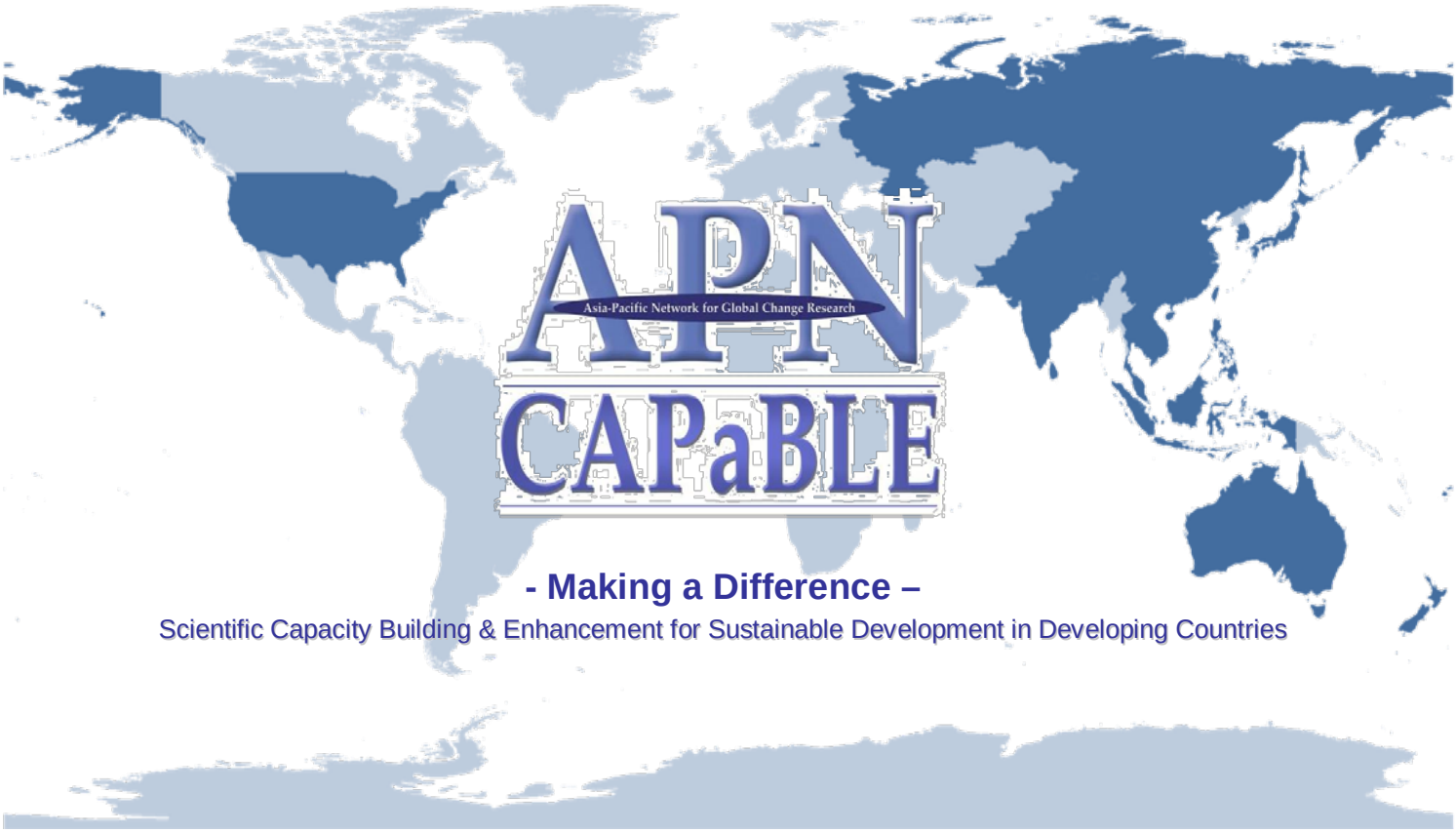
FINAL REPORT for APN PROJECT
Project Reference: CBA2010-03NSY-Indrawan



Developing the Capacity for Teaching Biodiversity and Conservation in the Asia-Pacific Region

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Developing the Capacity for Teaching Biodiversity and Conservation in the Asia-Pacific Region

Project Reference Number: CBA2010-03NSY-Indrawan
Final Report submitted to APN

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OVERVIEW OF PROJECT WORK AND OUTCOMES

Minimum 2pages (maximum 4 pages)

Non-technical summary

In the Asia-Pacific region many young researchers working on biodiversity conservation and related sustainable development issues have limited opportunities to obtain quality field-based training or exposure to modern analytical techniques. The problem is self-reinforcing because faculty in regional developing country institutes have rarely received adequate training themselves, and thus lack the knowledge to teach advanced courses. Through this project we strove to break this negative feedback cycle by giving junior faculty and researchers high-level training in biological field research and data analysis. We taught a six-week field course, a six-day experimental design and data analysis course, and a one day scientific paper writing course. In addition, we established a website for future management of the program (www.pfs-tropasia.org) and a web-based alumni network so that opportunities of future collaboration and scientific exchange are realised.

The project successfully ran the training activities as described in the proposal and therefore met its primary aim, namely to teach advanced courses on topics related to environmental resource management through training junior faculty (and researchers) in modern field research methods and data analysis, and to increase the capacity of institutions in regional developing countries to conduct research on environmental issues

Objectives

AIMS:

> to teach advanced courses on topics related to environmental resource management through training junior faculty in modern field research methods and data analysis, and to increase the capacity of institutions in regional developing countries to conduct research on environmental issues, and.

OBJECTIVES:

1. To deliver a six-day workshops on Experimental Design and Data Analysis
2. To deliver a one-day workshop on Scientific Writing
3. To deliver a six-week field course on Biodiversity, Conservation and Sustainable Development
4. To develop a web-based alumni network for course participants, so that opportunities for future collaboration and academic exchange can be realised

Amount received and number years supported

The Grant awarded to this project was:
US$ 33,190 for Year 1: 17 May 2010 - 16 May 2011

Activity undertaken

1.1. Six day workshops on Experimental Design & Data Analysis
1.2. One day workshop on Scientific Paper Writing
1.3. Six week field course on Biodiversity, Conservation and Sustainable Development
1.4. Establishment of Program website and alumni forum

Results

1.1. Six-day workshop on Experimental Design & Data Analysis

The workshop was held at the Bali Botanic Gardens 12-15 July 2010, and attended by 29 participants from 11 countries.

1.2. One-day workshop on Scientific Paper Writing

The workshop was held at the Bali Botanic Gardens (16 July 2010) and attended by 32 participants from 10 countries.

1.3. Six week field course on Biodiversity, Conservation and Sustainable Development

The field course was held at Alas Purwo National Park, East Java (25 Jul-14 Aug), Baluran National Park, East Java (15 – 18 Aug.), Rinjani National Park, Lombok (19 Aug-31 Aug), and Bali Botanic Gardens (1-4 Sep). The course was attended by 20 participants from 11 countries.

1.4. Program website

To realise the opportunities for developing a sustainable training program for the region a website was set up that both serves to advertise program activities and handle the application process.

Relevance to the APN Goals and Science Agenda, Scientific Capacity Development and Sustainable Development

Improved environmental resource management in the region will depend on having new cohorts of well-trained local scientists, in both academic and managerial positions, motivated to develop research projects, apply research findings to environmental problems, and engage in environmental issues. The courses covered themes (1), (2) and (3) in the APN science agenda, the project is directly related to capacity building, and is sustainable because it involves training the trainers

Self evaluation

The project can claim to have been very successful in running the workshops and pursuing the long-term goal of establishing a sustainable training program in the region, as can be seen through the program website.

Potential for further work

Further discussions between interested parties have been held, both directly as a result of the project and through related activities. The Program for Field Studies in Tropical Asia office, currently supported by XTBG, has prepared a proposal for submission to potential consortium partners including both the World Agroforestry Institute (ICRAF) and the Center for International Forestry Research (CIFOR).

Publications

The outputs of media outreach included a one full-page special report at *the Jakarta Post* (three articles, 14 Aug. 2010), one full-page coverage at a national newspaper, *Koran Jakarta* (two articles, 7 Sept. 2010), a national news agency online, *Antara News* (W. Jawa, E. Jawa, Bali, W. Sumatera, respectively 15 Aug., 16 Aug., 3 Sept. and 7 Sept. 2010), and a half page coverage at a local newspaper, *Radar Banyuwangi* (two articles, 2 Sept. 2010). As a matter of course, the media coverage increases public attention at local and national quarters towards the importance of research for decision making, and the importance of the local park sites for the conservation of biodiversity.

The participants of the six-week fieldcoruse are also currently polishing their reports for inclusion in a *Proceedings* report. We anticipate that a number of the reports will be submitted to peer reviewed journals and two have already been presented at international conferences. We are also preparing a manuscript for submission to *Journal of Education for Sustainable Development* on the experience of running the field course.

References

NA

Acknowledgments

All participants of the courses are appreciated for admirable persistence in completing the courses.

The organizers thank Ms. Liana Bratasida and Dr. Erna Adiningsih, the Indonesian NFP and SPG, respectively, as well as Dr. Adi Basukriadi of Universitas Indonesia (UI), for inputs and endorsements of this project. Further institutional support from the UI was delivered through the offices of Dr. Luthfiralda Sjahfirdi, and Mr. Supriatna.

Thanks are due to the international scientists whom freely provided time and expertise in support of the courses.

Matching funding and in-kind contributions was provided by diverse institutes, including Xishuangbanna Tropical Botanic Garden, ICRAF (World Agroforestry Institute), Tunghai University (Taiwan), and several of the overseas participants for the workshops who paid course fees.

In addition, all the promised in-kind support from Indonesian institutions were delivered. The heads of national parks, namely Mr. Hartono (Alas Purwo), Mr. Indra Arinal (Baluran), and Mr. Purwantono (Rinjani) facilitated and mobilized crucial field support. The Bali Botanic Garden – Indonesian Institute of Sciences, represented by Dr. Bayu Adjie and his team provided facilities for the workshops. Lecturers from Universitas Gadjah Mada made worthwhile contribution toward the entire length of the courses.

Last, but not least, appreciation is conveyed to the team members of APN, all of whom have been particularly helpful throughout this project.

TECHNICAL REPORT

Minimum 15-20 pages (excluding appendix)

Preface

The primary aim of the project was to "*develop the capacity to conduct research on environmental issues and to teach advanced courses in topics related to environmental resource management in the Asia Pacific Region".* It was a collaborative effort between the Universitas Indonesia – Center for Biodiversity Strategies and the Asia Pacific Chapter of the Association for Tropical Biology and Conservation and its partners that ran training workshops during the summer of 2010. Three workshops were run in total: (i) Experimental Design & Data Analysis (6 days), Scientific Paper Writing (1 day), and Field course on Biodiversity, Conservation and Sustainable Development (6 weeks). Supporting organizations were Asia Pacific Network for Global Change Research. Xishuangbanna Tropical Botanic Garden, Universitas Gadjah Mada, ICRAF (World Agroforestry Institute), Tunghai University (Taiwan). Local institutions of the Government of Indonesia provided respective in-kind contributions: The National Park Agencies of Alas Purwo, Baluran, and Rinjani, and the Bali Botanic Garden. Resource staff from a variety of both regional and further afield institutes provided teaching on a voluntary basis.

In accordance to the contract, the program documented by this report commenced within the period of 17 May 2010 - 16 May 2011

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1.0 Introduction

Improved environmental resource management in the region will depend on having new cohorts of well-trained local scientists, in both academic and managerial positions, motivated to develop research projects, apply research findings to environmental problems, and engage in environmental issues. However, students in developing countries have few opportunities to get high quality training in field research and data analysis. The problem is self-reinforcing, because faculty have rarely received adequate training and thus lack the knowledge to teach advanced courses. Through this project we aimed to break this negative feedback cycle by providing high-level training in biological field research and data analysis for students in junior faculty positions.

The courses covered themes (1), (2) and (3) in the APN science agenda and were directly related to capacity building. It was also sustainable because it involved training the trainers, that is junior faculty from regional research institutes.
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2.0 Methodology

The teaching and training activities were ran as described in the proposal, all towards meeting its primary aim, namely to increase the capacity of institutions in regional developing countries to conduct research on environmental issues and to teach advanced courses on topics related to environmental resource management through training junior faculty in modern field research methods and data analysis. The activities encompassed both field courses and shorter workshops: (i) Workshop on Experimental Design & Data Analysis; (ii) Workshop on Scientific Paper Writing; (iii) The field course on Biodiversity, Conservation and Sustainable Development. In addition, as described in the proposal, we established a program website including an alumni forum. To foster value added impact, media outreach was conducted throughout the activities.

Details on the specific course materials, etc. are given in the Appendices as described below.

3.0 Results

3.1. The Workshop on Experimental Design & Data Analysis

VENUE & SCHEDULE:—The workshop was held at the Bali Botanic Gardens 12-15 July 2010.

COURSE SYLLABUS:— The workshop was divided into a *Basic* and *Advanced* classes and was designed as a statistics course for non-mathematicians. The course involved both lectures and practical sessions using real-life datasets. The practical sessions were taught using the open-source software R; thus empowering the participants to use one of the most advanced statistical packages available and one that is entirely free. The outline of the course given in Appendix 1.

COURSE PARTICIPANTS:— The lectures were attended by 29 participants from 11 countries (Table 1).

Table 1. List of participants: Experimental Design and Data Analysis (12-15 Jul Bali Botanic Garden)

Name	Country	Gen.	Course	Fellowship
Thasun Amarasinghe	Sri Lanka	M	Advanced	Yes
Sayam Chowdhury	Bangladesh	M	Basic	Yes
Sinlan Poo	Singapore	F	Advanced	No
Dossa Gbdadamassi	Benin	M	Basic	Yes
Zhang Yuan	China	F	Basic	Yes
Nilam Wulandari	Indonesian	F	Basic	Yes
Lan Qie	Singapore	F	Advanced	No
Elly Yanah Arwanih	Indonesia	F	Basic	Yes
Warin Wannapraproti	Thailand	F	Basic	Yes
Wang Gang	China	M	Advanced	Yes
Brett Scheffers	Australia	M	Advanced	No
Junbin Zhao	China	M	Advanced	Yes
Aditya Hani	Indonesia	M	Basic	Yes
Frida Sidik	Indonesia	F	Basic	Yes
Anne Devan-Song	Singapore	F	Basic	No
Dini Farkah	Indonesia	F	Advanced	Yes
Erwin Brunio	Philippines	M	Advanced	Yes
Umilaela	Indonesia	F	Advanced	Yes
Phetprakhai Wonkson	Thailand	M	Advanced	Yes
Loren Bell	USA	M	Basic	No
Lip Khoon Kho	Malaysia	M	Advanced	Yes
Augustin Orou	Benin	M	Basic	Yes
Sandy Nurvianto	Indonesia	M	Advanced	Yes
Indriani Ekasari	Indonesia	F	Advanced	Yes

Subekti Sulistawati	Indonesia	F	Advanced	Yes
Sherryl Paz	Philippines	F	Basic	Yes
J Berton C Harris	Australia	M	Advanced	No
Pongthep Suwanwaree	Thailand	M	Advanced	Yes

RESOURCE STAFF:—The syllabus for the *Basic* course was developed by Dr Jason Tylianakis (University of Canterbury, New Zealand) (Appendix 1). Dr Tylianakis teaches regular courses in "Statistics for biologists" and "Regression modelling" for undergraduates, and has previously taught this course for the ATBC AP. Dr Rhett D. Harrison (XTBG) taught the *Basic* course assisted by Mr Junichi Fujinuma (Hokkaido University, HU). Meanwhile, Dr Soumya Prasad (Indian Institute of Science, IIS) taught the *Advanced* course, assisted by Dr Raman Kumae (IIS), which was based on courses developed by IIS. The Advance Course introduced student already familiar with linear modeling to broader set of statistical philosophies, in particular maximum likelihood estimation, model comparisons and averaging, and Bayesian statistics. It also introduced students to multivariate statistics.

3.2. The Workshop on Scientific Paper Writing

VENUE & SCHEDULE:—The workshop was held at the Bali Botanic Gardens (16 July 2010).

COURSE SYLLABUS AND RESOURCE STAFF:— The course involved lectures with topics including: science paper writing, ethics of publishing, choosing a journal, manuscript submission (all given by Dr Rhett Harrison, XTBG), "How to publish in high impact journals" (Dr Vojtech Novotny, Czech Academy of Science), "Message box: A personal experience of scientific publishing" (Dr Geroge Weiblen, University of Wisconsona), lessons learned from a peer reviewed journal in Indonesia (Mr Mochamad Indrawan, UI), poster presentations and conference talks (RH)

COURSE PARTICIPANTS:— The lectures were attended by 32 participants from 10 countries (Table 2).

Table 2. List of participants for the Scientific Paper Writing workshop (16th July)

Name	Country	Gen.	Fellowship
Lalaina Cynthia	Madagascar	F	Yes
Atus Syahbudin	Indonesian	M	No
Subekti Sulistyawati	Indonesian	F	Yes
Sutomo	Indonesia	M	No
Dini Fardila	Indonesia	F	Yes
Sherryl Lipio-Paz	Phillippines	F	Yes
Thasun Amarasinghe	Srilanka	M	Yes
Erwin Brunio	Philippines	M	Yes
Umilaela	Indonesia	F	Yes
Elva Gemita	Indonesia	F	No
Pongthep Suwanwaree	Thailand		Yes
Dewi Lestari	Indonesia	F	No
M Kadek Erosi Lindadartha	Indonesia	F	No
Luthfiralda Sjahfirdi	Indonesia	F	No
Mufti P Patria	Indonesia	M	No
Zhao Junbin	China	M	Yes
Loren Bell	USA	M	No
Wang Gang	China	M	Yes
Dyan M.S. Putri	Indonesia	F	No
Tri Warseno	Indonesia	M	No
Angga Prathama Putra	Indonesia	M	Yes
Elly Yanah Arwanih	Indonesia	F	Yes
Zhang Yuan	China	F	Yes

Phetprokhai onkson	Thailand	F	Yes
Warin Wannapraptibi	Thailand	F	Yes
Nilam F Wulandari	Indonesia	F	Yes
Indriani Ekasari	Indonesia	F	Yes
Orru Matilo T.B. Agustin	Benin	M	No
Sayam Chowdhury	Bangladesh	M	Yes
Adesa Ghadamasi G.O.	Indonesia	M	No
Ni Putu Sri Asih	Indonesia	F	No
Tuah Malem Bangun	Indonesia	M	No

3.3. The field course on Biodiversity, Conservation and Sustainable Development

VENUE & SCHEDULE:—The field course was held at Alas Purwo National Park, East Java (25 Jul-14 Aug), Baluran National Park, East Java (15 – 18 Aug.), Rinjani National Park, Lombok (19 Aug-31 Aug), and Bali Botanic Gardens (1-4 Sep).

RESOURCE STAFF:—The field course was taught by international experts, who each gave a 2-3 day module based on their own research field. This ensured that the participants received the most advanced training possible in each topic covered. In addition, Dr Rhett D. Harrison (XTBG) coordinated the course assisted throughout by Mr Junichi Fujinuma (HU).

COURSE SYLLABUS:— The philosophy behind the syllabus is that for each topic the students should learn directly from experts in the field, and then have the opportunity to apply the lessons learnt in developing their own research ideas; thus gaining first-hand research experience in the topics covered. Resource staff each teach a 2-3 day module based both on classroom lectures and field-based exercises. A strong emphasis was placed on the development of research questions and hypotheses, appropriate experimental / sampling design, and the data analysis and write up. The participants developed and conducted two short research projects during the course, which was subsequently analysed and written up during the course.

The specific topics selected for the earlier part of the course provided advanced training in ecology and other biodiversity related fields. A module at the end of the course focused on global change and the consequences for conservation and sustainable development. However, it should be noted that there was a strong focus on global change and environmental resource management throughout the course. In addition the course made maximum use of the location by studying biomes on either side of Wallace's line, a major

biogeographical divide. This enabled the students to appreciate the importance of evolutionary history in understanding ecosystems and their responses to global change.

On the final day of the course these projects were presented at the Bali Botanic Gardens. The course participants gave oral presentations of their short research projects to an invited audience, including several members of the local media. Participants are currently revising their written papers for inclusion in the course *Proceedings* and we hope to publish several of the papers in peer reviewed journals.

A summary practical report of the course has been published (Developing the Capacity for Teaching Biodiversity and Conservation in the Asia-Pacific Region. *Asia Pacific Network for Global Change Research Science Bulletin* 1: 62), and we are also preparing a manuscript for submission to *Journal of Education for Sustainable Development* on the experience of running the field course

COURSE PARTICIPANTS:— The course was attended by 20 participants from 11 countries (Table 3).

Table 3. List of participants for the Biodiversity, Conservation and Sustainable Development Field course (25 Jul – 4 Sep)

Name	Country	Gen.	Fellowship
Thasun Amarasinghe	Sri Lanka	M	Yes
Sayam Chowdhury	Balgladesh	M	Yes
Dossa Gbdadamassi	Benin	M	Yes
Zhang Yuan	China	F	Yes
Indriani Ekasari	Indonesia	F	Yes
Tharanga Aluthwattha	Sri Lanka	M	Yes
Sherryl Paz	Philippines	F	Yes
Wanlop Chutipong	Thailand	M	Yes
Phonevilay Sichanthongthrip	Laos	F	Yes
Haiying Yu	China	F	ICRAF
Ekananda Paudel	Nepal	M	ICRAF
Dalivanh Samontry	Laos	F	Yes
Teng He Huang	Taiwan	M	Tunghai Uni

U Gemring Jungkum	Myammar	M	Yes
Medha Baskara	Indonesia	M	ICRAF
Asep Ayat	Indonesia	M	ICRAF
Elly Yanah Arwanih	Indonesia	F	Yes
Ni Putu Diana Mahayani	Indonesia	F	Yes
Angga Putra	Indonesia	M	Yes
Niki Kurniawati	Indonesia	F	Yes

3.4. Program website

To realise the opportunities for developing a sustainable training program for the region a website was set up that both serves to advertise program activities and handle the application process. The website was used for the courses funded by the project. Networking and future collaboration among alumni are promoted through an associated alumni site, with discussion fora and help rooms. The website is hosted by XTBG for the program and has already been used for a subsequent field course run in Yunnan and another statistics workshop that was held in conjunction with the ATBC AP meeting in Bangkok 2011.

4.0 Discussion

4.1. Comments and feedbacks to the training courses

Experimental Design & Data Analysis

Both the Basic and Advanced courses received high praise from the participants, with very little in the way of substantiative suggestions to do things differently. We very much hope that we will be able to hold both Basic and Advanced workshops in association with the regional meetings of the ATBC AP chapter. Through lack of sufficient funds unfortunately we were not able to run the Advanced course in the most recent workshop in Bangkok in March 2011.

Scientific Paper Writing

Feedback on this workshop was good. However, we believe it would be improved to have participation from 2-3 resource staff and include practical exercises over a 2-3 day workshop, instead of the 1 day course as run.

Field course on Biodiversity, Conservation and Sustainable Development

Biologists from around the globe committed their time and expertise as resource staff, offering lectures and hands-on training in their field of expertise, including: plant taxonomy and collecting, biodiversity and carbon (Ferry Slik—XTBG); plant physiology and plant-environment associations (Kung Fang Cao—XTBG); biogeography (FS and Richard Corlett—National University of Singapore); arthropod biodiversity, ants (David Lohman—City College of New York-CUNY); bees (Rhett Harrison—XTBG); herbivory (DL); bird taxonomy and ecology, distance sampling (George Gale—King Mongutt's University of Technology Thronburi); behaviour ecology of birds (GG); behaviour ecology of large mammals (Satyawan Pudyatmoko—Universitas Gadjah Mada). Animal-plant interactions were strongly emphasized, including frugivory and seed dispersal (RC); pollination and co-evolution (RH).

The field course also captured multidisciplinary approaches to biodiversity conservation and global climate change, including training for establishing multifunctional landscapes, the role of agro-forestry, Rapid Carbon Stock Appraisal (all by ICRAF team, led by Dr Sonya Dewi, with contributions from Subekti Rahayu and Elok Mulyoutami as members of the team), as well as the role of conservation biologists, the application of economic valuation, and policy formulation and advocacy (Mochamad Indrawan). The heads of the national parks visited provided introductions to the ecology and management each of the parks (Hartono—Alas Purwo NP, Indra Arinal—Baluran NP, Director Rinjani NP), and one experienced staff member shared his long-term research on birds in the Baluran NP (Swiss Winasis—Baluran NP).

At both Alas Purwo and Rinjani, participants engage in their own student research projects, the results of which were presented at a concluding field course symposium. Participants formed small teams of 2-3, and each team designed and conducted a research project in Alas Purwo and another in Rinjani. The use and practice of statistics using R was encouraged with the constant assistance from Rhett Harrison and Fujinuma Junichi, and just before the symposium aided by Sandy Nurvianto from Universitas Gadjah Mada

At the end of the field courses, participants presented the results of their research at a one-day field course symposium (Bali Botanic Gardens, 3 Sept. 2010). Example topics were: Influence of leaf litter composition on ant community structure in the natural forest of Alas Purwo National Park; Arboreal ant community in mixed forest, Alas Purwo National Park; How ecological traits and leaf physiological traits affect the degree of insect herbivory in understorey plants; Does the availability and the size of the dung effect the diversity/abundance of dung beetles? Results from some of these projects are being prepared as manuscripts for submission to international journals.

At the end of the field course, it may be fair to say that the participants were quite dazzled by the biodiversity of species and ecosystems, as well as human-nature interactions in the localities adopted as the training grounds, especially Alas Purwo National Park and Rinjani National Park.

Constructive feedbacks for the field course were received. The chance to learn and practice the R software was greatly appreciated by many but some students reported difficulty in keeping up with the training. Requests were made to include more basic statistic training (this was particularly a problem for students who did not attend our Experimental Design & Data Analysis workshop). Different background of participants necessitate lectures to be accompanied with further basic introductions of concepts ("more lectures in basic theory", one participant). Some also requested lecture notes, although for pedagogic reasons we believe it is better to ask the students to take their own notes. The research projects were praised by all participants, some describing the experience as formative.

While appreciating the existing technical support, a few participants suggested that training for the R software could be backed by increased numbers of assistant lecturers.

4.2. Results of Media Outreach

A reporter from *The Jakarta Post*, one of two largest selling English newspaper in Indonesia covered the activities (30 July – 2 Aug. 2010), and several press releases were prepared which informed the general public of Indonesia of the importance of this regional training and network for biodiversity, conservation and sustainable developments.

The outputs of media outreach included a one-page special report in *the Jakarta Post* (three articles, 14 Aug. 2010), one-page coverage in a national newspaper, *Koran Jakarta* (two articles, 7 Sept. 2010), a national news agency online, *Antara News* (W. Java, E. Java, Bali, W. Sumatra, respectively 15 Aug., 16 Aug., 2 Sept. and 7 Sept. 2010), and a half-page coverage at a local newspaper, *Radar Banyuwangi* (two articles, 2 Sept. 2010). As a matter of course, the media coverage increased local and national public attention about the importance of research for decision- making, and the importance of the local park sites for the conservation of biodiversity

Results of Media Outreach

Indrasafitri, D. 2010. Young scientists learn about nature in Alas Purwo. *The Jakarta Post*. 14 August 2010 http://www.thejakartapost.com/news/2010/08/14/young-scientists-learn-about-nature-alas-purwo.html

Indrasafitri, D. 2010. The long, rocky road towards harmony. *The Jakarta Post*. 14 August 2010

Jauhari, A. 2010. UI-UGM fasilitasi ilmuwan teliti Alas Purwo. [Universitas Indonesia and Universitas Gadjah Mada facilitated scientists to research Alas Purwo]. Antara West Java – News Agency, 15 Aug. 2010 (in Bahasa Indonesia) http://antarajawabarat.com/lihat/berita/26047/ui-ugm-fasilitasi-ilmuwan-teliti-alas-purwo

Anon. 2010. UI-UGM fasilitasi 30 ilmuwan muda mancanegara. [Universitas Indonesia and Universitas Gadjah Mada facilitated 30 young scientists from international quarters]. Antara East Java - News Agency, 16 Sept. 2010 (in Bahasa Indonesia) http://www.antarajatim.com/lihat/berita/40581/ui-ugm-fasilitasi-30-ilmuwan-muda-mancanegara

Anon. 2010. UI UGM facilitasi ilmuwan teliti Alas Purwo [Universitas Indonesia and Universitas Gadjah Mada facilitated scientists to research Alas Purwo]. Antara West Java – News Agency, 7 Sept. 2010 (in Bahasa Indonesia) http://www.antara-sumbar.com/id/berita/nasional/d/0/118544/ui-ugm-fasilitasi-ilmuwan-teliti-alas-purwo.html

Anon. 2010. Ekosistem yang terjaga selamatkan Banteng Alas Purwo. [Protected ecosystem helps save the Banteng of Alas Purwo]. Antara Bali News Agency, 3 Sept. 2010. http://bali.antaranews.com/berita/6508/ekosistem-yang-terjaga-selamatkan-banteng-alas-purwo

Anon. 2010. Baluran – Alas Purwo asset international. [Baluran – Alas Purwo are international assets]. Radar Banyuwangi, 2 Sept. 2010 (in Bahasa Indonesia)

Anon. 2010. Peserta terkesan dua taman nasional [Course participants are impressed with two national parks]. Radar Banyuwangi, 2 Sept. 2010 (in Bahasa Indonesia)

Setiawan, B. 2010. Taman Nasional perlu pengawasan ketat. [National Park needs close monitoring]. Koran Jakarta, 7 Sept. 2010 (in Bahasa Indonesia)

Setiawan, B. 2010. Kawasan steril dari tumbuhan pendatang [protected areas should be made steril from invasive species]. Koran Jakarta, 7 Sept. 2010 (in Bahasa Indonesia)

4.3. Added values

Added values were further provided through scholarships provisions, and corporate visibility of APN

In addition to the participants from developing countries in the Asia-Pacific region who received support to attend the training activities, four participants received scholarships to attend the ATBC 2010 ("Tropical Biodiversity: surviving the food, energy and climate crisis", Sanur, 19 – 23 July 2010). The sponsorship support by APN is acknowledged through display of logo at the website developed for the course (www.pfs-tropasia.org). Further acknowledgement were made through the ATBC 2010 meeting whereby the APN logos were displayed by the banners, programme book, and final report.

5.0 Conclusions

The project met or exceeded the aims and objectives as stated in the proposal:-

AIMS:—To increase the capacity of institutions in regional developing countries to conduct research on environmental issues, and to teach advanced courses on topics related to environmental resource management through training junior faculty in modern field research methods and data analysis.

All three workshops directly funded by the project, contributed to this aim and were successfully run. A website was established to support a regional training program, and other progress made in development of a sustainable regional training program.

OBJECTIVES:—

1. To hold a four-day workshops, respectively, on Experimental Design and Data Analysis, and Science Writing
   COMPLETED
2. To hold a six-week field course on Biodiversity, Conservation and Sustainable Development
   COMPLETED
3. To develop a web-based alumni network for course participants, so that opportunities for future collaboration and academic exchange can be realised.
   COMPLETED

In conclusion: the project successfully delivered the training activities as described in the proposal and therefore met its primary aim, namely to teach advanced courses on topics related to environmental resource management through training junior faculty (and researchers) in modern field research methods and data analysis, and to increase the capacity of institutions in regional developing countries to conduct research on environmental issues.

5.0 Future Directions

The training courses run under the project were a direct extension of those begun by the DIVERSITAS in WESTERN PACIFIC & ASIA program (DIWPA), the Center for Tropical Forest Science (CTFS) and, most recently, Xishuangbanna Tropical Botanical Garden (XTBG). Further discussions between interested parties have been held, both directly as a result of the project and through related activities. The Program for Field Studies in Tropical Asia office, currently supported by XTBG, has prepared a proposal for submission to potential consortium partners. Moreover, as a direct result of the project both the World Agroforestry Institute (ICRAF) and the Center for International Forestry Research (CIFOR) have indicated their interest in participating in such a consortium. Indeed, ICRAF co-funded the course recently hosted by XTBG in Yunnan. In addition, discussions have been held with various partners who would be involved in hosting training activities. As a direct result of this project, University of Gajah Mada, Indonesia recently signed an MOU with the Ministry of Forestry Indonesia to collaborate in running research activities and training courses at Alas Purwo. UGM, UI, and XTBG are planning to sign a MOUs in the near future. Meanwhile, ICRAF regional office in Indonesia and XTBG submitted a proposal to the National Science Foundation China to fund research and training activities in Alas Purwo (NSFC-CIGAR proposal call; submission date 20 March 2011). Colleagues at King Mongutt's University of Technology Thronburi, Thailand have also started to make progress in securing the support of their institute to host courses in Thailand.

Thus, the project can claim to have been very successful in pursuing the long-term goal of establishing a sustainable training program in the region. Obviously, such a program will require external funding, particularly for the support of participants from lower-income countries, and we hope we can look forward to APN's continued support of our efforts.

References

NA

Appendices

Appendix 1. Modules for Experimental Design and Data Analysis Course *(Basic course)*

This six-day course is an intensive course based on a full-semester course taught in the University of Canterbury, New Zealand. It uses the open source statistical computing program R, which is introduced to course participants at the beginning of the course and used throughout.

Module I: Scientific methodology and experimental design (~1.5 days)

This module starts with a review of the basics of scientific methodology and statistical concepts, including the deductive reasoning and test statistics used in classic hypothesis testing. Examples of simple regression and ANOVA are worked by hand to facilitate through understanding of the fundamentals of the typical ecological questions. Students then learn to how to do regression and ANOVA models in R.

Experimental design is introduced to the students in a structured manner, starting from the concepts of treatment, control, replication and randomization. Different types of single factor designs are then covered. Students then move on to nested design for testing multiple factors operating at hierarchical spatial or temporal scales. Variance components (fixed and random effects) are then introduced. Examples all the principle types of experimental design are provided and worked by the students in corresponding practicals.

Module II: Parametric models and non-parametric models (~1 day)

Assumptions of parametric models are reviewed, with the emphasis on what can cause each assumption to be broken, what happens if it is broken and how to check it with model checking tools in R. Suitable data transformations are then introduced to deal with “problematic” data in parametric models. Non-parametric rank tests are then introduced and their limitations discussed.

Module III: General linear models, model fit and simplification (~1.5 days)

At this stage the students will be relatively familiar with regression and ANOVA models in R. Here they learn that both belong to a group of models called the general linear models and how to deal with both continuous and categorical predictors in the same model (ANCOVA). Their understanding of the underlying mathematics is reinforce through learning to interpret the model outputs and by working out the model predictions by hand.

Assumptions of parametric and linear models are revisited at this point as the students learn how to assess the validity of model assumptions and model fit. They then learn what defines the most parsimonious model based on the Akaike’s Information Criterion (AIC). Students are then guided through the steps of model simplification step by step using a few examples and given adequate exercises during practicals.

Module IV: Generalised linear models (~1.5 days)

When the underlying error distribution of the data does meet the assumptions of linear models, is there a better way than to resort to data transformation or non-parametric models? This question is discussed in detail and the advantages of generalized linear models are introduced. The underlying mathematics of the generalized linear models is briefly covered but avoiding too much maths. These include the concepts of different families of error distribution, the linear predictor and the link function. Examples of the common types of generalized linear models are then given with different families of error distribution. These mainly include modeling for count data, binary data and proportion data, which are often encountered in ecological studies.

On the last day of the course, a few hours are set aside for the students to discuss their own data and how they think they can analyze these data using the modeling tools in R. This may be done in voluntary and relatively casual presentations. Interactions and discussions between the presenters and the audience are highly encouraged.

Module V: Graphics for statistics

Through out the course the use of R's basic graphics package is taught in the context of data checking and model checking. Students learn how to produce and modify basic graphs including line and scatter plots, box plots, and bar-charts. In addition, two voluntary evening classes are taught in the advance graphics package Lattice.

Modus operandi

The course is taught by two post-doctoral level (or higher) instructors, experienced in ecological field studies and data analysis in R. One or two teaching assistants will be with the class to provide one-on-one help for the students, especially during the practicals. At least one practical is associated with each lesson. The pace of the lessons is carefully monitored and adequate Q&A time is provided so that after each day, most participants feel reasonably stretched but not overwhelmed.

Appendix 2. Field Course Syllabus and Schedule

Field course training modules / *modus operandi*

Module I: Measuring / assessing biodiversity (~10 days)
This module provides an introduction to the study of different taxa and advanced methods for field sampling. Evening lectures provide an opportunity for review of general topics, such as the diversity and evolution of each group, their basic biogeography, ecology and functional importance. The module is divided into components for each of the main taxal groups covered (e.g. plants, arthropods, and vertebrates), and each component is taught by an expert with research experience of the group in the Asian tropical region.

Participants from the region are often well versed in one particular group, for example they may be competent field botanists or keen Lepidopterists, but know little of other groups. This module empowers participants to think across traditional taxonomic boundaries, and introduces advanced field study techniques, for example how to sample insects for DNA barcoding and the used of the DISTANCE sampling for estimating vertebrate densities. Participants therefore not only learn how to recognise and study a range of taxa but also learn how theoretical concepts of conservation biology and ecology apply across the forest biota.

Module II: Focal taxa
This is a practical exercise that runs for most of the duration of the course and after a one-day introduction is completed in the participants' spare time. Participants select a focal taxa, usually a plant genus or arthropod family, that is not related to their normal field of study. The participants then collect or observe their taxa in the different sites visited by the course. Using taxonomic references and close observation, they note the species (morphospecies) present at each site and construct a species character matrix from their observations. This matrix is then used to generate a phylogeny. The participants then conduct community phylogenetic analyses based on the assemblages observed at each site. The results of this exercise are presented as a brief written report at the end of the course.

The exercise provides training in the close observation of a particular taxa, not in their normal field of study, and allows participants to appreciate better the differences in the sites visited by the course through their observations. It provides an introduction to evolutionary concepts and advanced methods employed in both alpha-taxonomy and phylogenetics. The module is taught using opensource softwear.

Module III: Experimental design and statistical computing
Although not strictly a field topic, this module is provided because good experimental design and a capacity to analyse data competently is essential to ecology and conservation. It comprises part of the preparation for the students to conduct their independent projects.

A one-day course is given in experimental design and statistics, including simple linear modeling. The course uses the opensource freeware program R, and a series of five evening workshops provide a practical introduction to statistical computing using R. The workshops use both standard datasets and those generated by the participants' own research projects. Topics covered include general linear models and principles of model simplification and checking, multivariate analysis including ordination, cluster analyses and redundancy analysis, and graphics, including the use of the high-level Lattice package. All analyses conducted during the field course, whether from resource staff led practicals or the participants independent research projects, are conducted in R and the participants are required to hand in their scripts along with their written reports.

Module IV: Practical conservation and sociology (~5 days)
In this module participants learn about the social aspects to conservation and resource management. Most participants on the field courses come from a biology background and therefore the methods of social study are unfamiliar to them. This module introduces techniques such as Rapid Rural Appraisal and Participatory Mapping, though both lectures and practice in conducting surveys.

Participants learn to appreciate the complexities of decision making and concensus building when dealing with local communities, and how to assess the value of natural resources to local communities and identify conflicts with conservation objectives.

Module V: Ecology / Plant-animal interactions (~4-6 days)
This module focuses on introducing the concepts and study techniques for plant-animal interactions. Ecology teaching in the region tends to have a population / autecology focus and symbiosis and co-evolutionary studies are rarely covered adequately. Participants learn to appreciate the importance of plant-animal interactions in the ecology of tropical forest. We focus on plant-animal interactions, because they are more readily taught in a short course and because of their functional importance in the tropical forest ecosystem and relevance to conservation. Topics covered would normally include frugivory and seed dispersal, pollination ecology, and herbivory. Evening lectures provide a theoretical background to the study, while resource staff led investigations give the participants an opportunity to practice study techniques.

Module VI: Independent projects
Perhaps the most important in the field course, during this module participants develop research questions, derive hypotheses and design and execute a research project to test these. The results are analysed and written up during the field course and presented orally at the course symposium.

Usually the module is divided in two projects, the first being conducted approximately halfway through the course and the second at the end. In the first project the participants spend one day to propose and discuss ideas within their groups. Resource staff engage in the process and guide the participants in their debates. In the evening, each group presents its idea to the course and the field research is conducted over the next 5-7 days. For the second project, participants may work alone or in small groups. Over a series of evenings prior to the start of the project, participants are required to present their research proposals to the rest of the course. Thus, the process is less structured than for the earlier projects, but still provides plenty opportunity for feedback and improvement. The projects are conducted over 5-7 days, and a further 5 days are provided at the end of the course for analysis and write up.

Participants are encouraged to work with people who are not from the same country and on topics unrelated to the normal topic of study.

Course symposium
On the final day of the course, participants present the findings of the projects conducted during the course to an invited audience. This both provides practice in making scientific presentations and an opportunity for wider feedback. It also forces the participants to complete their projects before the end of the course.

Course Proceedings
A course proceedings is published 2-3 months following the completion of the course, which presents the results of the research projects and focal taxa exercise. Reports handed in at the end of the course are reviewed and participants then revise their work for publication in the proceedings. Proceedings of previous courses are available through the program website. Selected papers from the proceedings may subsequently be submitted for publication in international journals.

Modus operandi
Each field course is co-ordinated by a post-doctoral level instructor, with research experience in the region. The co-ordinator is responsible for inviting resource staff and arranging the teaching schedule. The co-ordinator will also normally teach 1-2 topics in their research discipline, supervise the independent projects, and teach general topics, such as the module on experimental design and analysis. The co-ordinator is supported by two teaching assistants, who are usually senior PhD students or recent doctoral graduates with previous experience on a field course. A local coordinator is also engaged to arrange logistics and run errands during the course.

Resource staff, who volunteer their teaching time, are recruited to teach each topic, so that for every topic participants are taught by people with research experience in the region. Normally a course would have 10+ invited resource staff.

Teaching is divided into evening lectures and practical exercises conducted during the day. Normally the lecture on a topic is given the evening before the practical exercise. A workbook with the schedule for the course and abstracts provided by the resource staff is given to all participants at the start of the course. In addition, resource staff provide PDFs of 3-5 papers per topic, which are assembled into a library for the students. In addition to providing background reading these provide useful material for the participants in developing their research ideas. The course is taught over a six week period and every 7^{th} day is give over to rest, which allows participants time to catch up on reading, internet, and chores, such as washing clothing.

Date	Time	Topics	Resource staff*
25 Jul	08:00	Travel to Alas Purwo National Park, East Java	
	19:00	Introduction to APNP	
26 Jul – 9 Aug		Measuring / assessing biodiversity	
26 Jul	08:00	Plant taxonomy	Dr Ferry Slik (XTBG)
	09:30	Plant collecting	
	19:00	Plant biodiversity and carbon	
27 Jul	08:00	Plant collecting	
	16:00	Plant biogeography	
	19:00	Plant physiology	Dr Kung Fang Cao (XTBG)
28 Jul	08:00	Plant-environment associations	
	19:00	Introduction to R	Dr Rhett Harrison (XTBG)
29 Jul	08:00	Focal taxa	
	19:00	Introduction to arthropods	Dr David Lohman (CCNY)
30 Jul	08:00	Arthropod biodiversity and abundance	
	19:00	Ants	
	19:30	Bees	Dr Rhett Harrison (XTBG)
	20:00	Herbivory	Dr David Lohman (CCNY)
31 Jul	08:00	Arthropod biodiversity and abundance	
31 Jul	19.00	Conservation and Sustainable Development	Dr. Mochamad Indrawan (UI)
1 Aug	19:00	Introduction to bird diversity and abundance	Dr George Gale (KMUTT)
02 Aug	08:00	Measuring bird diversity and abundance	
	19:00	Bird behavioural ecology	
03 Aug	08:00	Bird behavioural ecology	
	19:00	Large mammal ecology	Dr Satyawan Pudyatmoko (UGM)
04 Aug	08:00	Large mammal ecology	
	19:00	Student presentations I	
05 Aug	08:00	Introduction to Statistics using R	Dr Rhett Harrison (XTBG)
	19:00	Biodiversity assessment for the tropics	
06 Aug	08:00	Assessing biodiversity and environmental gradients	
	19:00	Student presentations II	
07 Aug	08:00	Assessing biodiversity and environmental gradients	
09-13 Aug		Independent student projects I	
09 Aug	08:00	20 Questions	
	19:00	Project proposals	
10-13 Aug		Student projects	
14 Aug	08:00	Travel to Baluran National Park	
15 Aug			
	19:00	Conservation	

16-18 Aug		Conservation and sustainable development	
16 Aug			
	19:00	Agroforestry in Indonesia	Dr Sonia Dewi (and the team from ICRAF)
17 Aug	08:00	Sustainable development and biodiversity	
	19:00	Conservation issues in Baluran NP	Mr Indra Arinal (Director Baluran NP)
	2000	Bird diversity and monitoring in Baluran NP	Mr Swiss Winasis (national ornithologist, and park official, Baluran NP)
18 Aug	08:00	Sustainable development and biodiversity	
19 Aug	08:00	Travel to Rinjani National Park, Lombok	
	19:00	Introduction to Rinjani National Park	Mr Purwantono (Director Rinjani NP)
20-24 Aug		Animal-plant interactions	
20 Aug	08:00	Frugivory and seed dispersal	Dr Richard Corlett (NUS)
	19:00	Frugivory	
21 Aug	08:00	Frugivory and seed dispersal	
	19:00	Seed dispersal	
22 Aug	08:00	Biogeography	
	19:00	Project proposals I	
23 Aug	08:00	Pollination and co-evolution	Rhett D Harrison (XTBG)
	19:00	Fig biology	
24 Aug	08:00	Pollination and co-evolution	
	19:00	Project proposals II	
25-29 Aug		Independent student projects II	
30 Aug	08:00	Travel to Bali Botanic Gardens	
31 Aug-02 Sep		Analysis and write up	
03 Sep		Course Symposium at Bali Botanic Gardens	
	08:00	Projects from Alas Purwo	
	14:00	Projects from Rinjani	
	19:00	Closing ceremony and dinner	
04 Sep		Participants return	

***** In addition, Dr Rhett Harrison (Co-ordinator) and Mr Junichi Fujinuma (Teaching Assistant) participated for the duration of the course, and Mr Indrawan was present close to 50% of the course including all the critical phases.