratory birds is a long-established and distinctive hunting practice among the Chashan clan of the Yao Minority (Chashan Yao, a.k.a. the Proto-Lakkja) in Dayaoshan, Jinxiu County since the mid-Ming Dynasty (around 1500 AD). Meanwhile, bird hunting along "bird hunting lines" has also been carried out for several hundred years on misty nights in the mountains of Ziyuan County. Though these practices have long existed, the current status as well as their history are apparently little known. For that reason, we conducted field studies in these two regions from August 2002 to December 2004 and the findings are summarised here.

The "bird basins" of the Chashan Yao

Bird basins are set up mainly on "Laoshan" a mountain near Jinxiu County Town, along with a few in Luohanshan and Lianhuashan, with a total area of 3,500 ha. These sites are important for migratory birds, which stop over on passage and overwinter at Dayaoshan. The high abundance of fruit trees there provides migratory birds with sufficient food to restore energy depleted by long-distance flight. Ninety percent of bird-basin users are from the Chashan clan of the Yao Minority living deep inside Dayaoshan, in Jinxiu, Baisha, Liula



在鸟盆中,被鸟漆棍粘著的一只白眉鸫
A Eye browed Thrush stuck on the "bird-glue" poles in water basin



一致时，候鸟才喜欢到盆上喝水。

「鸟盆」主要是使用由酸椎、米椎和红椎等木材制作而成，长40至50厘米、宽24至32厘米、高15至20厘米，一般一棵树可制作40至60只左右的鸟盆，鸟盆可以使用15至60年。「鸟漆」是由鸟漆树（冬青科）的树皮加工制成的胶，一般8至10斤树皮可制得1斤鸟漆，而鸟漆树需约20年时间才长到直径20厘米，剥1株才得8至10斤树皮。据瑶民说，为了使有限的鸟漆树能持续利用，当地人一般不把鸟漆树砍倒，而是先把树一侧的树皮剥下，到第二年这边树皮长出后，再剥另一侧。近年随著国家禁止砍伐杂木林，一些瑶民尝试改用水泥或用塑胶桶制作鸟盆，但据他们反映，候鸟不太喜欢在这两种鸟盆喝水，因而鸟获较少。

农历7月中至中秋节前后，瑶民便开始修进山的路和鸟盆路，并根据家人的年庚和生辰每年择日动工。从国庆节后几天起，大多数人家都有人背米、油、盐和被子进山捕鸟，当地瑶民叫「守鸟盆」，每次在山上住的时间为3至5天。立冬前后10天，是候鸟来得最多，捕鸟最「烘」的时间，这段时间瑶民习惯邀亲戚朋友到自家的鸟盆山场共同分享捕到的鸟肉和喝酒庆贺，十分热闹。到农历小雪，鸟盆捕鸟活动基本上收摊，前后历时约1个半月。瑶民将捕获的鸟即时拔毛，清理内脏。鲜鸟肉在山上当天煮妥，但瑶民往往舍不得多吃，会带回家与家人分享或烘成「鸟乾」、腌制成「鸟醃」留以待客或取醃汁做药，据说对治疗痢疾，特别是血痢有特效。

茶山瑶民自觉保护鸟盆区域的山林，并期望鸟果树上结多一些鸟果，使更多的候鸟在这里停歇和越冬，从而使鸟盆狩猎多有收获，密森也有利于在林中进行香菇、芸香草等种植。历经长期的保护，鸟盆区域已形成了独特的自然和人文森林生态景观，与周边其他在秋冬季缺水的高山相比，这种独特的生态环境十分有利于候鸟飞来停歇和越冬。因此，在获得生态与社会经济利益的同时，须权衡打鸟界对鸟（类



在金秀县城市市场上售卖的鸟
Birds on sale at Jinxiu market

and Xidi natural villages administered by Jinxiu Town.

The name "bird basin" refers to the water basins connected to streams by bamboo guttering. To trap birds, poles daubed with glue, extracted and processed from the bark of so-called "bird-glue trees" (mainly *Ilex* spp.), are fixed horizontally inside



在老山上其中一条鸟盆线
One of the bird-hunting lines at Laoshan

the wooden basins; birds that come to rest or drink will be stuck. Basins are distributed along ravines or ridges at intervals of one to three metres. A so-called "basin road" (usually 1-3 km in length) may accommodate 100 to 1,000 basins. The practice started with the use of individual adhesive poles along streams, and gradually developed into the widespread setting of basins on hillsides. Newly-crafted basins usually take two years to become consistent with the surrounding environment (e.g. through the growth of mosses) to attract birds.

Bird basins (40-50 cm long by 24-32cm wide by 15-20cm high) are usually crafted from *Castanopsis* spp. It is estimated that one tree is able to make approximately 40-60 basins of 15 to 60 years' durability, while one catty of glue requires 8 to 10 catties (4-5 kg) of tree bark. The bird-glue trees take 20 years to grow to a diameter of 20 cm dbh, while one trunk can provide 8 to 10 catties of bark. To allow sustainable use, the Yao only strip off the bark from one side of the trunk each year to give the bark some time for growth. In response to the national logging ban, some bird trappers attempted to use concrete basins or plastic buckets instead, but birds apparently seldom visit these 'artificial' basins and hence the harvest has decreased.

Between Lunar July (around August) and the Mid-Autumn Festival (around mid-September) the Yao construct the basin roads on a chosen day (selected according to family members' age and birthday). Most people go hunting a few days after National Day carrying rice, oil, salt and blankets, and the trip usually takes three to five days. Ten days either side of the solar season "Onset of Winter" is the peak time

广西传统捕鸟

种)群的负面影响及其道德操守(鸟类要经历数分钟至一小时的死亡挣扎)。

「打鸟界」的历史传说与现状

桂东北越城岭一带的湘桂走廊，亦是广西境内候鸟迁徙的必经路线。每年候鸟南北迁飞季节，当地山民便会于大雾天的夜间在山冲隘口两侧山岭以烧火和汽灯照明引诱，用带枝的竹竿打鸟，当地人称这地方为「打鸟界」。如今当地政府为保护候鸟，打鸟界已更名为「爱鸟界」，但打鸟界的历史传说及活动仍屡禁不止。

传说始于唐朝(公元618-907)时，在上洞打鸟界的山岭上有一座庵堂，当时有一个尼姑，因香火不旺，生活落泊。在一个小雨雾天傍晚，尼姑上山回来，烧一堆火，忽见有许多鸟冲下，撞到火堆里和墙上，尼姑捉起这些鸟到街上卖，换来油盐、米等生活用



村民亦会安装套索来捕捉鸟类和鼠类
Lassos used for bird and rat catching

品，从此生活得以改善。如今，当年的庵堂遗址还在，在上洞村的北面还有一个村庄叫「庵堂冲」。

资源县的打鸟界主要有四处，第一处是上洞村附近一带的山上；第二处是车田乡粗石村附近的隘门界；第三处是车田乡的鸭头水；第四处是梅溪乡的戈垌坪。在各处打鸟界附近的村庄，许多村民的房前屋后都放有用于打鸟的带枝竹竿。但由于当地政府每年都上山查处，并在市场上没收捕获的鸟类，村民们只能偷偷地上山打鸟。

在打鸟界的山岭上，村民搭起用于晚上打鸟时避风的草棚、支撑鸟网的竹竿、用于打鸟的带枝竹竿和打落的鸟羽、翅膀等随处可见，尤其以上洞打鸟界的场面最大，打鸟范围在2平方公里以上。在大雾天晚上，打鸟界的山岭上都可看见有几十上百盏汽

for bird hunting, when most migratory birds pass through. A celebration party will be held among the trappers with their relatives and friends to share the harvest. Bird hunting usually lasts for one and a half months and ends when the solar season "Little Snow" (November) commences. The Yao immediately



在金秀县城市场上聚集著买鸟和卖鸟的人
People dealing with bird transactions at Jinxiu market

remove all feathers and organs of the birds caught, and cook them whole. However in most cases the flesh is baked or preserved for greeting guests, or producing medicine, believed to cure bloody dysentery.

By protecting the forest habitat, the Yao hope to increase the number of fruit trees to attract more migratory birds to stop over, thus raising the harvest. The forest microclimate also improves the yield of understorey herbs and mushrooms. Thus bird basins have led to the formation of a unique landscape with well-



在鸭头水一屋前，一大堆清理打到的鸟时留下的羽毛，当中大都是鹭科的鸟
Heaps of feathers left after hunting in front of a house at Yatoushui, most of which are egrets

protected vegetation compared to the surrounding arid environment. The negative impact of hunting on bird populations, and ethical concerns over the cruelty involved (birds take a few minutes to one hour to die) must be weighed against ecological and socio-economic benefits.



村民将打到的鸟拿到资源县城的市场上卖，当中大都是池鹭
Villagers selling their harvest, mostly Pond Egrets, in Ziyuan market

灯，但当有外地人走近时打鸟的人都争相逃走。这段时间，打鸟界所在乡镇和县城的许多饭店都收购捕获的鸟，最多的一家一天可收到200多斤。2004年9月20日晚，是鸭头水打鸟界十几年来打得鸟最多的一晚，最少有2,000斤以上。从一些山民捕到的鸟和出售的鸟乾来看，主要是鹭科、秧鸡科的种类，亦有少量鸭科的种类，还有一些猛禽和雀形目的种类。据当地村民介绍，必须是在没有月光和大雾天的晚上，候鸟低空飞行时才能打得到，季节主要在秋季，收获十分不稳定，有时一个晚上才得几只，有时可得上百只，但当地有「十晚九不空，总有一晚挑不动」的说法。

近几年由于有许多外地人的参与和收购，给政府的管理上带来了难题。我们将继续对打鸟界的候鸟和当地山民的猎捕情况进行调查和分析，以使这一区域的候鸟保护得到人们的进一步关注和加强。

也许，假以时日，传统的打鸟方法可以为受危鸟类及其生境保育作借鉴。如云南巍山的鸟道雄关，便引用了大雾天上山烧火打鸟的方法来进行鸟类环志的研究^{1,2}。加深对野生种群状况的认识看来是实践保育的首要工作。（本项目由香港嘉道理暨植物园及世界自然基金会[WWF CHINA]资助）

The "bird hunting lines" at Ziyuan County

The Hunan-Guangxi Corridor in northeast Guangxi is another important migration pathway for birds. During the migration season, villagers attract birds by lighting fires or gas lamps on foggy nights, then strike the birds with bushy bamboos. Despite the strong advocacy of "bird-loving" activities by the local government, bird hunting remains unaffected and has a mythological grip among villagers.

The myth dates back to the Tang Dynasty (618-907 AD) when a nun at Shangdong Village was leading an impoverished life due to a lack of donations. One drizzly and foggy night, she lit a fire after returning from the hills, and suddenly many birds fell down on the fire or collided with the wall. By exchanging these birds for salt, oil and rice, she improved her living conditions. Today the ruins of the nunnery remain in the north of Shangdong Village.

Increasing outsiders' participation has placed the government in a dilemma, with local traditions and wishes pitted against conservation concerns. Current status and impact of hunting on migratory birds should certainly be evaluated to inform decision-making, and there is a clear need to raise public awareness regarding migratory bird conservation.

Perhaps, in time, traditional methods of bird hunting may contribute to conservation of threatened birds and their habitats; at Niaodaixiongguan in Yunnan's Weishan County, for example, the attraction of migratory birds to lights in foggy conditions is today exploited for ringing studies^{1,2}. Improved understanding of the impacts on wild populations seems an essential first step to implementing conservation measures.



打鸟人晚上用来支撑鸟网的竹竿
Bamboo poles used for supporting bird nets

(This project is co-funded by KFBG and WWF China)

广西传统捕鸟

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广西黑叶猴(*Trachypithecus francoisi*)的保护现状

Conservation status of Francois' s Leaf Monkey *Trachypithecus francoisi* in Guangxi

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黑叶猴 (*Trachypithecus francoisi*) 只见于地形复杂, 多峡谷陡壁的地区, 当中以喀斯特石山生态系统为主。黑叶猴仅分布在越南北部的Tuyên Quang省(宣光省)、Bắc Kạn省(北干省)、Cao Bằng省(高平省)和Hà Giang省(河江省)等几个省的局部地区¹、中国西南部的广西壮族自治区西南部、贵州省的西南部、东北部以及重庆市的金佛山、芙蓉江一带(与贵州的北部接壤), 数量稀少, 被列为我国一级重点保护野生动物。据叶智彰²关于亚洲叶猴的起源和扩散的描述, 我们可以推测, 黑叶猴从越南(亚洲的叶猴源于印度亚区)经广西进入贵州和重庆。广西黑叶猴的分布和种群数量的多少对全球黑叶猴的保护起到至关重要的作用。20世纪80年代早期的数量估计表明, 广西黑叶猴种群数量达4,500-5,000只, 分布于23个县^{3,4}。20世纪90年代中期, 黑叶猴的种群数量丢失了一半, 只有2,000至2,500⁵, 种群数量变动很大。90年代后期, 广西黑叶猴的种群数量仍在下降之中, 分布区也在进一步缩小。

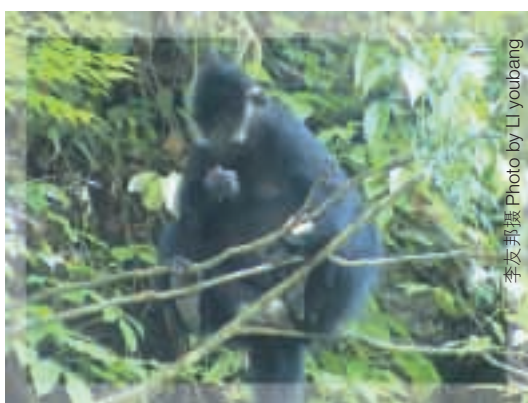
采用查阅县志、访问法和野外实地调查的方法, 我们于2002年3月始全面调查了广西黑叶猴所有分布区并进行了种群数量的估计。调查表明, 由于过去过度的捕猎(合法和非法)和栖息地环境的破坏, 广西分布的黑叶猴种群下降到仅300只左右。它们分布在龙州弄岗国家级自然保护区、大新恩城珍贵动物保护区、大新下雷水源林保护区、扶绥珍贵动物保护区、崇左珍贵动物保护区、隆安龙虎山自然保护区、大明山国家级自然保护区(马山、上林及武鸣交界)、隆林县大洪豹自然保护区、天等县福新乡龙郡村(非保护区)、德保大旺乡念德村(非保

Francois's Leaf Monkeys *Trachypithecus francoisi* (also known as Black Langur) are known only from areas with complex landforms and deep gorges, in particular well-developed karst ecosystems. Francois's Leaf Monkeys occur only in the provinces of Tuyên Quang, Bắc Kạn, Cao Bằng and Hà Giang¹ in northern Vietnam and in parts of southwestern China, including southwest Guangxi, southwest and northeast

Guizhou together with Jinfoshan and Furongjiang in adjoining Chongqing. The Black Langur is rare and is under State Class I protection. Based on Ye Zhizhang's² depiction of the origin and dispersal of Asian langurs, we can deduce that Black Langurs originated in Vietnam (the Asian langur group originated in the Indian sub-continent) and expanded to Guizhou and Chongqing through Guangxi. The Black Langur population halved from 4,500-5,000 in 23 counties of Guangxi in the 1980s^{3,4} to 2,000-2,500 in the 1990s⁵. In the late 1990s, its population was

still on the decline and its range shrinking.

A province-wide survey on the population size of langurs was launched in March 2002 by searching chronicles of different counties, interviewing and conducting field surveys. Due to over-hunting (legal and illegal) and past habitat destruction, the remaining population within Guangxi is only some 300 individuals. They occur at 14 sites in 12 counties, namely Nonggang National Nature Reserve (NNR) (Longzhou County), Encheng Rare and Precious Animal Nature Reserve (NR) and Xialei Headwater Forest NR (Daxin), Fusui Rare and Precious Animal NR (Fusui), Chongzuo Rare and Precious Animals NR (Chongzuo), Longhushan NR (Long'an), Damingshan NNR (at the junction of Mashang, Shanglin and Wuming counties), Dahongbao NR (Longlin), Longjun Village (an unprotected site in Tiandeng County), Niande Village (unprotected in Debao County), Xinxing and Shangming Villages (unprotected in Jingxi County, on the Vietnam border), Gulongshan Headwater NR and Diding Headwater Forest NR (Jingxi County) (Figure 1).



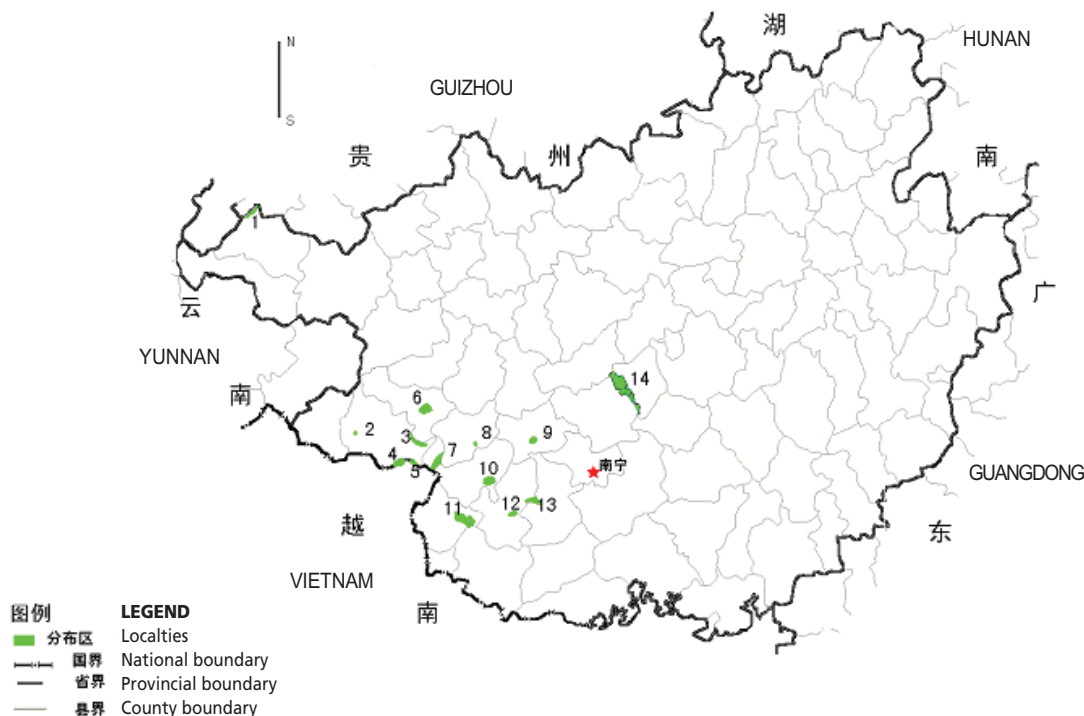
岌岌可危: 身处广西的雌性黑叶猴
Precarious hold: a female Black Langur in Guangxi.

广西黑叶猴

护区)、靖西县湖润镇新兴村和岳圩镇上皿村(越南交界)、靖西县古龙山水源林保护区、靖西县底定水源林保护区等12个县14个分布点(图一)。

这些分布点之间距离相当远,最近的分布点之间(龙州和大新)的直线距离15公里,分布区严重隔离,分布区片断化程度相当严重。在14个分布点中,除了龙州弄岗国家级自然保护区内石山植被是较成熟的阔叶林、人为干扰比较小之外,其他分布点的植被多数被灌丛所取代,栖息环境人为干扰也相当大。在这些分布点中,最大种群数量是75只(弄岗自然保护区),最小的种群仅有4只(底定自然保护区)。任何一个分布点的数量都小于IUCN所规定的最小有效种群的种群数量⁶。因此,就广西范围内的灵

These pockets of distribution are quite distant from one another; the closest (15km as the crow flies) are Longzhou and Daxin and thus the habitats are highly fragmented. Nonggang NNR is the least impacted by human activities with more mature broadleaf forest, whereas vegetation of other sites is degraded to shrubland and habitat damage is serious. The largest population occurs in Nonggang NNR, amounting to 75 individuals, while the smallest is of four individuals at Diding NR. None of the sites meets the minimum size threshold recommended by IUCN⁶. The status of Black Langurs in Guangxi is arguably even more critical than that of White-headed Langurs *Trachypithecus leucocephalus*⁷, whose remaining population is at least concentrated in two potentially viable sub-populations.



广西黑叶猴的最新分布状况

Current distribution of Black Langurs in Guangxi

注: (1) 隆林大洪豹自然保护区; (2) 靖西县底定水源林保护区; (3) 靖西县古龙山水源林保护区; (4) 靖西县岳圩镇上皿村; (5) 靖西县湖润镇新兴村; (6) 德保大旺乡念德村; (7) 大新县下雷水源林保护区; (8) 天等县福新乡龙郡村; (9) 隆安县龙虎山自然保护区; (10) 大新县恩城珍贵动物保护区; (11) 龙州弄岗国家级自然保护区; (12) 崇左珍贵动物保护区; (13) 扶绥珍贵动物保护区(昌平); (14) 大明山国家级自然保护区。

Key: (1) Dahongpao NR (Longlin); (2) Diding Headwater Forest NR (Jingxi); (3) Gulongshan Headwater NR (Jingxi); (4) Shangming Village (Jingxi); (5) Xinxing Village (Jingxi); (6) Niande Village (Debao); (7) Xialei Headwater FR (Daxin); (8) Longjun Village (Tiandeng); (9) Longhushan NR (Long'an); (10) Encheng Rare and Precious Animal NR (Daxin); (11) Nonggang NNR (Longzhou); (12) Chongzuo Rare and Precious Animal NR (Chongzuo); (13) Fusui Rare and Precious Animal NR (Changping, Fusui); (14) Damingshan NNR (Mashan, Shanglin and Wuming).

长类保护而言，黑叶猴的保护问题似乎比白头叶猴 *Trachypitecus leucocephalus* 的保护问题更严峻⁷，因为后者比前者分布更集中，任何一个亚种群都是一个可持续种群。

在广西黑叶猴分布的这14个地区中，受威胁程度也有相当大的差别。天等县福新乡龙郡村(非保护区)、靖西县底定水源林保护区、隆林县大洪豹自然保护区、崇左珍贵动物保护区、靖西县湖润镇新兴村和岳圩镇上皿村(越南交界)、大新下雷水源林保护区、靖西县古龙山水源林保护区、龙虎山自然保护区等几处分布区所受的威胁程度最大，这些分布区的黑叶猴活动范围内人口密度大，亚种群都很小，有的亚种群分布范围内的植被受到严重的破坏。这些黑叶猴对环境变化更为敏感。因此，必须建立一个完善的种群监测系统对这些黑叶猴进行跟踪监测，出现任何不利的人为干扰或环境变化时，可以及时作出相关的执法或保护行动，必要时更可以考虑迁地保护措施以保存这珍贵的物种。相对而言，龙州弄岗国家级自然保护区、大新恩城珍贵动物保护区、扶绥珍贵动物保护区、大明山国家级自然保护区、德保大旺乡念德村等分布点中的黑叶猴就较安全，这些分布区的黑叶猴亚种群都超过了30只，分布区的栖息地保护相对完整，为黑叶猴保存了较好的栖息环境；更重要的是这里的人为猎捕现象已经基本上没有了。举例说，2001年，弄岗国家级自然保护区楞垒村的两头黑叶猴因受追踪器的噪音干扰而袭击村民，受伤的村民却未有还击。(Huang, 2004, 投稿中)。此外，自2001年起，一群9只的黑叶猴便生活于扶绥保护区中华村约200米以外的地方，他们亦没有被猎杀。1999年，中国政府开始没收私枪，并取得显著成效。非法持枪会被依法处分，因此，村民有也不敢公然使用私枪。

综上所述，广西黑叶猴的保护措施面临迁地保护和就地保护的抉择。但广西黑叶猴的保护问题仍以就地保护为主。究其原因：第一、对广西野生黑叶猴捕猎已经基本上停止，随著保护力度的加大，非法捕猎可以在更长的时期内受到抑制；第二、我们对扶绥一群黑叶猴为期4年的数量动态监测研究表明，2001年数量只有4只，2002和2003年又各自有2只和3只出生，黑叶猴的数量增长速度还是比较快的；第三、广西西南地区沼气池建设的推广改变农村的能源结构，减少了对石山森林植被的依赖；第四、广西黑叶猴栖息的石山山脚部分相当面积已经退耕还林，不久以后有望改变这些栖息环境的质量，使分布区之间的黑叶猴个体交流更加容易。

广西自然保护区网路并未覆盖现有广西黑叶猴的所

These 14 sites greatly vary in the extent of threats. Longjun Village (an unprotected site), Diding NR, Dahongpao NR, Chongzuo NR, Xinxing and Shangming Villages, Xialei NR, Gulongshan NR and Longhushan NR are the most threatened; these areas are characterized by a high human population with small langur sub-populations, and habitats seriously degraded. Since Black Langurs are very sensitive to environmental changes, a comprehensive monitoring system must be used to keep track of them, so that immediate enforcement and conservation actions can be taken whenever there are any unfavourable human disturbances or environmental changes. If necessary, ex-situ conservation could be considered. In comparison the situation for populations in Nonggang NNR, Encheng NR, Fusui NR, Damingshan NNR and Niande Village is less bleak; each has a population size of more than 30 individuals, and their habitats are in better condition. More importantly, langur hunting seems to have ceased. For instance, in 2001 two Black Langurs near Lenlei village of Nonggang NNR attacked villagers having been agitated by the noise produced by a radio telemetry device, but the villagers took no revenge (Huang, 2004, in prep.). A Black Langur group of nine has been living near Zhonghua Village 200m outside Fusui NR since 2001, but no hunting has been reported. In 1999, the Chinese government began to confiscate private guns and has achieved impressive results; those who own illegal guns will be punished by law and seldom do people dare to use the guns even if they still own them.

The above findings raises a choice between in-situ and ex-situ conservation as the primary means of protecting these monkeys. The former seems preferable for the following reasons. First, hunting of Black Langurs is apparently disappearing in Guangxi, and it will be kept under control before long with increased conservation efforts. Second, a four-year study of population dynamics of leaf monkeys at Fusui revealed that the potential growth rate of Black Langurs is high: in 2001, only four individuals remained, yet two and three babies were born in 2002 and 2003 respectively. Third, construction of biogas pits to promote alternative energy use is likely to reduce the public reliance on limestone forest vegetation. Last, the "Green for Grain" programme has been extensively carried out in the limestone habitats of leaf monkeys, whose quality hopefully will soon be improved to facilitate individual exchange between different habitat pockets.

Since not all of Guangxi's Francois's Leaf Monkeys live in habitats protected by nature reserves, extending the network of nature reserves is of high priority. The site in Debao County is being proposed as a nature reserve, which will favour the langurs if established. Recently, the primate populations of Yuexu Town to Renzhuang Town along the Vietnamese border are gaining increased attention from conservationists, and establishment of a trans-boundary nature reserve would provide a safer habitat for all primates this area supports.

Captive breeding of Black Langurs has long been a hot research

有种群,因此,加快保护区网路的建设也是保护这些黑叶猴的重要举措。德保县黑叶猴保护区正在申报之中,促成这一保护区的建立更有利保护这里的黑叶猴;岳圩镇到壬庄乡与越南交界的灵长类资源也开始受到重视,跨国自然保护区的建立将为栖息于这里的黑叶猴(包括其他灵长类动物)提供更安全的栖息地。

然而,到目前为止,对黑叶猴研究更多的是室内饲养繁殖的研究^{7,8,9,10,11},广西黑叶猴野外研究的生物学资料相当少^{12,13,14}。可喜的是,广西黑叶猴的研究已经得到了科学工作者的重视。野外黑叶猴的行为生态学研究、栖息地选择、食物选择、栖息地植被特徵等研究已经开展或部分完成;黑叶猴遗传多样性的研究也已经开始;此外笼养黑叶猴繁殖周期激素水平的研究也在进行。这些研究成果的取得将弥补广西黑叶猴研究中的许多空白,为如何根据黑叶猴的生物学特性来制定有效的保护措施和为野生种群的恢复和壮大提供科学的依据。

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topic^{7,8,9,10,11}, whereas the field ecology of Black Langurs is poorly understood as only a few surveys^{12,13,14} have been undertaken. Encouragingly, researchers' concern over langurs has gradually increased as field studies of their behavioural ecology, habitat selection, feeding choices, characteristics of habitat vegetation and genetic diversity have been launched or partially finished. Meanwhile research on the hormone levels during breeding cycles have been initiated on captive langurs. These can not only fill in the gaps in knowledge, but also serve as a solid foundation in the effective protection, recovery and expansion of the wild population.

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何 谓 成 功 ？

What does success look like?

易绍良、留佳宁及林芷薇译

现时保育界可干的大事之一是要重新为「成功」下定义。社会种种与数字挂钩的情况屡见不鲜，可惜的是，大家早已欣然接受事物的客观数值等同其内在价值。国民生产总值(GNP)是最佳例证，它仅以经济增长为计算基础，却把成就我们人类的其他成功要素，如空气质素、水质、公民教育及医疗系统等通通抹煞。换言之，我们计算经济增长，那么经济增长便是我们唯一的目的。同样地，若只以可保育的面积及可筹得的金钱这些单位来衡量土地保育，只会令保育土地的重要性与价值大幅下降。

西方史哲托马斯·巴利(Thomas Berry)曾说过：「这一切都和『故事』有关。我们现在陷入困境，正是因为拿不出一个好故事。我们正处于两个时代的转接点，上一代的经典已时移世易不适用了。」那么现在一起就让我们开创先河，缔造新的经典故事。这个新故事的主角是追求心灵合一的优质生活——一个新的美国梦。保育工作是这位主角冀盼能藉以走向美满结局的路径。而向我们讲故事的，是所有勇于与地上万物共享博爱、勇于追求天人合一的融和关系的人们。我们且看看林·雪尔洛(Lynn Sherrod)细诉她与燕巴谷(Yampa Valley)的沙丘鹤一同生活的经历：

外形庞大的沙丘鹤是很害羞的一种鸟，外人都不易接近它们。某天早上，我闲著没事，打算跟丈夫做杂务来打发时间。他当时正在草地上修理电围栏的太阳能充电器。那时我听到两只鹤——它们终生配对——它们在对唱，我最爱在夏天的清晨听见这种萦绕不断的急速鸣叫。我们经常把窗户打开，它们

One of the most important steps that the conservation community can take is to redefine notions of success. Our society's fixation with numbers isn't unusual, but it should be readily apparent by now that one tends to become what one measures. The perfect example of this is the degree to which our gross national product - a calculation based entirely on economic growth - tends to significantly diminish our own estimation of other attributes that might make us successful as a people, attributes like the quality of our air and water, the education of our citizens, the state of our healthcare system. We measure economic growth; therefore economic growth is our primary purpose. Likewise, the purpose and value of land conservation is significantly diminished when it is measured only in terms of acres saved and dollars raised.

The cultural historian Thomas Berry wrote, "It's all a question of story. We are in trouble now because we don't have a good story. We are in between stories. The old story is no longer effective." So let us now begin the exciting work of creating and telling that new story. The protagonist is the yearning for a better life - a new American dream - that lies within the human heart and soul. Conservation is the pathway along which our protagonist hopes for a good and noble conclusion. And the storytellers are all the people who have risked entering into a shared sense of love, a shared sense of an evolving and maturing relationship with all of the inhabitants of the land. Lynn Sherrod tells us her story about living among the sandhill cranes of the Yampa Valley:

Sandhill cranes are very, very shy and they're very hard to get close to. And they're really big birds. One morning, I just wanted to hang out with my husband so I went out on chores with him. He was over in the field working on a solar charger for the fence line. Then I heard two

何谓成功

的叫声便成了我早上起来听到的第一把声音，也是毕生听过最特别的。尤其是当叫声在山谷造成回音，实在美妙！我能听到它们对唱全归功于Del，他就 在山谷不远处。他虽然没有看见这些鸟，但我看着他 从两只鹤的中间走过，与它们相距大概只有15尺。两只鸟并没有飞走的意欲，反而在继续对唱。Del就是那么低调的默默干活，他已成为环境的一部份，是万物「共生」的写照。于我而言，这就是生活。

我们对地球的关爱应如同对待自身心灵那样。因此土地保育工作若要论成效，亦应顾及自然及文化两方面。从事保育工作的人，我们处理地球上的环境问题一直都采取「拯救」土地或立法等技术上、政治上的解决方案。这些方案都有必要，但又算不上是长远之策。而土地保育在道德上又应肩负何种责任呢？我们应重新审视对土地保育的冀盼，乃保卫世上一切值得珍爱的事物。要把这份冀盼对现，不能单靠数算保护了多少地，关键在于能汇聚多少人对大地的爱与尊重。我们最大的成就，将不在于能宣布「我们保住了这片土地」，而在于能说：「你属于这里」。土地保育应是大地之魂与文化结合的故事，它重覆地提点我们人类在大地上的角色。

节译自彼德·富比斯的《The Great Remembering: Further Thoughts on Land, Soul, and Society》(2001, The Trust for Public Land, San Francisco, California, USA).

cranes - they mate for life - and they were calling back and forth to each other and they have this real kind of haunting rattling cry and I love it in the morning in the summertime. We always have our windows open and it's the first thing I hear every morning and to me that will be one of the most special sounds of my entire life. Especially as it echoes across the valley. It's beautiful. And I could hear these two cranes calling to each other because Del was near their space. And he couldn't see them but I watched him walk right through the middle of them, and they were probably only fifteen feet apart. Neither one of them ever flew; they kept calling back and forth. Del was so low-key, doing his work slowly, he was so much a part of what they were used to that they all co-existed. To me, that's what it's all about.

Our concern for the Earth should be the same as our concern for our own heart and soul. This is why land conservation must search to see the results of its labor in both nature and culture. Our struggle as conservationists is that we have consistently responded to the Earth's cry for help with technical or political solutions such as "saving" land and passing new laws. While it is clear that we must do these things, it is also clear how inadequate they are as lasting solutions. What then is the moral response that land conservation must make? I believe it is to rethink the promise of land conservation as the defense of all things worth loving in this world. This aspiration for land conservation will be not reached alone by how much nature we can put aside, but by how much love and respect for the land we can engender in the greatest number of people. Our greatest achievement is not being able to say "we saved this place," but being able to say, instead, "you belong here." Land conservation can become the story of how the soul of the land became the soul of our culture, signaling over and over our place in the world.

Excerpted with kind permission from The Great Remembering: Further Thoughts on Land, Soul, and Society by Peter Forbes (2001, The Trust for Public Land, San Francisco, California, USA).

《森林脉搏》投稿须知

范畴

《森林脉搏》由嘉道理农场暨植物园中国项目出版，每年两期，为致力从事华南地区自然保育人士报导环保资讯，提供讨论及交流渠道，藉以启发读者。《森林脉搏》的内容题材包罗森林和生物多样性各个保育范畴，尤以改善资源管理与减少威胁为报导主题。凡从事相关保育的工作者、森林管理人员、科研人员及顾问等都欢迎投稿。

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Author guidelines for *Living Forests*

Scope

Living Forests magazine is published twice a year by the China Programme, Kadoorie Farm and Botanic Garden. It aims to inform, inspire and serve those dedicated to nature conservation in the South China region, providing a platform for discussion and information exchange. *Living Forests* publishes material on all aspects of forest and biodiversity conservation, particularly with the potential to improve management and reduce threats. We welcome submissions by forest managers, researchers, advisers and practitioners with related objectives.

Content

1. Articles

Feature articles (1,000-1,200 words) and short articles (500 words), with photographs, are invited on topics relevant to the magazine's focus in South China.

2. Letters

Contributions (generally <500 words) in response to material published in previous issues of the magazine.

3. Notices and news

Items (generally <500 words) concerning recent developments in conservation or important announcements, other than from published sources. Other items of interest include news of the availability of grants or funding opportunities, and announcements of relevant meetings, workshops and conferences.

4. Recent publications

Brief announcements of new publications and book reviews. Authors and publishers are invited to send publications to the Editor for potential review. Reviews of recent books are also welcomed; prospective reviewers are advised to consult the Editor in advance.

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