Frontier Vietnam Environmental Research

REPORT 28

Biodiversity survey and monitoring training: Bai Tu Long Bay

Workshop proceedings

Frontier Vietnam
2004

Frontier Vietnam Environmental Research

Report 28

Biodiversity survey and monitoring training: Bai Tu Long Bay

Workshop proceedings

Bhagwat, S., Bloxam, C. & Fanning E. (eds)

Ministry of Agriculture and Rural Development

Forest Protection Department

Darwin Initiative: Department for Environment and Rural Affairs, UK

Bai Tu Long Bay National Park Authority

Frontier-Vietnam

Institute of Ecology and Biological Resources

Society for Environmental Exploration

Hanoi
2004

Technical report citation:

Frontier-Vietnam (2004 Bhagwat, S., Bloxam, C. & Fanning E. (eds). Biodiversity survey and monitoring training: Bai Tu Long Bay. Workshop proceedings. **Frontier-Vietnam Environmental Research Report 28** . Society for Environmental Exploration, UK and Institute of Ecology and Biological Resources, Hanoi and Darwin Initiative, UK Government. ISSN 1479-117X

ISSN: 1479-117X

Frontier-Vietnam
Since 1993, Frontier-Vietnam has implemented extensive biodiversity surveys, natural resource assessments, socio-economic research, environmental education, awareness raising activities and training in protected areas of Northern Vietnam.

Institute of Ecology and Biological Resources
The Institute of Ecology and Biological Resources (IEBR) is an institute under the National Centre for Sciences, Hanoi. IEBR has carried a wide range of biological and ecological research all over Vietnam and has collaborated by a wide range of national and international organisations.

Society for Environmental Exploration
The Society is a non-profit making company limited by guarantee and was formed in 1989. The Society's objectives are to advance field research into environmental issues and implement practical projects contributing to the conservation of natural resources. Projects organised by The society are joint initiatives developed in collaboration with national research agencies in co-operating countries.

Bai Tu Long Biodiversity Awareness Project
The Bai Tu Long Bay Biodiversity Awareness Project (BTLBBAP) aims to raise biodiversity awareness and to facilitate conservation measures in the Bai Tu Long Bay National Park, Van Don District, Quang Ninh. (MAP) It will achieve this through assisting the National Park's many stakeholders to meet the conservation obligations committed to Vietnamese law under the Biodiversity Action Plan, 1994.

Frontier-Vietnam Forest Research Programme
The aim of the programme is to provide the Vietnamese Government with the comprehensive information on the nation's protected areas. Each research expedition assesses the extent and the condition of forest cover, identifies the different species of fauna and flora and maps the forests as a source of food, medicine and building materials for the local people, community based work is also important to assess how reliant communities are on these resources.

FOR MORE INFORMATION

Forest Protection Department
P.Hong Ha TP
Ha Long
Quang Ninh
Tel: (0)33 835 990

Darwin Initiative
Department for Environment, Food and Rural Affairs
4/CI Ashdown House
123 Victoria Street
London, SW1E 6DE
Tel: +44 (0)20 7944 6205
Fax: (0)20 7944 6239
Email: darwin@defra.gsi.gov.uk

Bai Tu Long Bay National Park Authority
Cai Rong Town
Van Don
Quang Ninh
Tel: 33 835 523

Frontier-Vietnam
Lane 40, No. 47 Ta Quang Buu
Bach Khoa
Hanoi

Institute of Ecology and Biological Resources
Sinh Vat
Nghia Do Cau Giay
Hanoi
84 4 8360870

Society for Environmental Exploration
50-52 Rivington Street, London, EC2A 3QP. U.K.
Tel: +44 20 76 13 24 22
Fax: +44 20 76 13 29 92
E-mail: info@frontier.ac.uk
Internet: www.frontier.ac.uk

TABLE OF CONTENTS:

LIST OF TABLES:

LIST OF FIGURES:

EXECUTIVE SUMMARY:

A Biodiversity Survey and Monitoring Training Workshop was conducted by Frontier between 19–30 May 2003 for the Bai Tu Long Bay National Park staff. This workshop is one of the series organised for capacity building the National Park authority, as part *of Bai Tu Long Bay Biodiversity Awareness Project (BTLB BAP)* (October 2001 – December 2003) funded by Darwin Initiative (DEFRA, UK).

Bai Tu Long Bay National Park was established in 2001 in order to expand the nature reserve of Ba Mun island, an uninhabited protected area of 2,000 ha. The marine and the terrestrial environments of the National Park now cover 15,000 ha. It is a relatively newly established national park with minimal infrastructure, manpower and resources. The present workshop was planned in order to provide training to the National Park staff of essential field skills required to effectively monitor biodiversity. The focus of this workshop was on forest biodiversity, particularly tree and bird diversity.

Two members of staff each from Science, Conservation and the Forest Protection departments of the National Park; and the head of Conservation department took part in the training workshop. In addition to a Biodiversity Trainer and a Biodiversity Evaluator, two Vietnamese scientists, a botanist and an ornithologist, were invited to carry out teaching activities. Three translators, a cook and BTLB BAP Project Manager also took part in the workshop.

The training workshop was divided into three parts – Classroom Component I (CC I), Field Component (FC) and Classroom Component II (CC II). While the focus of the workshop was on teaching field-based techniques (FC), initial introduction to the theory of biodiversity surveying and monitoring and planning was made during CC I and time was allocated for data analysis, report writing and presentation of results during CC II. Teaching methods used included PowerPoint presentation, talks with visuals, games, providing information worksheets, discussion and practical exercises. Some time was spent doing individual teaching and discussion. Performance of each of the trainees was assessed continually.

Assessment and feedback were used to ensure that the workshop and training was at an appropriate level for the trainees, teaching was appropriate and relevant, trainees were improving their knowledge, field skills and reporting ability, and the stakeholders were happy (experts, national park directors, trainees). Methods of assessment and feedback included:; an initial interview for a first impression of each trainee; worksheets to determine the level of basic skills and knowledge; observation to monitor behaviour; formal and informal questioning; performance in a management role play; standard of written work and presentation; a comprehensive individual feedback session; a final multiple choice assessment; opportunistic informal feedback; and feedback forms at the end of the course. All trainees performed satisfactorily in most aspects of the training.

As a result of the training workshop the trainees learnt: to prepare a survey plan; what makes good camping practice; theory and context of biodiversity surveying and monitoring; tree, bird and GPS survey techniques; management role-play; good data recording practice; how to analyse data, write report and present the results.

The key reasons for the success of the workshop include: flexible and adaptable approach to teaching; focus on field-based training; use of visuals and games; and continual assessment of performance; a combination of incentives, responsibilities and high expectations; and enthusiasm and efficiency of staff, trainers and experts. The main limitations of the workshop include: limited time available; language limitations; unfamiliarity of Vietnamese experts with participatory teaching approach; and weather.

The main recommendations were: further training workshops for the National Park management staff in useful skills (such as use of technical equipment, writing project proposals and grant applications, marketing to increase the profile of the park; protection plans for endangered species; ecotourism management; environmental education; English language; socio economics appraisal skills); young and enthusiastic staff be given opportunities to learn and to practice their skills; the National Park be encouraged to form relationships with local, regional and international conservation organisations, academic institutions and other national parks across Vietnam; set up an information service section such as library, Internet etc.; engage in environmental education of staff and stakeholders; and increase technical capacity by investing in useful field equipment.

With the knowledge that there is ample capability within the National Park staff, we fully endorse recommendations for further capacity building of appropriate skills, and help in gaining the correct resources and technical expertise to effectively manage the National Park.

Law enforcement workshop: Bai tu Long Bay: 162/10/022

ACKNOWLEDGEMENTS

This workshop was part of the Bai Tu Long Bay Biodiversity Awareness Project (BTLB BAP) 162/10/022, funded through the Darwin Initiative, of the Department for Food and Rural Affairs, UK and the Society for Environmental exploration, UK, implemented through Frontier-Vietnam. The event would not have been possible without the collaboration, advice and assistance of a number of people. In particular, acknowledgements are due to the following:

Bai Tu Long National Park Authority

Director:	Nguyen Duc Tuy
Vice Director:	Pham Tuan Hung
Head of Science Department:	Ngo Van Dinh
Head of Forest Protection Department:	Pham Van Sy
Head of Conversation Department:	Nguyen Dinh Ung
Head of General Department:	Luong Xuan Chin

Workshop Speakers

Botanist: University of Hanoi:	Dr Tran Dinh Nghia
Ornithologist: IEBR:	Dr Truong Van La

Society for Environmental Exploration

Managing Director:	Ms. Eibleis Fanning
Development Programme Manager:	Ms. Elizabeth Humphreys
Programme Manager (Research):	Ms. Nicola Beharrell
Operations Manager:	Mr. Matthew Willson

Frontier-Vietnam

Biodiversity Trainer:	Dr. Shonil Bhagwat
Biodiversity Evaluator:	Ms. Catherine Bloxam
Country Co-ordinator:	Ms. Elizabeth Tydeman
BTLBBAP Project Manager:	Mr. Leo Bottrill
BTLBBAP Education Co-ordinator:	Mr. Daniel Burns
BTLBBAP Project Officer:	Ms. Hoang Lan Huong
Translator:	Mr. Nguyen Duc Long, Ms Ngoc Thi Men

ABBREVIATIONS

Organisations

DANIDA	Danish Development Agency
DEFRA	Department for Environment, Food and Rural Affairs
EC	European Commission
FFI	Fauna and Flora International
FPD	Forest Protection Department (Vietnam)
IEBR	Institute of Ecology and Biological Resources
IUCN	The World Conservation Union
MARD	Ministry of Agricultural and Rural Development
NGO	Non-governmental Organisation
SEE	Society for Environmental Exploration
TRAFFIC	TRAFFIC International
UNDP	United Nations Development Programme
WWF	World-wide Fund for Nature

People

CB	Ms Catherine Bloxam
HK	Mr Hoang Van Khahn
LB	Mr Leo Bottrill
LD	Mr Le Xuan Dung
LK	Mr Le Van Khai
LT	Ms Liz Tydeman
ND	Ms Nguyen Thi Diem
NH	Mr Nguyen Van Hung
NM	Ms Ngoc Thi Men
NU	Mr Nguyen Dinh Ung
PD	Mr Pham Xuan Dieu
PL	Mr Pham Khahn Linh
PP	Mr Pham Xuan Phuong
SB	Dr Shonil Bhagwat
TL	Dr Truong Van La
TN	Dr Tran Dinh Nghia
VN	Mr Vu Nam

Science

A.s.l.	Above sea level
Dbh	Diameter at breast height
GPS	Global Positioning System
UTM/UPS	Universal Transverse Mercator / Universal Plotting Sheet

Miscellaneous

BTEC	Business Training and Education Council
UK	United Kingdom

1. INTRODUCTION

This is the report of Bai Tu Long Bay Biodiversity Survey and Monitoring Training Workshop conducted by Frontier-Vietnam in May 2003 for the Bai Tu Long Bay National Park staff. This workshop was second in a series of capacity building workshops for the National Park staff.

Bai Tu Long Bay National Park has been established since June 2001. It is a relatively newly established national park with minimal infrastructure, manpower and resources. Until now, the National Park staff was not sufficiently skilled to undertake biodiversity surveying and monitoring. The present workshop has initiated the training process.

1.1 Need for the workshop

Biodiversity Action Plan for Vietnam (VIE/91/G31, 1995) requires every National Park Authority to formulate a management plan and to make calculated resource use decisions (Government of the Socialist Republic of Vietnam, 1994). Without an adequate surveying and monitoring programme Bai Tu Long Bay National Park cannot fulfil the above requirement stated in the Biodiversity Action Plan for Vietnam.

Bai Tu Long Bay National Park staff have accompanied Frontier -Vietnam in biodiversity surveys as part of Frontier-Vietnam Forest Research Programme. Many of the staff have shown interest in continuing their learning of survey techniques. This workshop serves to consolidate skills learnt so far and further develop skills of the participants. It was realised during a the forest research programme initiatives that the National Park staff, have varying science and fieldwork experience.

The present workshop was planned in order to provide training to the National Park staff of essential field skills required to effectively monitor biodiversity. The focus of this workshop was on forest biodiversity, particularly tree and bird diversity. The staff had also expressed interest in learning to use global positioning system (GPS) technology. The field training was therefore focused on tree, bird and GPS surveys.

1.2 Background – Bai Tu Long Bay National Park

Bai Tu Long Bay is a beautiful landscape, consisting of numerous islands with limestone mountains. The landscape is very similar to Ha Long Bay, a popular tourist destination easily approachable from the capital Hanoi. Bai Tu Long Bay is relatively unspoiled because of difficult access. The region has tourism potential and a priority of the National Park is on developing tourism. However, a thorough understanding of biological resources and their use in the area is necessary in order to manage eco-tourism successfully. This understanding is currently lacking.

The National Park Authority has limited management resources. The complexity of the natural environments and the variety of stakeholders make management of the National Park challenging. Although a considerable budget has been allocated for the natural resource management of the park, it currently runs on an operational budget of less than 500 USD per year.

The national park has a Science, Conservation and a Forest Protection Department who are jointly responsible for managing the national park. Because the park is newly established, the skills, knowledge and resources required have not yet been put in place for successful park management. The National Park Management has had no other external funding or help apart

from Frontier/ Darwin. This workshop is aimed at providing some of the necessary skills to survey and monitor biodiversity – a key element of any good natural resource management plan.

1.3 Scope of the workshop

The workshop, conducted between 19 and 30 May 2003, was intended to provide practical training to the National Park staff. The emphasis of the workshop was on teaching field-based forest biodiversity survey and monitoring techniques. The classroom component of the workshop was teaching theory of biodiversity, planning survey and monitoring and demonstrating data analysis techniques. Some teaching was also carried out during the field component in order to complement the teaching of field techniques. The data analysis, report writing and the presentations by the trainees took place in classroom.

The field schedule had to be cut short by one day because of the heavy rains as a consequence of an unexpected typhoon at the time of fieldwork. As a result, less time was spent in the field than planned.

Table 1: Summary of available time

Category	*Amount of time available (hrs)*
Preparation	100
Classroom Component I - theory, data recording and management	*50*
Field Component	*50*
Classroom Component II - Data analysis, report writing and presentations by the trainees	*50*

1.4 Participants of the workshop

The National Park has four departments, namely, Forest Protection, Science Conservation, and Administration. The heads of each department report to the Vice Director, who in turn reports to the Director. The staff of the three departments work closely together. The trainees included two members of staff each from the Forest Protection, Science and Conservation departments; and the head of Conservation department.

In addition to the authors of this report, two local experts were invited to offer their expertise in tree and bird species identification during the field component of the training workshop.

Three translators and a cook were also deployed for facilitating the training. The BTLB BAP Project Manager tnam co-ordinated the organisation of the workshop.

Table 2: List of participants

Name of the participant	*Abbreviation*	*Description of the role*
Trainees		
Mr Nguyen Dinh Ung	NU	Head of Conservation department within the National Park, also responsible for looking after the progress of other trainees during the workshop
Mr Pham Khahn Linh	PL	A member of staff in the Conservation department, responsible for bird data recording during the workshop
Mr Pham Xuan Dieu	PD	A member of staff in the Conservation department, responsible for GPS data recording during the workshop
Mr Hoang Van Khahn	HK	A member of staff in the Science department, responsible for bird data recording during the workshop
Mr Pham Xuan Phuong	PP	A member of staff in the Science department, responsible for tree data recording during the workshop
Mr Nguyen Van Hung	NH	Ranger in the Forest Protection department, responsible for tree data recording during the workshop
Mr Le Van Khai	LK	Ranger in the Forest Protection department, responsible for GPS data recording, and for driving and maintaining the speed boat during the workshop
Trainers		
Dr Shonil Bhagwat	SB	Biodiversity Trainer
Ms Catherine Bloxam	CB	Biodiversity Evaluator
Vietnamese Experts		
Dr Tran Dinh Nghia	TN	Vietnamese tree expert
Dr Truong Van La	TL	Vietnamese bird expert
Facilitators		
Mr Vu Nam	VN	Translator during field component
Ms Ngoc Thi Men	NM	Translator during classroom component
Mr Le Xuan Dung	LD	Frontier Vietnam Liaison Officer, translator during some of the field and classroom sessions
Ms Nguyen Thi Diem	ND	Cook, during the field component
Mr Leo Bottrill	LB	BTLB BAP Project Manager, co-ordinating the organisation of the field and the classroom components of the workshop

1.5 Resources

The resources available to carry out reconnaissance survey, classroom teaching and field training are listed in *Appendix 7.1*.

1.6 Programme

The detailed programme of the training workshop is described in *Appendix 7.2.*

2. COURSE CONTENT

This section describes in detail the content of the training workshop. The section is divided into three main subsections – Classroom Component I, Field Component and Classroom Component II. Each section describes teaching methods used.

A participatory and flexible approach was taken during teaching to ensure the course was tailored to the skill level and the needs of the trainees. As a result of the assessments, elements were added to the programme in response to specific requests made by the trainees, and individual trainees were given tasks and responsibilities that reflected their skill level and were continually challenging.

The style of training adopted did not provide answers parrot-fashion but encouraged discussion amongst the team, sharing knowledge and finding individual answers and conclusion. We expected trainees to work through problems and take responsibility for every stage of their learning. The trainees did not appear to be used to this method of teaching. Not providing a specific answer at the beginning of the workshop was sometimes misinterpreted of lack of knowledge on the part of the trainers, and it was extremely encouraging to see their improvement as the training progressed.

2.1 CLASSROOM COMPONENT I

2.1.1 Introductions

LB introduced CB and SB to NH, the Vice Director of the National Park, before the beginning of the workshop. It was important to brief him about the content of the course and to keep him informed of the plan for the two weeks of the workshop.

After the initial presentation about the course content and assessments (*Output 6.1.1, slides 1-16*), the trainees introduced themselves to CB and SB. The trainees were given name badges and asked to wear them during the Classroom Component I.

2.1.2 Initial assessment

An initial assessment was carried out in order to form an impression of each trainee's background, knowledge, aspirations and views on what they wanted to learn. The intention was to alter the course in minor ways to include particular interests of trainees.

Interview: A 30-minute semi-structured interview of each trainee (*Section 3.1.2*, *Appendix 7.3.2*).

Worksheets: To assess the knowledge and skill level of the trainees (*Section 3.1.3*) four worksheets were filled in on the following topics: Camp life (*Output 6.1.2*), Species identification of trees, birds and mammals found in the area (*Output 6.1.3*), Mapping skills (*Output 6.1.4*) and Fieldwork (*Output 6.1.5*).

2.1.3 Biodiversity survey and monitoring theory

The purpose of this session was to introduce to the trainees the theory of biodiversity survey and monitoring.

Teaching methods:

Web-of-life - The session started with a participatory game, web-of-life. Each trainee was asked to play the role of an organism in the ecosystem (including a fruit tree, a fruit-eating bird, a beetle, an insect-eating bird, a raptor, a reptile, a small herbivorous mammal and a large carnivorous mammal). The trainees were asked to brainstorm about the links between different organisms. For each link identified, a bundle of nylon string was passed from one organism to the other and the trainees playing the roles of the respective organisms were asked to hold their parts of the string. This created a complex web connecting all the trainees with each other. At this stage, a human being was introduced in the ecosystem. The human cut down the fruit tree and the whole web collapsed. This demonstrated the importance of protecting all species in the ecosystem and of conservation of biodiversity.

Talk and PowerPoint presentation: The subject was introduced using PowerPoint slides in English and Vietnamese (*Output 6.1.1, slides 17-20*).

2.1.4 Survey planning, Health and Safety, and general field skills

The purpose of this session was to introduce to the trainees the theory of survey planning, consideration of Health and Safety issues, minimising impact on the environment, logistics and general field skills.

Teaching methods:

Talk and PowerPoint presentation: The subject was introduced using PowerPoint slides in English with Vietnamese translations (Output *6.1.1, slides 21-24, Output 6.1.6*). In addition to the PowerPoint slides, the trainees were also shown photographs from previous Frontier expeditions.

Worksheets and Discussion: A discussion based on the collective answers to the questions in Survey Plan Worksheet (*Output 6.1.6*) was instigated to draw aspects of survey planning that were not commonly known about.

Writing a survey plan: Each participant was given an hour to write an individual survey plan under exam conditions based on the previous talks and discussion.

2.1.5 Introduction to field techniques

The purpose of this session was to introduce to the trainees a variety of field techniques used for biodiversity survey and monitoring.

Map reading and GPS surveys

Being able to read maps and to use GPS are essential for the survey work. It was also considered important by the Vice Director of the National Park. The theory of GPS was introduced in the classroom.

Bird identification and survey

Techniques, equipment and resources required for bird identification and methods for surveys were introduced in the classroom.

Tree identification and survey

Techniques, equipment and resources required for tree identification and methods for surveys were introduced in the classroom.

Teaching methods:

Talk and PowerPoint presentation: The subject was introduced using PowerPoint slides in English and Vietnamese languages (*Output 6.1.1, slides 25-33*). In addition to the PowerPoint slides, the trainees were also shown photographs from previous Frontier expeditions. The intermittent display of photographs from the expeditions helped to keep the trainees interested in this lengthy classroom session.

Introduction to equipment: The equipment necessary for biodiversity surveys was displayed during the classroom session. All the trainees got a chance to see and use the equipment during and after the session.

2.1.6 Data analysis, report writing and presentations

The purpose of this session was to introduce to the trainees methods of analysing data, writing report and making presentations (*Output 6.1.1, slides 33-37*, *Outputs 6.1.10, 6.1.12 and 6.1.13*). Although this section was presented in the classroom, further practical training was conducted in the field using the data set that the trainees generated at the end of the fieldwork.

Teaching methods:

Talk and PowerPoint presentation: The subject was introduced using PowerPoint slides in English and Vietnamese languages (*Output 6.1.1, slides 33-37*, *Outputs 6.1.10, 6.1.12 and 6.1.13*).

Use of equipment: The trainees, particularly those with some previous knowledge of forest measurement techniques, were interested in calculating basal area and volume of trees. This was not possible in the classroom, so the measurement and calculation was demonstrated using objects such as a glass of water. The trainees were particularly interested in measuring tree heights accurately. While the use of clinometer was demonstrated, it was emphasized that for biodiversity surveys, high accuracy of tree height estimates is not crucial.

2.2 FIELD COMPONENT

After the reconnaissance survey, a suitable location, Cai Quyt mountain on Ba Mun island, was chosen. The location was suitable for transport of material and people, it had enough camping ground for all the participants and plenty of fresh water. The location also allowed access to the speed boat in case of emergency. The criteria used in the choice of the location were convenience and safety, rather than survey plan or sampling design.

The Field Component included field teaching and practical work. The rest of this section describes the teaching methods and practical exercises used for each of the field components, and elaborates on the survey methods used.

2.2.1 Camp logistics

Camp logistics was considered to be an important part of the training. Although some trainees had experience of camping in forest, explaining to them good camping practice was essential.

Teaching methods

Worksheets: In order to assess the collective knowledge of the trainees about camp logistics, they were given a worksheet asking various questions about good camping practice (*Output 6.1.2*).

Discussions: The trainees were encouraged to discuss good camping practice using a schematic diagram of the potential campsite. The trainees were divided into two groups and were asked to mark camping ground, drinking water source, cooking area, washing area, bathing pool, toilet area. The two groups discussed and debated about their proposed camping arrangements. There was discussion about waste management and maintaining the cleanliness of the campsite.

Practical exercise: Some trainees were familiar with the camping area and they were able to make quick decisions about setting up the camp. It took less than two hours before the campsite was fully functional..

2.2.2 Data record management

Three leaders and three assistants were nominated to take the responsibility for maintaining, managing and updating bird, tree and GPS data records. Use of data record books was considered more suitable for compilation of the data rather than using data sheets, mainly because of the ease of maintaining bound books in comparison with loose leaves.

2.2.3 Tree identification and survey

This was considered an important part of the training course. The National Park currently suffers from unsustainable logging. Tree identification and surveys were considered useful because of the need for the knowledge of tree species and exposure to various tree survey techniques, in order to be able to manage the resource sustainably.

Tree identification

Teaching methods

Worksheets: As preparation for tree identification, the trainees were given photocopied sheets containing black and white drawings of leaf shapes and types (*Output 6.1.8*). Many trainees were aware of the local names of common valuable timber trees because of their Forestry background. However, the knowledge about the principles and practice of tree identification were lacking.

Presentation by local expert: A local tree expert, TN, was invited to give a presentation about plant identification techniques, and collection and preservation of plant specimens.

Talk with visuals: For tree diversity surveys, it is important to be able to identify trees based on their vegetative characteristics, mainly because flowers and fruits are not available throughout the year. The trainees were introduced to basic leaf types – simple alternate, simple opposite, palmately and pinnately compound leaves; and imparipinnate and paripinnate compound leaves – using schematic drawings on whiteboard.

Practical exercise: After the explanation of leaf types, the trainees were divided into two groups and given half an hour to go and collect from the forest all leaf types drawn on the whiteboard. The two groups were asked to display all the leaf types using the collected specimens. The competition between the two groups encouraged them to make the best effort to collect leaves of all types.

Vegetation sampling design

Some of the trainees had provided help to Frontier volunteers on previous expeditions. Although some were aware of plot measurement techniques, it was thought essential to introduce to them the rationale for sampling vegetation.

Teaching methods

Talk with visuals: The subject was introduced using schematic diagrams of sampling designs, namely, systematic and random; and sampling units, namely, plots and transects.

Discussion: The trainees were encouraged to discuss the suitability of sampling design before they started vegetation surveys. However, they were not able to discuss pros and cons of various sampling designs and come up with a practical solution without having done vegetation surveys in the forest near the campsite. The discussion was initiated once again after the first day of vegetation survey practice, but the trainees still found it difficult to discuss.

Practical exercise: The trainees set up plots in random design.

Vegetation survey techniques

Teaching methods

The trainees were divided into two groups. Techniques of setting up vegetation plots and vegetation transects were demonstrated. The trainees needed to demonstrate correct use of compass and clinometer, precautions that need to be taken while measuring distances with tape measures (e.g. avoid twists) and using dbh (diameter and breast height) tapes.

Practical exercise: One group was asked to set up a plot and the other group was asked to set up a transect. Some trainees had assisted Frontier volunteers in using the vegetation survey equipment, but had not used it on their own initiative. Most trainees were able to grasp the techniques easily.

Tree data record management

Teaching methods

During class work the trainees were encouraged to come up with a list of parameters that they wanted to measure in vegetation surveys. The discussion had to be guided in order to ensure that all the necessary parameters were measured. (NH) and an assistant (PP) were nominated to take the responsibility of maintaining, managing and updating tree data records.

Practical exercise: One individual from each group recorded tree data in their field note books. After each day's work NH and PP were responsible for recording all the data collected by both groups into the data record books.

Survey and Research Methods (Trees)

Aim:

The aim of tree surveys was to test whether the disturbance to the forest vegetation decreases with increasing altitude on Ba Mun island. Lower altitudes on the island are often more accessible than the higher altitudes. The disturbance to the forest caused because of logging is therefore likely to be higher in parts of the island near to the coast than on the slopes of Cai Quyt mountain.

Due to the limited time available for the workshop fieldwork, one of the objectives of tree survey was to determine the sample size of trees necessary for obtaining a good idea of species diversity on Cai Quyt mountain.

Plot sampling:

A systematic sampling design was used in order to test qualitatively whether the structure of forest is different at low and high altitudes. Five plots of 10x10 m^2 were set up at 20, 50, 80, 110 and 140 m a.s.l. (above sea level) on random side – left or right – of a path leading up to the mountain top. The plots were established so that the plot boundaries are along cardinal directions and the plots are 10m away from the path in order to avoid the effect of disturbance on the forest structure. All trees ≥ 6cm dbh were marked and identified to species level with the help of TN. The dbh was measured using a 1.3 m stick. For each tree, height was estimated using 2.5 m long sticks (the use of clinometer was found difficult because the tree tops were often not visible due to the dense undergrowth). The distance of the tree along X and Y axes of the plot was measured. The extent of the canopy of each tree in N, S, E and W directions was measured on the ground. Two 2x2 m^2 subplots were set up in two corners of the plot in order to sample ground flora. Species were identified by TN and the number of individuals of each species were counted. Species were assessed according to their abundance were obtained by adding the numbers of individuals counted in two plots (Based on a pilot survey, the following rule of thumb was used: >30 individuals = Abundant, 5-30 individuals = Common, <5 individuals = Rare). Vertical profiles of forest structure and canopy maps were drawn for each plot. The sketches were compared in order to examine the level of disturbance and its effect on the forest structure. The estimates were purely qualitative.

Transect sampling:

In addition to plot-based vegetation surveys, trees were enumerated along transects and identified to species level with the help of TN. Two transects were used, one along a stream and the other along a path. Trees within 1m on both sides of the transect were included. Species accumulation curves were plotted for the stream and the path transects using number of trees sampled on the X-axis and the cumulative number of species on the Y-axis; and a comparison was made of the pattern of species accumulation.

2.2.4 Bird identification and survey

In the human-used landscape of the National Park, understanding and distribution of bird diversity may be a useful indicator of forest quality. In the long term, this understanding is likely to be valuable for sustainable management of the National Park. It was therefore

important to include bird identification and survey techniques as a component in this training workshop.

Bird identification

Teaching methods

Worksheets: As preparation for bird identification, the trainees were given photocopied sheets containing black and white drawings of morphological features and the names of body parts of birds (*Output 6.1.9*).

Some trainees were aware of the local names of birds. However, their knowledge about good bird watching practice was limited.

Talk by local expert: The trainees were given a presentation about bird watching, species identification and sampling techniques by a Vietnamese bird expert, TL.

Introducing Equipment: The use of binoculars to the trainees was demonstrated.

Talk: A presentation on taking notes of bird observations was given, followed by a discussion on what needs to be recorded while taking notes of bird observations. The technique of drawing a simple picture of a bird and adding a variety of morphological features to the sketch was demonstrated.

Discussion: A brainstorm of the type of records that would accompany a bird observation was undertaken.

Identification: Birds in Vietnam, as in most parts of the world, are very well studied and field guides in local languages were easily available for amateur birdwatchers. The use of field guides for bird identification was demonstrated to the trainees and they were encouraged to compare their bird notes with the description in the field guide in order to attempt accurate identification. The emphasis was given to detailed observation, good record-keeping practice and accurate identification.

Practical exercise: The trainees were asked to observe birds around the camp, to draw sketches and to take notes of their observations. They were made aware that while experience is necessary for authentic identification just by observing the bird, the experience can be gained through sincere observations and note taking. At the end of the training, they were given a CD ROM of bird calls in order for them to become familiar with identification by bird calls.

Bird survey techniques

Teaching methods

Without sufficient experience of being able to identify birds by observation and by calls, it was thought that techniques such as transect walks and point counts are difficult for the trainees to practise. The emphasis of bird surveys, therefore, was on observing, identifying and recording birds in order to make a species checklist.

Practical exercise: The trainees were divided into three groups, each accompanied by an experienced staff member – TL, SB and CB. The trainees were encouraged to observe birds carefully and to make notes. The experts helped the trainees to confirm species identity of birds using field guides.

Bird data record management

Teaching methods

During class work the trainees were encouraged to come up with a list of things that they wanted to record about birds. (HK) and (PL) were nominated to take the responsibility of maintaining, managing and updating bird data records.

Practical exercise: All trainees recorded their bird observations in their own field note books, including a sketch of the bird. At the end of each bird watching session, trainees were helped to identify species of birds that they observed. HK and PL were responsible for ensuring that each trainee and other participants have recorded their confirmed (preferably to species level) observations in the data record book.

Survey and Research Methods (Birds)

Aim:

The aim of bird surveys was to make a checklist of species observed during the weeks forest stay. One of the objectives was also to construct a species accumulation curve in order to determine the amount of effort necessary to get a good idea of species diversity on Cai Quyt mountain,

Bird observation and identification:

The trainees were divided into three groups, each accompanied by an expert. Three groups went out to different parts of the forest, between 11 am and 12 noon on one morning and between 5 am and 8 am on three mornings. Birds were observed using standard bird watching binoculars (8x40). The time and date of observation, the description of the habitat where the bird was sighted the location where possible, and the height of the bird in the tree were recorded in the field notebook. The number of birds sighted was also recorded. A sketch of the bird was drawn in the field notebook and the morphological features described using the sketch. Species were identified using a Vietnamese field guide, 'Chim Vietnam' (Cu *et al.*, 2000). Field guide in English language (King *et al.*, 1975) was also used with the help of experts and trainers because some species observed during the field work were not found listed in the Vietnamese field guide. A list was made of all the correctly identified species.

Estimating effort:

All sightings of birds were arranged in chronological order. Species accumulation curve was constructed using times of observation on the X-axis and cumulative number of species on the Y-axis.

2.2.5 Mapping and use of GPS

Being able to use GPS and to make use of the information obtained using GPS for mapping was an important component of the training workshop. The use of modern GPS technology is likely to be useful for the National Park in order to map the existing habitats and to plan their management in future. Tree and bird surveys during the present workshop were supplemented by GPS surveys.

Marking waypoints and mapping route

Teaching methods

The trainees were divided into two groups. Each group was explained the functions of different keys on GPS receiver. Demonstration of marking a waypoint and saving it was given. The technique of marking a route using more than one waypoints was demonstrated. The use of GOTO function in the GPS was demonstrated by navigating to the campsite from a distant waypoint.

Practical exercise: The trainees were asked to use different keys on GPS receivers and repeat marking a waypoint, marking a route and navigating to the campsite. More extensive GPS surveys were carried out later on at points corresponding with the locations of tree plots, tree transects and bird surveys.

Locating points on the topographic map

Teaching methods

The trainees were introduced to the concept of grid systems, and X and Y co-ordinates using paper maps (in conjunction with the worksheets). The available topographic map of Ba Mun island used UTM/UPS grid system. The conversion of co-ordinates from one grid system to the other – from degrees, minutes, seconds to UTM/UPS and vice versa – was demonstrated.

Practical exercise: The trainees were asked to use different grid systems on the GPS and convert co-ordinates from degrees, minutes and seconds to UTM/UPS and vice versa.

GPS data record management

Teaching methods

During class work the trainees were encouraged to come up with a list of things that they wanted to record in GPS surveys. A discussion facilitated by the trainers was conducted to ensure that all the necessary recording was made. (PD) and (LK) were nominated to take the responsibility of maintaining, managing and updating GPS data records.

Practical exercise: All trainees recorded the GPS co-ordinates corresponding with the vegetation plots, a range of points along vegetation transects and bird survey points. PD and LK were responsible for ensuring that each trainee and other participants have recorded their GPS survey points in the data record book.

Survey and Research Methods (GPS)

Aim:

The purpose of GPS surveys was to identify and map bird and tree survey locations on the topographic map of the study area.

GPS surveys and mapping:

Garmin 12 and 48 GPS receivers were used. The scale on the topographic maps was 1:25,000. Points were marked corresponding to bird survey locations, tree plot locations and various points along vegetation transects. The date, time and description of the location was made with each marked point, and sometimes a sketch map was made to accompany the record. GPS receivers were set to India-Thailand projection in order to be consistent with the projection of the topographic maps. Co-ordinates in UTM/UPS grid system were recorded in the field notebooks. The topographic map were enlarged using a photocopier and traced on graph paper before plotting the points, in order to be able to mark the points distinctly on the map. A very large scale map was also prepared for display in the classroom during presentations.

2.2.6 Management Game

Management of Bai Tu Long Bay National Park poses a challenge to the managers because of the variety of ecosystems present within the National Park boundaries and a range of stakeholder interests in the natural resources therein. It was thought necessary to include a management role play game in the training workshop in order to assess the trainees' ability to show a basic understanding of the issues involved, and to demonstrate some principles of natural resource management.

Teaching methods

A schematic diagram of a fictional area was drawn on paper (*Output 6.1.7)*. Each trainee was given one such map and was asked to represent an organisation that had a stake in the management of the fictional area *(Appendix 7.3.7*). PP and NH represented ecologists, NU represented a logging company, PL and HK were local people and PD represented a tourist company. Each group of stakeholders were given a set of questions relevant to their role in the management game. They were given 24 hours to prepare a five-minute presentation using these questions as a guideline. The trainees were required to give a presentation to CB and SB, who represented the government, in order to present their case as effectively as possible. The trainees were told that the government will make decision about the management of the fictional area based on the strengths of the trainees' arguments.

Practical exercise

The role play game took place in a formal setting. The government introduced the subject and requested each group of stakeholders to present their case. Each group was given a strict time limit of five minutes. After all the presentations were over, the forum was open for questions. Each group of stakeholders were asked questions by other groups. Each group was required to defend their case by answering the questions. The question-answer session lasted for five minutes for each group. The government listened to the arguments and the following discussion carefully with the help of the translators, VN and LD. CB and SB discussed the strength of each case and made the decisions about the management of the fictional area. The

decisions were announced the next day. The description of how each trainee performed is in *Section 3.1.8*. The transcripts of the discussion are in *Appendix 7.3.7*.

This was followed by a further teaching session about lessons learned from the management game, and aspects that one would need to consider in order to make an effective management plan. A sequence of stages that would have to be completed including the review process were demonstrated. The qualities of criteria and the type of indicators that would be required to monitor the success of a management plan, including economic, social and environmental indicators were discussed.

2.3 CLASSROOM COMPONENT II

2.3.1 Individual training and feedback

Individual feedback sessions were arranged in order to give the trainees an opportunity to express how they felt about the training workshop and discuss the progress they have made. They received feedback on their performance and some parts of the course were reiterated. The emphasis during these sessions was on those components of the training workshop that the individual trainees would benefit from more practice. All participants demonstrated their use of the GPS. Each feedback and training session lasted between one and two hours (*Section 3.2.3, Appendix 7.3.9*).

2.3.2 Discussion of analyses, conclusions and recommendations

The trainees were able to perform the analyses after the initial demonstration, however, they struggled to interpret the analyses, draw conclusions and come up with recommendations. It was therefore necessary to discuss this with the trainees individually.

Teaching methods:

CB and SB had one-to-one sessions with individual trainees and asked them, what the analyses told them and what conclusions they would make. Considerable emphasis was placed on questioning the trainees in order to make sure that they interpret the results correctly and draw sensible conclusions.

2.3.3 Report writing

The trainees had about 48 hours to write the report. Each trainee was responsible for one section of the report; the sections included Introduction (NH), Resources (LK), Materials and Methods (PL), Tree Surveys (PP), Bird Surveys (HK), GPS Surveys (PD) and Conclusions and Recommendations (NU) (*Section 3.1.7*, *Appendix 7.3.8*).

Teaching methods:

SB had one-to-one sessions with individual trainees and asked them with the help of translator, LD, what they wanted to include in the report. The trainees came up with draft sections of their report. After reading these drafts, it was clear that further help with the report writing section was required. Questions were used to guide trainees' answers to help them with structure and relevant content. These questions were discussed with the individual trainees and they were asked to write the final report. They were encouraged to use the report writing guidelines (*Output 6.1.12*) that they were given at the beginning of the training workshop.

2.3.4 Presentation of results

Each trainee was responsible for presenting section of the report that was written by them. They were given about 12 hours to prepare for the presentation. Each presenter was given 10 minutes and extra 5 minutes were allocated for the audience to ask questions.

Teaching methods:

The trainees used the presentation guidelines (*Output 6.1.13*) that they were given at the beginning of the training workshop. A talk about effective presentation techniques was given.

2.3.5 Final assessment

On request from the Vice Director of the National Park, an examination was designed for all the trainees. The examination consisted of 25 multiple choice questions divided into different sections according to the different components of the workshop (*Output 6.1.14*). The answers of all the trainees were assessed immediately and discussed with them (*Section 3.1.9*).

2.3.6 Feedback questionnaire

All the trainees were given an opportunity to respond to a series of multiple choice questions in order to state what they felt about various components of the training workshop. The choices included 1. Strongly agree; 2. Agree; 3. Disagree; and 4. Strongly disagree (*Output 6.1.15*).

3. ASSESSMENT AND FEEDBACK

Assessment and feedback were regarded as essential and integral parts of the training. Our work-schedule and approach to assessment was quite formal to emphasize the high performance we expected from the trainees.

This section outlines; the methods of assessment and feedback used throughout the training, the components of the course it applied to, gives an overview of the group performance or general findings and gives comments about each method.

Assessment and feedback was used to:

- Ensure the workshop and training was at an appropriate level for the trainees,
- Teaching was appropriate and relevant,
- Trainees were improving their knowledge, field skills and reporting ability,
- The stakeholders were happy (experts, national park directors, trainees)

Methods of assessment and feedback were:

- A completion record to monitor attendance,
- An initial interview to for a first impression of each candidate's knowledge and interest in the course,
- Worksheets to determine the level of basic skills and knowledge, and the interests of each candidate with respect to the course,
- Observation to monitor behaviour and skill level,
- Data handling from the field to the classroom,
- Formal and informal questioning,
- Performance in a management role play,
- Standard of written work in planning, analysing results and reporting on the survey,
- Presentation of the results to the vice director of the national park,
- A comprehensive individual feedback session,
- A multiple choice assessment,
- Opportunistic informal feedback and,
- Feedback forms for the trainees at the end of the course.

3.1 ASSESSMENT

From the beginning of the course we were very clear that assessment was part of the training and that CB was responsible for continuous assessment and feedback. An assessment sheet was given to each trainee to clarify what they will be assessed on and how (*Output 6.1.11*).

This section provides a summary of each method of assessment; a description of each method and its objective (*Description*), which aspects of the course it was designed to assess (*Content*), refers to any training or research outputs (*Outputs*), a group overview of the result of the assessment (*Performance Summary*) and any other comments relevant to this assessment (*Comments*).

3.1.1 Completion Record

Description The sections the trainees carried out were recorded to ensure each attended and completed all parts of the course.

Content Applicable to every part of the course.

Outputs None.

Performance Summary *Appendix 7.3.1* shows the completion record of all who participated in the workshop. Unfortunately the Vice Director (Mr Hung) and the Head of Science (Mr Dinh) were unable to attend the whole course. LK, the most experienced boat handler on the course missed a number of sessions because of problems with the boat. The other trainees, with only minor exceptions were able to able to complete all sections of the course.

Comments We were satisfied with the attendance during the training. Course materials were given to the national park for those who were unable to attend the course.

3.1.2 Initial Interview

Description A 30 minute semi-structured individual interview was given to form an initial impression of each trainee's background, knowledge of the park, aspirations, and view about what they expected and wanted to learn. This enabled the course to be altered in minor ways to include the trainee's particular interests. The interview was based on the questions listed in the box below. Examples of interviews with members of the Science Department, Conservation Department and the Forest Protection Department (transcribed from notes taken during the interview) are documented in *Appendix 7.3.2*.

Interview Questions

About themselves:
What is your name?
How long have you worked in Bai Tu Long Bay?
What do you like/ dislike about it?
What are you good at?
Is there anything you would like to get better at?
Is there anything that you would like to achieve but have not been able to?
What are your aspirations?

About Bai Tu Long Bay:
Tell me about the National Park and the surrounding area.
(inc. people, islands, animals and plants, geography)
What does Biodiversity mean?
Do you think the park could be improved?
Have you learnt anything from Frontier that you think has helped you carry out your job?
Do you know of any other organisations that work in Vietnam with conservation, natural resource management?

About the Training:
What do you expect to learn?
What do you want to learn?
How might this help you to manage the National Park?

Content Introductions (*Section 2.1.1*) and Initial Assessment (*Section 2.1.2*).

Outputs None.

Performance Summary There was a strong indication of a wide variety of knowledge and knowledge gaps, ranging from detailed science knowledge to apparently no knowledge of the National Park, science or management. Some had been to forestry or fishery college and some had worked with research organisations before. Other trainees had had no formal training to manage the park, with very limited access to technical help. Many stated their desire to learn survey skills and be able to manage the national park more effectively. Many had ideas about improving the management of the park, such as increasing the funding, capacity, equipment, technical assistance, more patrolling, a more in depth understanding of the natural resources to provide information about the forest protection department, fisheries training, developing tourism, animal rescue centre. Data about the park seemed limited, and when asked, most trainees repeated the same set of statistics without much further elaboration. This could have been the way the question was phrased, lack of information, or that the trainees did not have access to the information. Organisations mentioned by trainees were Frontier, DINIDA, UNDP, SNV, WWF, IUCN, FFI, Birdlife, Darwin, PAM, IBEA and two local NGO's.

Although it was not possible to tell from the initial interview whether they were honest answers, the interviews generally gave a positive first impression, and it seemed that most trainees were keen to do the workshop.

Comments This was a very good way of making an initial assessment of each trainee, and developing an initial rapport. Having individual interviews allowed us to get a feel for the different characters, interests and skill levels, and gave the opportunity for each trainee to present themselves as they wished to be viewed. They also had the opportunity to ask any questions and state opinions about what they wanted from the course and why.

As a result of these interviews, we were able to think about how we can get the best out of each trainee and how to pitch the work. At the request of two trainees we added basic principles of management and monitoring, and related the training to fisheries.

3.1.3 Worksheets

Description To assess the knowledge and skill level of the trainees, each was given a series of questions about camp life, species of birds, trees and mammals potentially found in the area, mapping skills and fieldwork. These were not intended as a 'test' but used solely to tailor the course to their skill level. A summary of answers to each of the questions can be found in *Appendix 7.3.3.*

Content Initial Assessment (*Section 2.1.2*), Survey Planning, Health and Safety and General Field Skills (*Section 2.1.4*), Introduction to Field Techniques (Section 2.1.5), Camp Logistics (*Section 2.2.1*), Tree Identification and survey (*Section 2.2.3*), Bird Identification and Survey (*Section 2.2.4*), Mapping and use of GPS (*Section 2.2.5*).

Outputs Worksheets 1 - Camp Health and Safety (*Output 6.1.2*), Worksheet 2 – Species Identification (*Output 6.1.3*), Worksheet 3 – Mapping (*Output 6.1.4*), Worksheet 4 – Good Science Practice (*Output 6.1.5*).

Performance Summary

1. Camp Health and Safety: According to the worksheets, some trainees were aware of potential risks and potential environmental impacts when doing fieldwork and how to minimize them. People who had worked with Frontier previously had a much better idea about these issues. Others had little or no concept of the effect people could have when camping in an area. They suggested ways to prevent impacts or hazards were to 'follow the rules' or 'know how to prevent impacts'. Similarly, when asked to describe how one would go about choosing a campsite, there was a marked difference between those who had and had not set up a campsite before. A translation misinterpretation made it difficult to assess if the trainees were fully aware of the sorts of equipment needed to carry out fieldwork.

Comments

Generally we were not satisfied with the answers of the camp health and safety; several discussion sessions in the classroom and in the field were used to highlight the key issues. Some trainees were asked to redo some of the questions during the feedback sessions at the end of the training.

Performance Summary

2. Species Identification: The results of this worksheet indicate that the trainees have some knowledge of the types of animals and trees found in the locality, but are not used to identifying them to species level. Most mammals were correctly identified by the local name to genus level, but in some cases the pictures were not good enough to identify to genus level. Between 0 and 3 trees were identified (out of 6) and usually 3 or 4 birds (out of 9) to genus level by the local name. These were the large conspicuous birds, and there was very little recognition of the smaller forest birds

Comments

The trainees used books and discussed amongst themselves the answers to the questions so it was not possible to assess individual knowledge. It did identify some resources of the park and show ingenuity on the part of the trainees.

Performance Summary

3. Mapping: With one or two exceptions, the answers to these questions were identical and correct. They tested knowledge of symbols, use of the legend, scale and grid systems. We supposed few trainees would be able to answer the questions independently.

Comments

The information on some of the worksheets was identical, so although it did not give a good indication of the range of individual knowledge it was useful to establish collective knowledge. Some map work was repeated when doing individual assessments with the GPS towards the end of the course.

Performance Summary

4. Good Science Practice: encouraged the trainees to identify qualities necessary to carry out good fieldwork, identify types of survey work and aspects that are normally recorded during surveys. There was a significant variation in the quality and content of the answers to the questions that clearly highlighted candidates that have worked in some surveying capacity before.

Comments

We were generally pleased by the range of answers given to these questions. These questions were discussed in detail with the two trainees that did not complete this worksheet.

General Comments This was a useful exercise which in some cases highlighted the differing knowledge levels and in some cases indicated group knowledge and a resourceful approach to finding information. This exercise remained relevant throughout the teaching to benchmark the amount the trainees were learning.

3.1.4 Observation

Description All staff, facilitators and trainees had the opportunity to comment on each trainee's behaviour and skills in the classroom and the field. A rough criteria was drawn up (Please see the box below), based on the assessment sheet given to the candidates at the beginning of the course (*Output 6.1.11*), but we preferred a non-prescriptive, opportunistic approach to this type of assessment. Each trainee was given comments during the individual feedback session. Comments about individuals can be seen in the summary sheet in *Appendix 7.3.9*.

Staff were looking for:

1. Demonstration of an awareness of camp health and safety and environmental impact,
2. Improvement in use of field equipment (GPS, compass, binoculars, dbh tape, clinometer),
3. Improvement in observation skills, marking plots measuring trees and taking plant samples,
4. Appropriate and professional behaviour in the classroom and the field with a high level of interest and effort,
5. Effective teamwork, and organisational skills.

Content Applicable to every part of the course

Outputs None

Performance Summary **1. Safety and Environmental impact:** The demonstration of health and safety issues was good amongst trainees, but their attempts to minimise environmental impact was generally low. The trainees showed a reluctance to deal with water, human and non-biodegradable waste in an appropriate way, even after lengthy discussion. Although there was a marked improvement throughout the course, litter was a persistent problem that had to be dealt with on a regular basis.

Comments This is likely to be an issue that is not regularly dealt within the normal course of business and may not be reflected in future work practices unless good waste management principles are reinforced.

Performance Summary **2. Field Equipment:** The trainees all demonstrated that they were able to use the field equipment, and most were confident and capable. The GPS was in English, which caused a problem initially. We used three different GPS models to demonstrate some differences in format but similarities in terminology, which should help them transfer their knowledge to most GPS systems. At the beginning of the field session, trainees were not very mindful about looking after the equipment and books available to them. This improved throughout the field course. It took a couple of days before the trainees took all the equipment necessary for vegetation surveys.

Comments We were confident that every trainee would be able to use field equipment effectively. When the national park receive equipment it will be very important to make sure each trainee knows how to look after the equipment as well as how to use it.

Performance Summary **3. Field Skills:** The initial observational ability of the trainees varied greatly. Although some improved, we felt more time was needed with each trainee to help develop that skill. It took time and effort to observe birds, and it was a new skill to use binoculars and record what was observed. There was initial difficulty getting some trainees to observe the bird for as long a time as possible to remember as much detail as they could.

Marking plots, measuring trees and taking plant samples was generally done with accuracy and confidence. Unlike observation skills, many of the trainees were familiar with these techniques from Forestry College or working with botanists and Frontier in the past. It was sometimes difficult to get the trainees to swap jobs because of the pecking order of the group, but we were confident that all trainees were able to set up a plot, measure trees and take samples.

Comments We were extremely pleased with the progress the trainees made on the course. They now need to practice and build on skills developed during the course – particularly the field observation. Most would be able to provide excellent support for a research team, and be able to carry out the practical side of monitoring, if given technical help during the set up and analysis. We hope the trainees get the opportunity to develop and build on the skills learnt during the training.

Performance Summary **4. Behaviour:** The majority of trainees were positive, polite, uncomplaining and professional. The overall experience was extremely encouraging and the trainees worked very hard. We were very pleased with their progress. There were times when a few trainees were reluctant to participate fully in the fieldwork and try to develop skills that they were not already familiar with. One trainee, although clearly very knowledgeable and well trained was not willing to put the effort into some tasks and we were not confident that the data collected was accurate. In the classroom sessions, drinking alcohol at lunchtime would have seriously impeded progress made in the afternoons, so alcohol was strongly discouraged. Even so, a number of trainees continued to drink and this reflected in their ability to produce good work.

Comments Their behaviour throughout the training is a good reflection on their potential to do significant work in the future.

Performance Summary **5. Teamwork and organisation:** Generally, the trainees worked well as a team, although the hierarchy remained apparent throughout the course. NU, as team leader of the workshop was managing the group and providing feedback for the staff. We were generally satisfied that the trainees were sufficiently organised when undertaking the training, although at times punctuality was an issue. There was one point where the trainees responsible for different data sets were asked to explain to the others about what data to collect and record. The reluctance of the trainees to do this resulted in confusion of the associated data that needed to be recorded with each plant, bird and GPS recording.

Comments Trainees should work on sharing knowledge and by helping and encouraging each other to achieve targets.

General Comments Observation is an excellent way to get a rounded impression of the progress individuals made, taking opinions from many sources into account.

3.1.5 Questioning

Description Much of the assessment was targeted to informal questioning to ensure each trainee understood key points during the training (see box below for broad criteria for questioning). Group and individual questioning continued throughout the whole course, and formal questions were given during the feedback sessions towards the end of the course. Some comments about individual progress can be seen in the summary sheet in *Appendix 7.3.9*.

Through questioning, the trainees were required to demonstrate the following:

1. Improvement in the level of understanding of biodiversity conservation and resource management issues in Vietnam, survey and monitoring, and the logistics required to carry out the surveys.
2. An understanding of why it was important to survey and how science can be used to answer management questions and help with monitoring.
3. An awareness of how to find relevant information and which organisations may be able to provide technical advice, information or funding.
4. The ability to explain the use of field equipment (GPS, compass, binoculars, dbh tape, clinometer).
5. An understanding of the analysis and how to interpret the data once it has been analysed.
6. An understanding of the importance of reporting and the potential target audience.

Content Applicable to every part of the course.

Outputs None.

Performance Summary **1. Biodiversity in context:** The initial level of knowledge for each trainee was very varied, and we tried to make sure that the trainees were sufficiently stretched by giving them individual responsibilities and questions targeted to improve performance. The trainees often knew that biodiversity was important, but not why it is important, and were not able to cite examples easily. At the end of the training course, the level of knowledge of each trainee still varied, but we felt all knew more than when they started.

Comments It was not possible in the time available to give the trainees a good general background on conservation biology. We would strongly encourage all the trainees to read around this subject to gain a deeper understanding of the local, national and international initiatives that may be useful to Bai Tu Long Bay in the future.

We had devised individual exercises for each of them based on areas we thought they could improve upon, but unfortunately there was not enough time to implement this without detracting focus from the analysis and report writing, so it was largely abandoned.

Performance Summary **2. Science, management and monitoring:** Through the management game, most trainees were able to understand the place that science had in monitoring and management. Transcript were taken from the notes made during the role play (*Appendix 7.3.7*).

Comments It would be necessary to do further training for the trainees to be able to formulate a management and monitoring plan without technical advice.

Performance Summary **3. Sources of information and help:** Some knowledge about information gathering and relevant organisations was apparent.

Comments It would be useful to help the trainees increase their understanding of relevant organisations in order to form collaborations, attract funding and gain technical assistance.

Performance Summary **4. Field Equipment:** All candidates were able to explain the principles behind the GPS, how to make waypoints and how to relate the information to topographic maps in Vietnam.

Comments There was significant emphasis on the GPS, and we were careful to ensure all the trainees were confident with this equipment. Although the trainees appeared confident with the other science equipment, we were not able to specifically question most trainees about their use.

Performance Summary **5. Analysis:** Analysis was discussed at length in the field and the classroom sessions. Each trainee was responsible for a different section of the report, most of which were required to analyse data, and one more required to interpret it. This meant not every trainee got the chance to directly analyse the data collected, although all were given exposure to different types of analysis and given the opportunity to discuss the analysis and suggest possible conclusions and recommendations.

Comments Although there was considerable emphasis on the analysis and interpretation of data, in order for all the trainees to become fully aware of all the types of analysis and what inferences can be drawn from them, a large amount of time needs to be spent with each candidate, which this training was not able to do given the time and personnel constraints.

Performance Summary **6. Reporting:** Through the presentations and report writing, most trainees understood the value of reporting. There was less understanding about targeting the nature of the report or presentation to suit the audience or the aim of the report, but there was not enough time to explore this in depth. Most trainees were not clear about the way in which a normal science report was structured, often confusing the difference between a method, result, conclusion and recommendation.

Comments Trainees need more practice to be proficient at reporting, and should read as many reports as possible to get a feel for the current standards and nature of reporting.

General Comments Group questioning was less successful because the discussion was dominated by a few members of the group, so we generally opted for targeted questioning, either in a group or individually. In order to avoid 'yes/no' answers, the questions tended to be structured in a way that required an explanation that more fully demonstrated the trainee's knowledge. This occasionally caused confusion when the nature of the question was too broad, or lost in translation, and on a couple of occasions caused misunderstandings, particularly as the trainees were not used to having to explain themselves in this way. On the whole, the trainees became more comfortable with this type of assessment as time went on and were more willing and able to contribute to group discussions and explain themselves more fully.

3.1.6 Data Recording

Description Data recording was regarded as a core skill essential for the trainees to undertake effective survey and monitoring work. The box below outlines what the trainees were assessed on.

Recording and Managing Data

Trainees were required to:

1. Identify what should be recorded in a survey,
2. Accurately record data in the field ,
3. Interpret the data taken in the field and use appropriate judgment to make correct identifications with relevant source materials,
4. Accurately transfer of data from field note books to the central data books,
5. Understand what the data can be used for, how it is analysed and how to interpret the analysis

Content Initial Assessment (*Section 2.1.2*), Survey Planning, Health and Safety and General Field Skills (*Section 2.1.4*), Introduction to Field Techniques (*Section 2.1.5*), Data analysis, report writing and presentations (*Section 2.1.6*), Tree Identification and survey (*Section 2.2.3*), Bird Identification and Survey (*Section 2.2.4*), Mapping and use of GPS (*Section 2.2.5*), Discussion of analysis, conclusions and recommendations (*Section 2.3.2*), Report writing (*Section 2.3.3*).

Outputs Worksheet 4 – Good Science Practice (*Output 6.1.5*), field notes, field data books, analysis (examples in *Appendix 7.3.6*), report (translation in *Appendix 7.3.8*).

Performance Summary **1. What to record:** Most trainees were able to identify some of the data it is important to record during a survey, although less could explain why they should be recorded.

Comments It was not possible to tell from the training whether the trainees would be able to apply the general principles from the training to other methods.

Performance Summary **2. Field notes:** Most trainees, after a number of days in the field were able to accurately record data in the field. It was much easier for the trainees to do the vegetation data, as some were familiar with that before, but the bird data was more difficult, and some trainees would require more time to get used to this form of recording. Even when the trainees had written a list of what data to record in their field note books, there was still a reluctance to record all the necessary data for each sighting. Drawing field notes was difficult for most, so the use of anatomical diagrams to aid descriptions was strongly encouraged. The data of one trainee was questionable, and we were not convinced he was strictly using what he observed to write his field notes.

Comments With more practice, most trainees will be extremely capable of taking accurate field notes.

Performance Summary **3. Identification:** It was difficult to tell whether all the trainees were able to use the data to make the correct identifications. More time would be required with each trainee to establish this. Most trainees were honest about the interpretation of the field notes, so they have the potential in future to be able to keep accurate bird records. The bird expert helped verify the accuracy of the data. Most identification of plant species was undertaken by the botanical expert.

Comments Making consistently accurate identifications is a skill that develops over time and with practice. Trainees progressed and have the capability but will but need more guidance to ensure that identifications are consistently correct.

Performance Summary **4. Data recording:** In all cases, the transfer of data and central record keeping was impeccable. It was logically set out, legible and all the necessary information was recorded. It took a considerable amount time for the trainees to create these data sets and as a result, some data recording was outstanding after the end of the fieldwork.

Comments Although the quality of the work was excellent, the trainees would have to ensure that records were strictly kept was up to date during the fieldwork.

Performance Summary **5. Analysis:** It was difficult to establish each individual's understanding of each type of data set, although most trainees knew about analysis and interpretation of at least one data set by the end of the training.

Comments It would be difficult for most trainees to apply this to many situations, so unless the methods are exactly the same, they should seek technical advice before embarking on a survey.

General Comments We were convinced that the majority of the trainees were extremely capable of carrying out fieldwork and supporting research or monitoring.

3.1.7 Written Work

Description To ensure the trainees were able to accurately relay the information on paper, the trainees were required to write a survey plan on day two of the training, a section of the report, and understand why effective reporting is necessary.

Content Survey Planning, health and safety and general field skills (*Section 2.1.4*), Report Writing (*Section 2.3.3*)

Outputs Survey Plan Worksheet (*Output 6.1.6*), Report Writing Worksheet (*Output 6.1.12*).

Performance Summary **Survey Plan:** It was very difficult for the trainees to write the survey plan after only half a day of teaching. The teaching up to that point had concentrated on the logistics, which were normally the strongest parts of the plans. At this point there was still confusion about what we were going to do in the field so aims and methods were weak.

Comments We were hoping to redo the survey plans to reinforce this but there was limited time available.

Performance Summary **Final Report:** Each trainee was responsible for a different part of the report. Although considerably more work and guidance would be required to produce a report of a publishable standard, we felt each trainee did an excellent job. The report contained all the elements necessary for a good report with some sound analysis of the data and appropriate conclusions and recommendations.

Comments Ideally each person would have written a report, but it was not possible due to time constraints and the amount of translation work involved. It would have been useful at this stage to have given more one-to-one guidance.

General Comments We would strongly encourage the trainees to practice their writing skills (for example articles for the website) and reading relevant publications and consult with experts before putting anything into the public domain.

3.1.8 Role play

Description The management game was used to demonstrate the basic principles and potential complexities of management issues, and highlight the ways that science can be used to answer management problems. It was also used to teach presentation skills in preparation for the final presentation. Each trainee was required to represent an organisation that had a stake in the management of a fictional area (tourist, ecologist, logging company and local people) and present and defend their proposed management options. A transcirpt of the notes taken during the game are recorded in *Appendix 7.3.7*. The box below describes the criteria the group were assessed on.

The Management Game Performance Criteria

1. Ability to empathise with the stakeholder group that they were representing.
2. Strength and imagination of the points put forward in the presentation.
3. Arguments were structured, concise and persuasive.
4. Good use of the map.
5. Strength of the arguments and counter arguments during the discussion.

Content Management game (*Section 2.2.6*).

Outputs Management Game Resource Map (*Output 6.1.7*).

Performance Summary All trainees were good at presenting and arguing their ideas. They got into character well and stayed in character throughout the game. Although many used ideas from their own general knowledge, most did not fully explain how the government would benefit from their management suggestions. Most did not use any visuals to support their case and did not cite specific locations for the management recommendations.

Comments This type of role play is very new to them, and we think they all did extremely well. From the management recommendations and the following discussion they all demonstrated their understanding of basic management principles.

3.1.9 Multiple Choice Test

Description A test was carried out under exam conditions at the end of the course. A multiple choice format was used to minimise translation requirements and so that the results could be given in time for the end of the workshop. The 25 questions were designed to cover the main elements of the course .

Content Applicable to every part of the course.

Output Multiple choice questionnaire (*Output 6.1.14*).

Performance Summary Apart from one trainee, who unfortunately missed several key parts of the course, all scored over 70%. A number of trainees were confused about the content of a survey plan and what to record when taking field notes of a bird. One trainee was under the impression that conservation meant stopping local people from fishing, but most other errors did not reveal fundamental misunderstandings.

Comments There were two slight translation errors that resulted in ambiguous answers. We were very happy with the results of the multiple choice, and felt it was a fair reflection of what they had learnt by the end of the training.

3.1.10 Presentation

Description To encourage the communication of ideas, each candidate presented part of the report to the park vice director and head of science, highlighting new skills and knowledge. Individual comments about the presentations are in *Appendix 7.3.9*.

Content Presentation of results (*Section 2.3.4*).

Outputs Some visuals, Giving Presentations Worksheet (*Output 6.1.13*).

Performance Summary Most presentations contained some structure, relevant information and kept to time. Some of the information was repeated by more than one trainee and only some had prepared visuals but considering some trainees had not given a presentation before, the overall standard was very good.

Comments Many trainees requested that the talks be half an hour each and were surprised at the suggested use of visuals. It was a useful exercise and allowed

the vice director and the head of the science department to get an impression of what the course consisted of and how each trainee had improved.

3.2: FEEDBACK

The following sections explains the types of feedback offered and who it was available to (*Description*), any details of the feedback contained in other sections of the report (*Output*), a general impression of the feedback received (*Feedback Summary*) and a discussion (*comments*).

3.2.1 Initial Interview

Description Through a 30 minute semi-structured individual interview, the trainees were given the opportunity to say what they thought about the national park what they expected the workshop to be like and what they wanted the training to include. There were all asked if they would like to ask us anything or if there was anything they would like to tell us.

Outputs The interview was based on the questions in Section 3.1.2. Notes were taken of the interviews (transcriptions of selected interviews are in *Appendix 7.3.2*).

Feedback Summary A number of trainees were keen to make known their previous experience in biodiversity survey and monitoring which helped us assess the skill levels. Many expressed a desire to learn more about survey work, and some asked for additional tuition on management and fisheries, mangroves and inter-tidal zones.

A number of trainees talked about the limited capacity of the park and asked for assistance in buying basic equipment or help with writing funding proposals so that they could raise the money themselves, and technical assistance to effectively carry out their roles within the park.

Comments We suspected that this generally good first impression may prove not to hold out throughout the training. We were pleased to see that this was not the case and most trainees displayed a desire to learn more.

With the knowledge that there is ample capability within the national park staff we would fully support recommendations for further capacity building of appropriate skills, and help in gaining the correct resources and technical expertise to effectively manage the park.

3.2.2 Informal Feedback

Description All the staff, experts, trainees and key national park staff were asked to make comments and suggestions on topics related to the workshops (See box below), normally on an opportunistic basis. The length of time and depth of the questioning depended on the opportunities that arose before, during and after the training.

People involved in the workshop were asked to provide feedback on:

1. Course content and level of training,
2. Teaching methods,
3. Progress of individual trainees,
4. The extent to which the workshop had achieved its objective.

Outputs None.

Feedback Summary **1. Course content:** There was a high level of interest in learning the skills offered during the training, and the trainees appreciated our attempts to tailor the course to support particular skill levels and areas of interest. As mentioned in other sections, a number of other areas of training were requested (reflected in *Section 4.3.1*).

There was also a strong interest in continuing to practice and build on the skills learnt in the training with several requests for Frontier to continue to work with the national park and numerous suggestions for other capacity building (See *Section 4.4*).

Some non-trainees questioned the reasoning behind the training, claiming that the national park staff would never have the capacity to carry out this type of fieldwork. Most however were surprised and pleased with the progress of the trainees and their ability to learn the skills taught on the course.

Comments Frontier has a two-year capacity building programme which may seek to incorporate some of the ideas of the national park staff into the programme of activities already set up with the park.

We were aware that some negative feedback may have been omitted for the sake of good relations, but the course facilitators did an excellent job of passing on feedback throughout the course that was not directly addressed in feedback sessions.

Feedback Summary **2. Teaching Methods:** Some styles of teaching were more popular than others with the trainees. There was sometimes a general dissatisfaction during group discussions, and some of the group found some of the classroom sessions boring and sometimes difficult to follow. This was particularly the case at the beginning of the workshop. Their interest levels picked up during the practical exercises and they responded well to being given responsibility.

Feedback about the amount that the trainees had learnt during the training, how hard they had worked impressed the workshop staff, experts, and national park staff alike.

Comments Although the trainers put a great deal of effort into making the learning interesting, a certain amount of lack of motivation is expected with some of the dryer aspects of the course, and we expected the participatory style in which it was taught difficult in the beginning. The results however show that overall teaching was extremely effective.

Feedback Summary **3. Individual Progress:** There was no doubt that progress was made by every individual on the course and the feedback of staff and national park staff confirmed this. Less certain was the ability of the group to be able to carry out effective survey design, planning, execution, data analysis and reporting without technical assistance.

Comments Technical guidance is advised for setting up future work for the science and conservation department.

Feedback Summary **4. Workshop Objectives Achieved:** The visible improvements in the skill and knowledge levels of the trainees, and the positive attitude of the key national park staff was extremely encouraging. The progress of the trainees encouraged a renewed sense of faith in their capabilities which will hopefully be reflected in their future projects and access to resources. The feedback reflected unanimous agreement about the success of the workshop.

3.2.3 Individual Sessions

Description Between one and two hours was spent with each trainee during the report - writing phase. This was an opportunity for the trainees to tell us how they felt about the course and their progress. We gave feedback on each area of work that was assessed, and also checked that everyone was able to perform basic functions on the GPS and relate the information to topographical maps. Some were tested on their ability to take accurate field notes and some were asked specific questions to check their understanding on aspects of the course.

Outputs Notes on individual assessments are in *Appendix 7.3.9.*

Feedback Summary The trainees either gave short standard answers about how they have improved and what they thought of the course, or were unwilling to talk about their own performance and talked generally about how the other trainees had performed.

Comments The trainees generally found it quite difficult to talk about how they had improved, or how the course could be improved, so although it was useful in other ways it was very difficult to get valuable and honest dialogue from this session.

3.2.4 Feedback Forms

Description This was the trainees' opportunity to state anonymously on the forms what they felt various aspects of the training. The forms had sixteen 'tick-box style' questions covering the initial and final classroom sessions, field training, how the teaching was conducted and the course content. There were also spaces for trainees who wished to state what lese they would like to be taught and if they had any other comments about the course.

Outputs Feedback Questionnaire Worksheet (*Output 6.1.15*).

Feedback The feedback was overwhelmingly positive. The only negative comment was about the differing skill levels of the trainees. Comments included that the course should be longer, more co-operation with NGOs and Frontier in the future, more research trips, more documents related to the ecosystem in Bai Tu Long Bay, funding for science equipment and a higher level of training.

There was also a long list of things that the trainees would like to learn given the chance (see *Sections 4.3.4* and *4.4*). Other skills the trainees would like to learn include; how to develop an effective management plan, the use of computers (including website design) and other technical equipment, writing project proposals and grant applications, marketing to increase the profile of the park, protections plans for endangered species, ecotourism management, environmental education, English, other aspects of ecosystem surveying and monitoring, socioeconomics skills.

Comments Because of a translation error, there was no 'strongly agree' on some of the forms. The feedback forms were completed straight after the multiple choice exam, and not enough emphasis was given to the anonymity of the form and that there would be no repercussion if negative comments were put on the forms. For this reason we suspect some of the answers were not as honest as we would have liked. Despite this we were convinced that the majority of the trainees were happy with the training they received.

4. RECOMMENDATIONS

This section aims to summarise the achievements of the training workshop, to spell out successes and limitations, and draw a series of recommendations for organising similar workshops in future based on the experience of the present training workshop. The final part of this section makes recommendations to the National Park for future natural resource management.

4.1 ACHIEVEMENTS

- The trainees learnt to prepare a survey plan, which included setting out aims and objectives, choosing survey location, identifying elements of biodiversity that need surveying, making survey schedule and making logistic arrangements.
- The trainees learnt what makes good camping practice, how to consider health and safety issues related to camping in forests and minimising environmental impact.
- During the classroom sessions, the trainees learnt what is biodiversity, why is it necessary to survey biodiversity and the difference between survey and monitoring.
- During the field sessions, the trainees obtained hands on experience of a variety of survey techniques, such as:
    - Preparing sampling design for tree surveys, analysing and comparing qualitatively the forest structure using plot sampling methods and drawing vertical and horizontal forest profiles; constructing species-accumulation curves based on transect sampling methods.
    - Taking notes of bird observations, making species checklists and constructing species-accumulation curves for bird species observed over a period of time.
    - Using GPS for mapping survey locations and being able to read and correlate the information on the maps with that obtained using GPS.
- The trainees learnt and discussed issues related to National Park management through a role-play game, where all of them demonstrated a very keen ability to understand the concerns of various stakeholders whose livelihoods are dependent on the National Park.
- The trainees learnt techniques and good practice of data recording; they showed the ability to analyse the data and to interpret the results.
- The trainees learnt to work together on different aspects of a research report. They showed understanding of the structure of a scientific report and learnt how to report research findings. The trainees also made short presentations based on their own section of the report.

4.2 SUCCESSES

The success of the present workshop has raised expectations of both the Bai Tu Long Bay National Park and the Frontier Vietnam staff and helped continued good relations between the two organisations. We believe that the following are the successes of the training workshop:

4.2.1 Course content

- A flexible approach that tried to incorporate the aspects that the trainees mentioned they would like to learn;
- Except the initial introduction in the classroom, most teaching sessions took place in the field, which made the training workshop practical and therefore directly useful to the National Park staff;
- We used a wide variety of teaching methods; and the participatory and interactive approach to the teaching was successful;
- The intermittent display of photographs from the previous Frontier expeditions, helped to keep the trainees interested in the classroom session.

4.3.2 Course Conduct

- Strict restrictions on consuming alcohol during lunch hours.
- Strictly abiding to the schedule was very important to all the trainees; we made every effort to keep to the schedule, so we endured that schedules were kept to.

4.2.3 Assessment and Feedback

- Formal assessment of performance and feedback of each trainee.
- The trainees had various abilities; individual assessments followed by personal attention to strengthen weaknesses helped to keep them interested.

4.4.4 Trainees

- We nominated trainees each for taking the responsibility of data organisation of trees, birds and GPS surveys. This helped us to make the trainees keen and interested in the subject that they were responsible for.
- The Head of Conservation department, the most senior trainee in the workshop was asked to give us the feedback on day-to-day basis; nominating him formally to undertake this job helped to ensure that the trainees are happy with the way the training workshop was progressing.
- The fact that most trainees had already taken part in Frontier expeditions meant that they were familiar with the basic field skills – we were able to build on what they already knew.
- Some trainees were extremely capable to grasp easily the field skills that we taught them; they were often motivated to learn and keen to practice the skills themselves.
- A combination of incentives, responsibilities and high expectations kept the motivation of the trainees at a high level.

4.4.6 Trainers

- Presence of two instructors – Biodiversity Trainer and Evaluator helped to keep the trainees occupied in some activity at all times throughout the training workshop; this also helped in dividing workload during preparation before the workshop.

4.4.7 Vietnamese Experts

- Inviting veteran Vietnamese scientists gave credibility to the workshop, in a country where age is highly respected.

4.3 LIMITATIONS

Following are what we believe the limitations of the training workshop; each set of limitations is followed by recommendations for organising similar workshops in future.

4.3.1 Course content

- The course did not include fisheries or marine biodiversity element in the training workshop.
- Surveys of mangroves could not be included in the limited time available for preparation and fieldwork.

  Recommendation: Continued training to the National Park staff in survey and monitoring of marine biodiversity, and other taxa such as mammals and reptiles is essential. Organisations such as VSO (Voluntary Service Overseas) may be involved to identify individuals who can provide such training. The most ideal option would be to have applied the research directly to a management plan scenario so that the results could go directly to a monitoring plan, or a monitoring plan be set up as part of the course.

4.3.2 Course conduct

- The trainees were not used to participatory teaching – they sometimes did not share ideas among themselves nor did they have much communication with each other in the classroom.
- Trainees were not used to taking their own initiative – we got an impression that they were doing things because they were told to do so.

  Recommendation: We appreciate that such change will take time to happen, but it is important that the young national park staff are encouraged to take initiative, because they have the capability to do so and are enthusiastic about their work.

4.3.3 Language

- The fact that we did not speak Vietnamese was an obstacle in teaching. While generally the translators did a very good job, they sometimes used their own discretion in conveying the message across.
- The translators all worked very hard because it was practically a 24 hour a day job.
- GPS receivers were in English language; it would have been easier for the trainees to grasp the technique if GPS receivers had Vietnamese option.
- It may be useful to identify Vietnamese trainers for similar activities in future.

Recommendation: Deploying additional translators will be helpful for future workshops.

4.3.4 Trainees

- Time was the main constraint in practising birding skills and plant identification skills learnt during the workshop.
- Time was a limiting factor in being able to write individual reports.
- Putting the one-week field study in the context of the principles of biodiversity survey and monitoring was not possible in the limited time available.
- The Director of the National Park did not have time to come and attend the final presentations of the trainees.

Recommendation: Follow-up of the present workshop is necessary; similar workshops can be organised through continuous support from a collaborative body with technical expertise. It is necessary to ensure that the trainees are encouraged to use what they have learnt. It is also important that the trainees who have shown their talents in the present workshop should be chosen for further intensive training. It will also be useful to focus individual trainees and use one-to-one teaching method to accommodate variable skill levels.

4.3.5 Trainers

- Helping the trainees learn by themselves (for example, we would have liked the trainees to be able to do research for their field experiment) was not entirely possible with the time available and there were instances where we had to instigate a more prescriptive form of learning.
- Asking questions to the trainees as much as we would have liked was not possible - we prepared individually targeted questions or exercises to challenge the trainees to their full potential but they were abandoned so as not to distract from the analysis and report writing.

Recommendation: In future, it will be helpful if the trainers are given extra time for preparation. We understand that workshops lasting more than two weeks are difficult to organise, but we suggest that such workshops can be organised more often or that practice or top-up sessions could be organised to build on or retain existing skills.

4.3.6 Vietnamese Experts

- Although the approach of this training workshop was intended to be participatory – the trainees working on their own initiative to learn the skills that they would like to possess – the Vietnamese experts were not familiar with this approach.

Recommendation: Although we acknowledge that this may be difficult, it will be useful to identify Vietnamese experts who are familiar with the participatory training approach.

4.4 RECOMMENDATIONS

Based on the experience of conducting the present training workshop and reflecting on feedback received during this time, we would like to make the following recommendations to the National Park:

4.4.1 Encouraging promising staff

- It is a common practice for the people at senior positions in the National Park to exercise their superiority over the junior members of staff. Currently, the national park has promising, young staff who will excel in their work provided they receive enthusiastic support and encouragement from the senior officials. We would like to recommend to the senior officials to encourage the promising staff by giving them the opportunity to develop.
- It is important that the trainees of the present workshop are encouraged to practice the skills they have learnt.
- It is also essential that the information is shared so that the National Park staff are able to read around the subject. It is necessary for the National Park to have a central repository of information such as a functional library.

4.4.2 Future Training

- The National Park should initiate exchange programmes with other national parks in the country. TN mentioned that there is an association of national parks in Vietnam, which frequently organises meetings and workshops. Bai Tu Long Bay National Park should send their staff, particularly the young and enthusiastic staff, to take part in such meetings.
- TL suggested that the National Park staff can undergo training in Hanoi with the help of museum specimens of birds and other taxa. The National Park should explore establishing such links with academic institutions in Vietnam.
- Other skills the trainees would like to learn how to develop an effective management plan, the use of computers (including website design) and other technical equipment, writing project proposals and grant applications, marketing to increase the profile of the park, protections plans for endangered species, ecotourism management, environmental education, English, other aspects of ecosystem surveying and monitoring, socio economic appraisal skills.
- Marine habitat forms a large part of the geographical area of Bai Tu Long Bay National Park. Currently there are very few staff with background in marine biology or fisheries. The Park should recruit more people with such background.

4.4.3 Increasing effectiveness of the National Park

- The National Park could be encouraged to form relationships with other conservation organisations in Vietnam; academic institutions such as the IEBR; international NGOs that have presence in Vietnam, such as WWF, IUCN, FFI; other local government and non-government organisations; and other national parks in the country, where the staff are experienced in national park management issues.
- It is important that the National Park improves communication about their activities to national and international audience. This will help them raise the

profile of the Park at national an international level, and attract more funding for management activities.

- Tourism is an important aspect for future development of the National Park. However, experience from other national parks in Vietnam suggests that often the stakeholders are not well informed of the principles of eco-tourism. Environmental education to the staff, the local people and tourist guides, therefore, is an important aspect for the development of the National Park in future.
- With the knowledge that there is ample capability within the National Park staff we would fully support recommendations for further capacity building of appropriate skills, and help in gaining the correct resources and technical expertise to effectively manage the park.

5. REFERENCES

Anonymous (2000) Identification of Animal Traces (In Vietnamese) Institute of Ecology and Biological Resources, TRAFFIC Southeast Asia and Forest Protection Department Vietnam Hanoi

Cu, Nguyen, Le Trong Trai and Karen Phillipps (2000) Birds of Vietnam, IUCN World Conservation Union, The World Bank and Birdlife International Hanoi

Francais C. M. and J. Payne (1998) A Field Guide to the Mammals of Borneo, The Sabah Society, Malaysia

Government of the Socialist Republic of Vietnam (1994) Biodiversity Action Plan for Vietnam Global Environment Facility Report VIE/91/G31 Government of the Socialist Republic of Vietnam Hanoi

Hill, M., D. Hallam and J. Bradley (1997a) Forest Research Methodology SEE Vietnam Forest Research Programme The Society for Environmental Exploration London ISBN 1873070039

Hill, M., D. Hallam and J. Bradley (1997b) Muong Nhe Nature Reserve Biodiversity Survey 1997, Technical Report No 11 Society for Environmental Exploration, London and Institute of Ecology and Biological Resources Hanoi (In Vietnamese)

Ho Pham-Hoang (1993) Trees of Vietnam – An Illustrated Flora of Vietnam Six Volumes, Pham-Hoang Ho, Montreal

Hung, Le Manh, Nguyen Duc Tu, Andrew W Tordoff and Vu Hoang Phuong (2002) A Rapid Field Survey of the Coastal Zone of Quang Ninh, Vietnam, Birdlife International, Danida and Institute of Ecology and Biological Resources Hanoi

King, B., M. Woodcock and E.C. Dickinson (1975) Birds of South East Asia Collins, London

Rabinowitz, A (1997) Wildlife Field Research and Conservation Training Manual, Wildlife Conservation Society New York

SFNC EC (1998) A Training Manual for Biological Surveying EC/MARD Vinh Vietnam

6. OUTPUTS

6.1 TEACHING OUTPUTS

These were the written training documents used to aid the teaching during both the classroom and field elements. They were all translated into Vietnamese and were given to each trainee in a booklet with answers where appropriate.

6.1.1 PowerPoint Presentation

Slide 1

FRONTIER Vietnam

Biodiversity Survey and Monitoring Training Workshop for Bai Tu Long Bay National Park Officers

19 May – 31 May 2003

Slide 2

UK Experts

Shonil Bhagwat, Biodiversity Trainer

Catherine Bloxam, Biodiversity Evaluator

Slide 3

Course Content

Introduction

Informal interviews

Exercises

Dinner

Slide 4

Course Content

In the classroom

What is BIODIVERSITY?

Why protect biodiversity?

Slide 5

Course Content

Biodiversity survey and monitoring

Planning a field survey

Health and safety

Slide 6

Course Content

Out in the field

Map reading and using GPS

Bird identification and surveys

Slide 7

Course Content

Tree identification and survey

Keeping field notes

Slide 8

Course Content

Back in the classroom

Data analysis

Report writing

Slide 9

Course Content

Evaluation of each course trainee

Field notebooks and data record books

Science and Conservation report

Slide 10

Course Content

Presentations

Concluding session

Summary of achievements

Slide 11

Expected achievements

Learn how to plan and carry out surveys

Know how to minimise impact and be safe

Slide 12

Expected achievements

Work together and exchange ideas

Be able to explain to others about the results of your survey

Slide 13

Assessment criteria

Not on the initial performance, but on these five elements:

Survey plan

Continual observation

Slide 14

Assessment criteria

Questions

Presentation

Written report

Slide 15

What we are here for

To answer your questions at any time

To make this course useful to you

To help you achieve what you want to

Slide 16

Discipline

Full attendance of each trainee

No alcohol during fieldwork

Slide 17

What is Biodiversity?

Variety of:

Genes

SPECIES

Ecosystems

Slide 18

Why protect biodiversity?

Species extinction

Remember: Web-of-life

We do not know how many species there are and what roles they play!

Slide 19

Why survey biodiversity?

To understand how many species there are and what roles they play

To manage conservation and use of biodiversity wisely

Slide 20

Why monitor biodiversity?

To evaluate whether management decisions are right or wrong

To take appropriate action

Slide 21

Planning a field survey

Why?

What?

Who?

Where?

When?

How?

Slide 22

Planning a field survey

Survey logistics

Food

Transport

Cost

Slide 23

Health and Safety

Choosing a campsite

Access

Water

Hygiene

Environment

Slide 24

General field skills

Observation

Field notebooks

Data record books

Slide 25

Map reading and GPS

Remember: Map reading exercise

Direction Distances

Scale Other features

Slide 26

Map reading and GPS

Global Positioning System – tells latitude and longitude position of a point on the earth

Signals from satellites

Slide 27

Map reading and GPS

Modern-day maps – use of satellite images

Lot of information about land features

GPS is useful to see what is on ground

Slide 28

Bird identification

Use of binoculars

Topography of a typical bird

What to look for while watching birds

Bird calls

Slide 29

Bird survey

Keeping field notes

Using field guides

Point counts and transect walks

Measuring bird abundance

Slide 30

Tree identification

Use of leaf features

Use of binoculars or fallen leaves

Types and shapes of leaves

Use of bark features

Slide 31

Tree survey

Vegetation plots

Vegetation transects

Collecting specimens for herbarium

Slide 32

Tree survey

Measuring forest structure and volume

Number of trees
Basal area
Height

Use of geometry and trigonometry

Slide 33

Tree survey

Measuring diversity

Number of species

Proportional abundance of species

Use of species accumulation curves

Slide 34

Data analysis

Birds

Number of species

Frequency of occurrence

Abundance – five-point scale

Slide 35

Data analysis

Trees

Number of species

Number of individuals

Plotting species accumulation curves

Slide 36

Data analysis

Trees

Calculating basal area

Calculating height

Slide 37

Report writing

Presentation of analyses

What does the analysis tell you?

Report structure

6.1.2 Camp Health and Safety Worksheet

Camp Health and Safety

Please answer the following questions about camp life. Write as many points down as you can think of:

1. What are the possible dangers when camping in the forest? How could risks be minimised?

RISK	How to minimise risk

2. What would you need to consider when choosing a campsite?

3. What impacts could a campsite have to the surroundings? How would you minimise these?

RISK	How to minimise risk

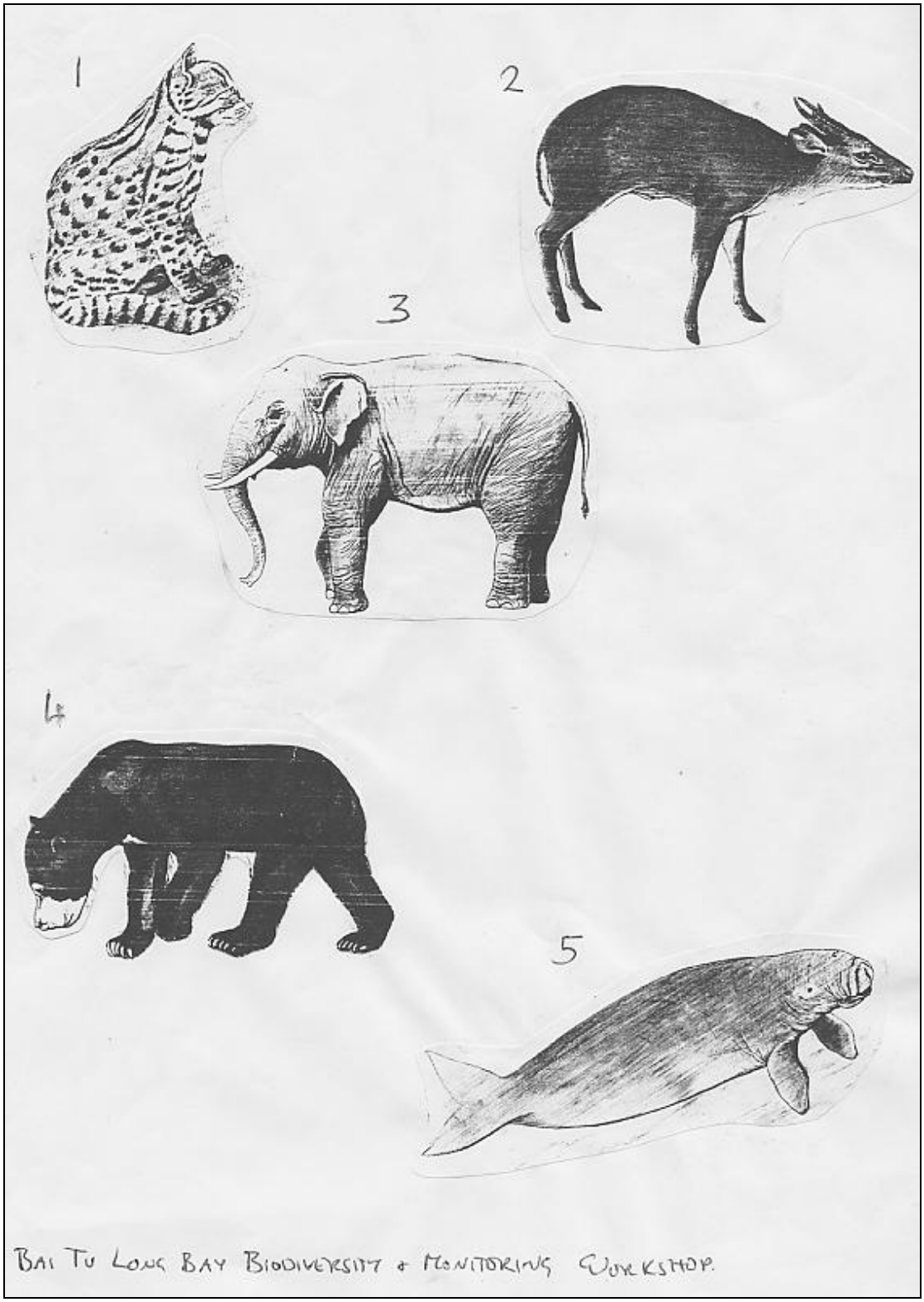
4. What equipment will we need to make a good campsite?

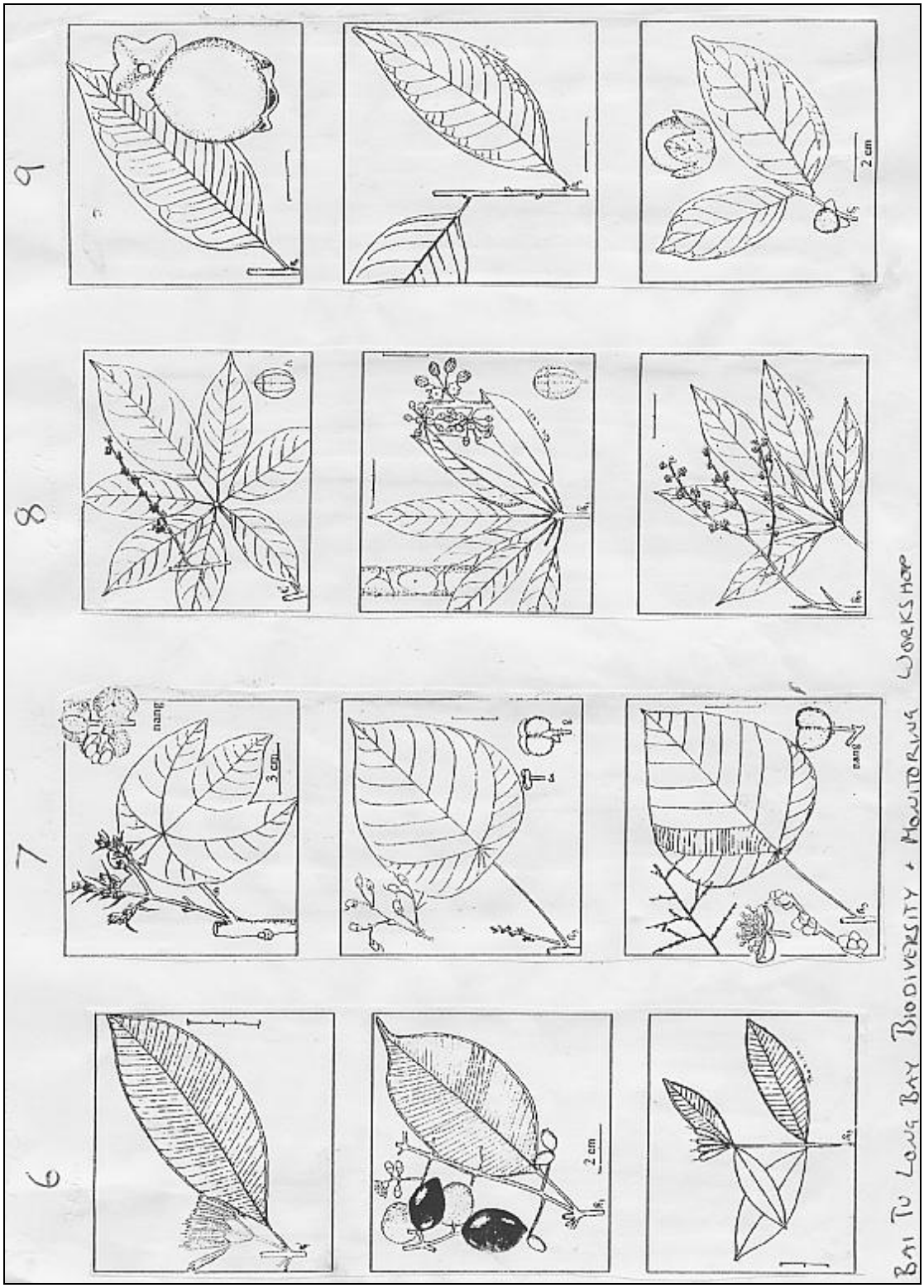
6.1.3 Species Identification Worksheet

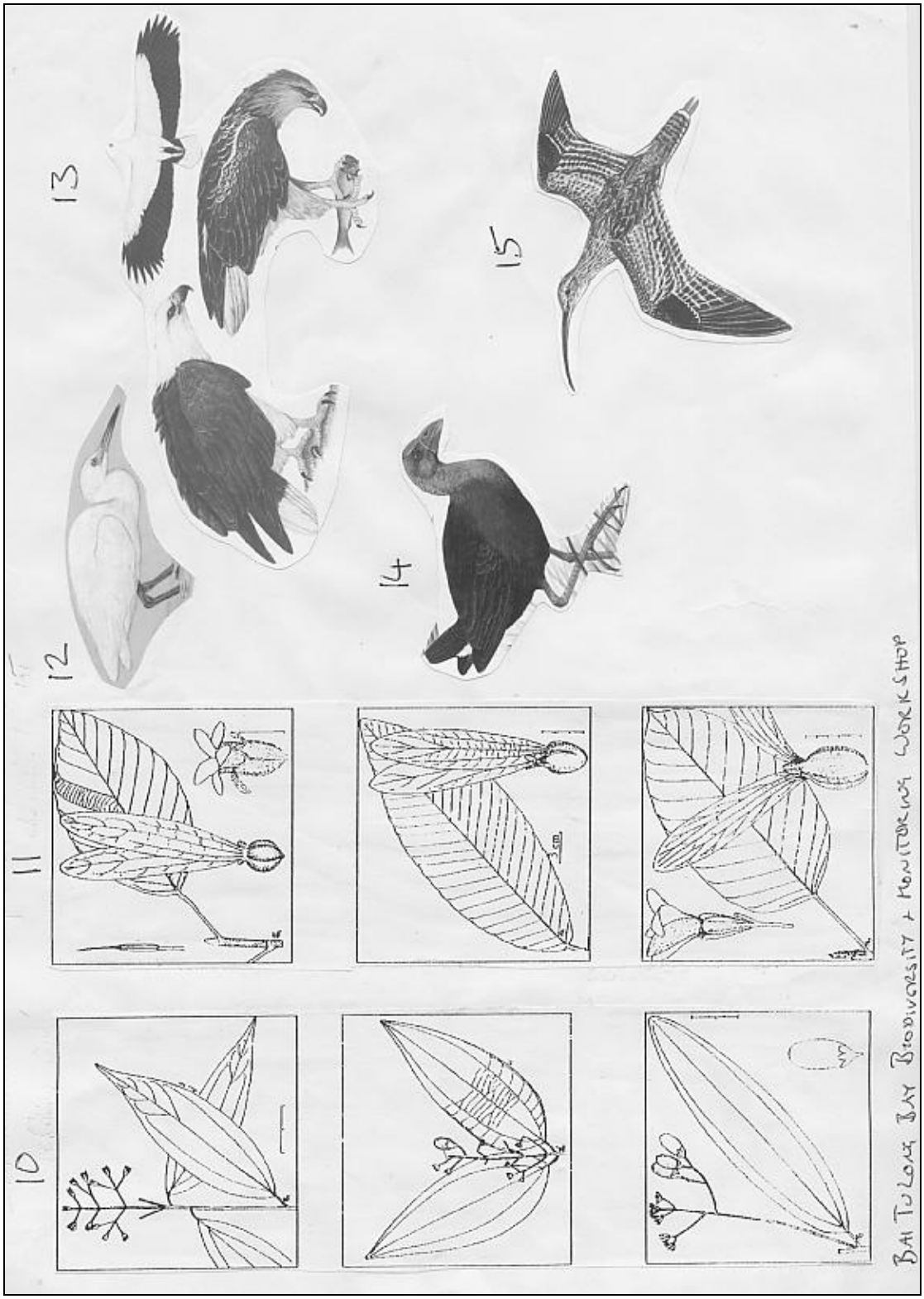
Species Identification

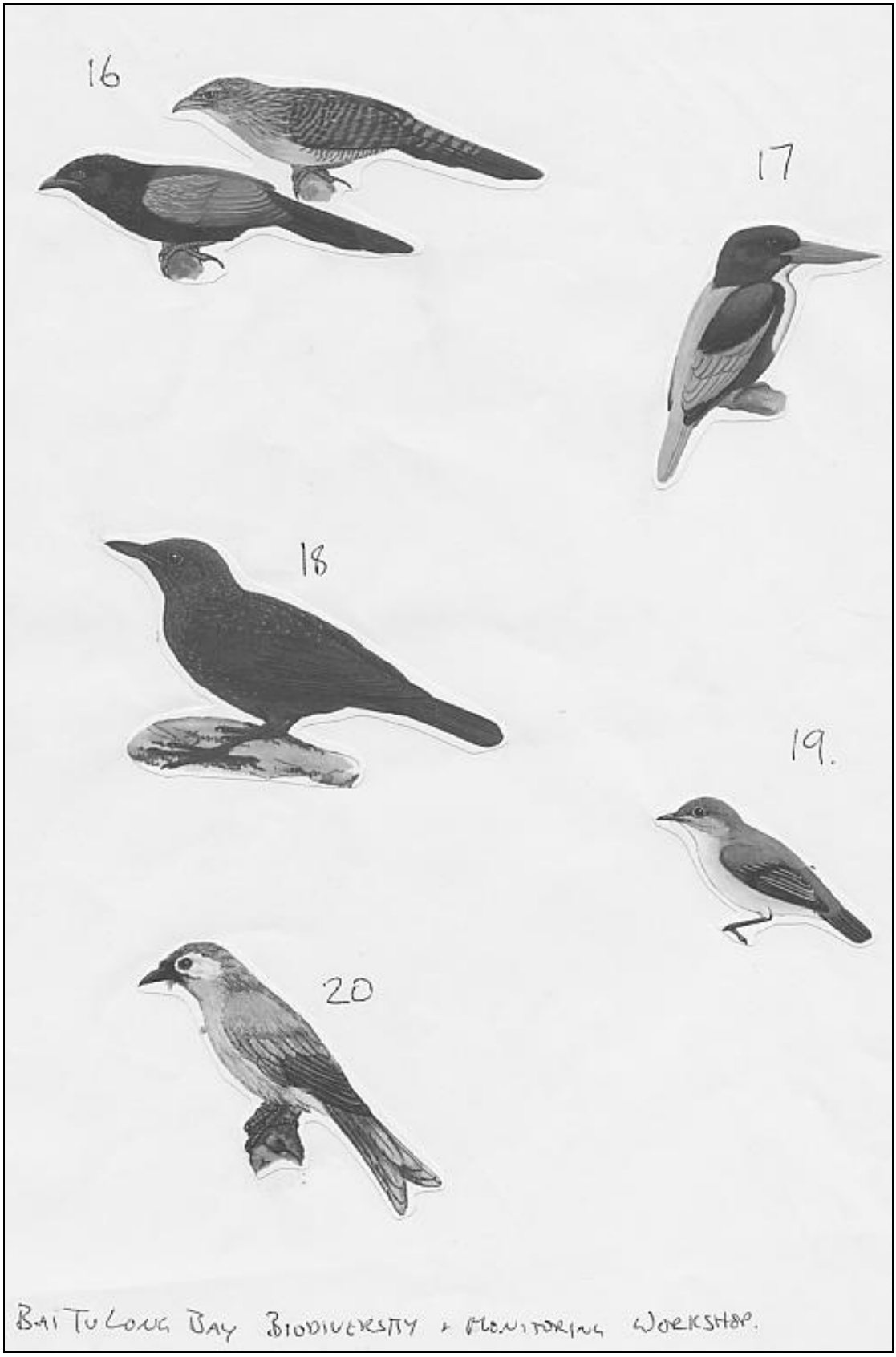
Please fill in the table about the animals and plants shown in the worksheet. In the 'other information' column, please write anything you know about the animal, such as where it lives, is it common or rare?, what does it eat? Do people use it?

Number	Name	Other information
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		


1
2
3
4
5
BAI TU LONG BAY BIODIVERSITY & MONITORING WORKSHOP.


9
8
7
6
3 cm
2 cm
2 cm
BAI TU LONG BAY BIODIVERSITY + MONITORING WORKSHOP


13
15
12
14
11
10
BAI TU LONG BAY BIODIVERSITY & MONITORING WORKSHOP


16
17
18
19.
20
Bai Tu Long Bay Biodiversity & Monitoring Workshop.

6.1.4 Mapping Questions Worksheet

Mapping Questions

1. Mark on the map an example of each of the following features:

Road
Path
River
Village
The top of a hill
A contour 400m above sea level
The boarder of T Bac Can
Highway 256

2. What is the nearest place to grid reference:

N2442.5, E610.5

N2447.5, E606.5

N2436.0, 612.0

3. What is the nearest place to longitude and latitude:

N22º01', E106º05'

N22º04', E106º04'

4. What is the scale on the map?

What does the scale mean?

5. How many kilometres is the length of one square?

6. Estimate the distance between:

Na Vang (Grid Reference N2435.8, E604.0) and No Tha (N2440.8, 604.0)

Bac Sen (N2434.9, E609.4) and Na Nen (2438.9, 607.5)

6.1.5 Good Science Practice Worksheet

Good Science Practice

1. What skills are needed to carry out good fieldwork?

2. What information would you normally record when carrying out a survey?

6.1.6 Survey Plan Worksheet

Survey Plan

A survey plan is needed to explain what you intend to do on a project. You should think carefully before starting, and write a survey plan that includes the following points:

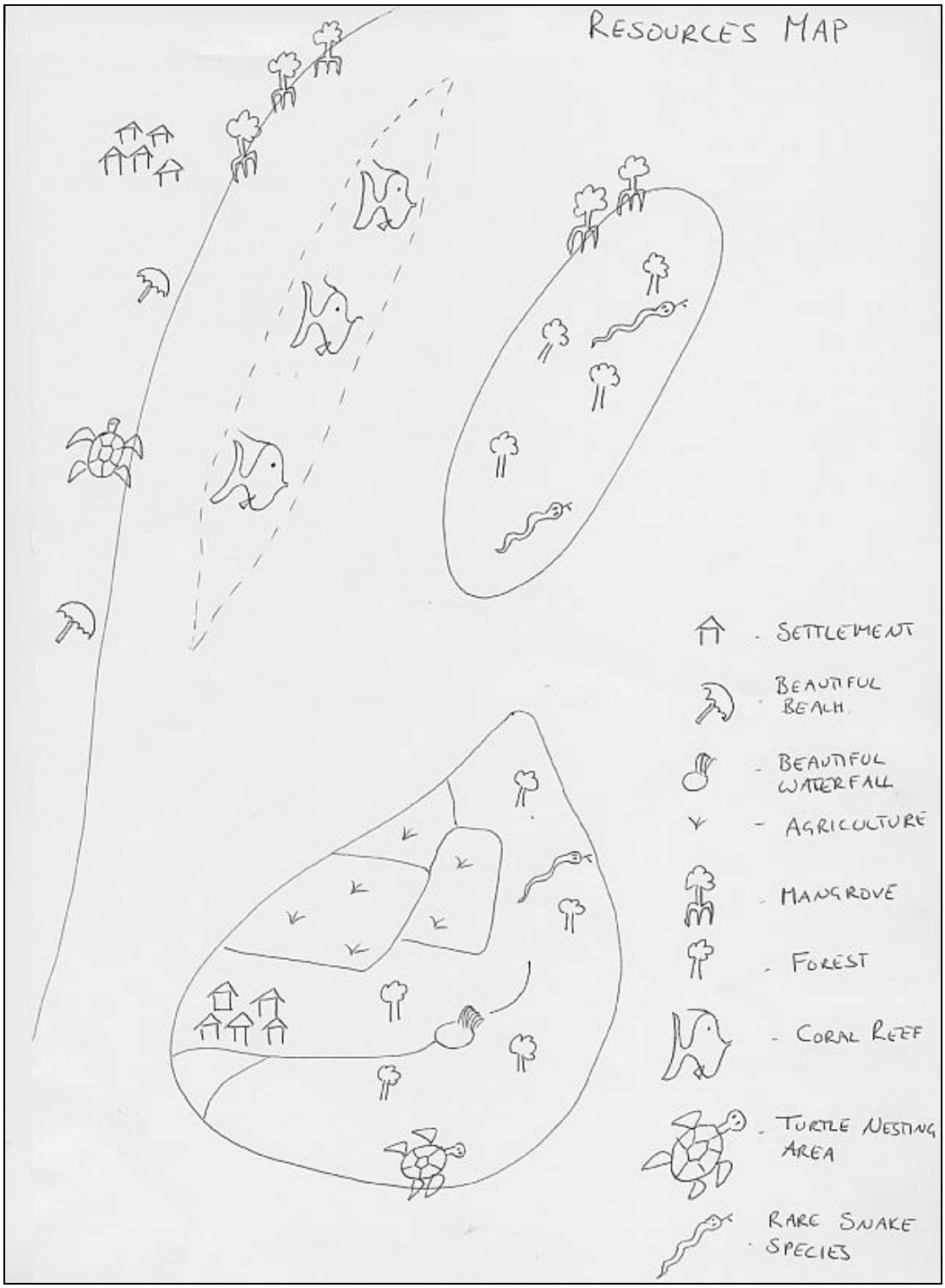
1. ***Why do you want to carry out the survey?***
   Is there a question you need to answer? Has the question ever been investigated before? Do you need to answer the question to help you manage the park, or encourage tourism?
2. ***What do you want to find out?***
   This describes the purpose of your survey.
   Example: To find out the number of mammal species on Dao Ba Mun.
3. ***Where will you be working?***
   Be as specific as possible. You should describe which country, province, island, and map references of exact survey sites.
4. ***When will you be working?***
   What time of year? For how long? What date will you start? What is the daily timetable?
   Example: Survey Timetable:

Day 1 (15th January 2003). Point counts and Field Observations		
TIME	**Activity**	**Personnel**
6.00-8.00	Cook Breakfast	Group 1
	Point counts	Group 2
	Field Observations	Group 3
8.00 – 9.00	Breakfast	
9.00 – 12.00	Field Observations	Group 1
	Cook Lunch	Group 2
	Point Counts	Group 3
12.00 – 13.00	Lunch	
13.00 – 15.00	Camp duties	Group 1
	Write up Data	Group 2
	Clean Science Equipment	Group 3
15.00 – 15.30	Break	
15.30 – 17.30	Point Counts	Group 1
	Field Observations	Group 2
	Cook dinner	Group 3
17.30 -	Dinner	
	Write up Data	
	Prepare for Survey Day 2	

5. ***Who will you be working with?***
   You should state who will be doing what during the survey.
   Example: Team leader, Experts, Assistants, Guides, Boat driver.
6. ***How will the work be carried out?***
   This is a description of how you will carry out the work. This should include:
   - Equipment needed
   - How to set up the survey
   - How to record the data
   - How you will use the data to answer your question

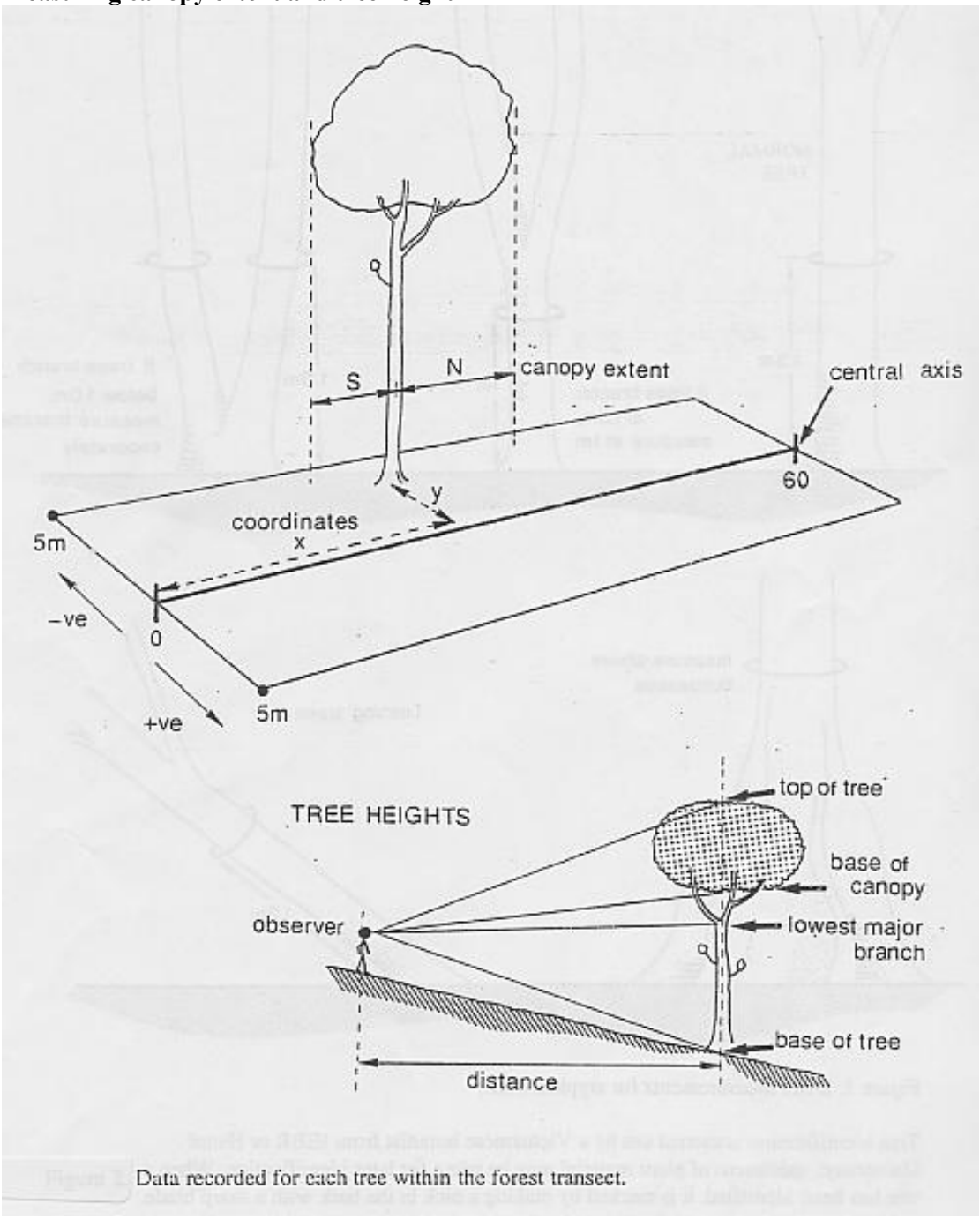
   Any health and safety considerations

6.1.7 Management Game Resource Map



6.1.8 Tree Measurement and Identification Worksheet

Measuring canopy extent and tree height



Data recorded for each tree within the forest transect.

Source: Hill *et al.* (1997a)

Measuring dbh

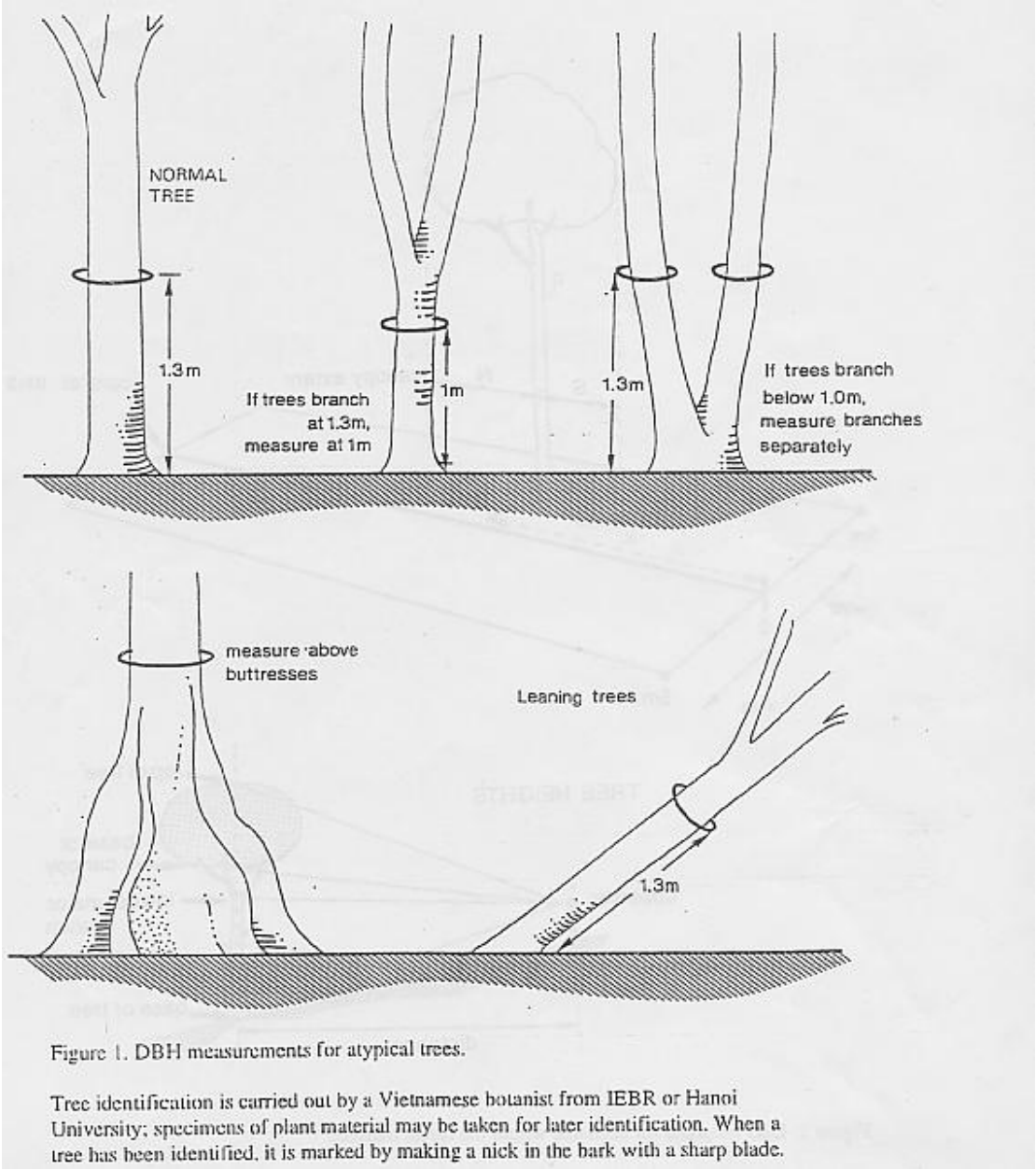


Figure 1. DBH measurements for atypical trees.

Tree identification is carried out by a Vietnamese botanist from IEBR or Hanoi University; specimens of plant material may be taken for later identification. When a tree has been identified, it is marked by making a nick in the bark with a sharp blade.

Source: Hill *et al.* (1997a)

Leaf types

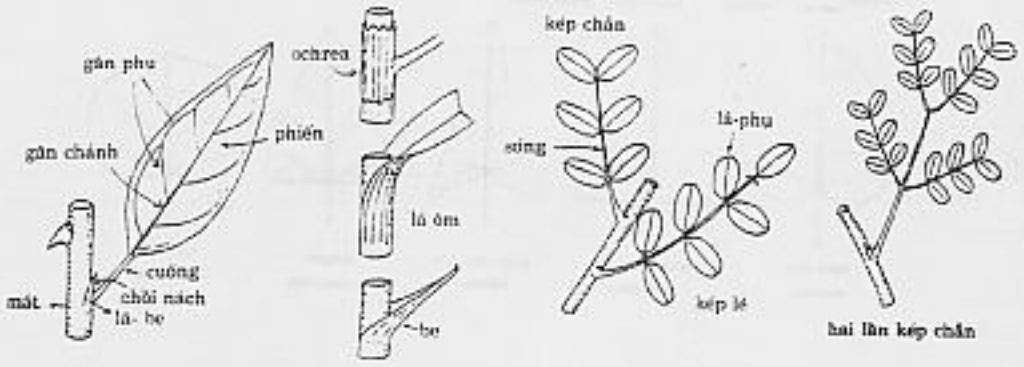
VÀI DANHTỪ THỰCVẬT

CỦ

Bộphận dinhdưỡng nào ở dưới đất và phù ra. Vídụ: củ Hành (do bẹ lá), củ Gừng, Khoai-ngọt (do thân), củ Sắn (do rễ). Khi củ chứa nhiều bột ta có một khoai: khoai Mì, khoai Lang. Khi ở trong khôngkhí, một phần của dây thân phù to ra ta có một giảhành (họ Lan, pseudobulb).

THÂN

Bộphận mang lá. Cây có thân mềm không có cocấu hậulập liêntục gọi là cỏ : Móngtay, Bạc-hà, Dưới. Cây cứng có nhánh, không cao lắm (dưới 7m) gọi là tiểumộc (shrub,treelet): Cách, Nguyệtquới, Dinhlăng. Những cây như Dâu, Sao, Xoài là đạimộc. Cây hay cỏ có thể là dây: bò như Rau-muống, leo quấn như Bimbim, leo nhờ vòi như Nho, Khổqua, hay trườn như Bônggiấy, Giun. Thân ở dưới đất gọi là cânhành (rhizome), vídụ: cỏ Cụa- gà *Panicum repens*, Ngải hoa *Canna*, Bồbồ...Khi cây sống một năm hay ít hơn, ta có cây nhátniên (annual); khi sống 2 năm ta có cây lưỡngniên (biennial), sống lâu hơn ta có cây đaniên (perennial).



Hình 1 : Hìnhthể và cocấu của lá.

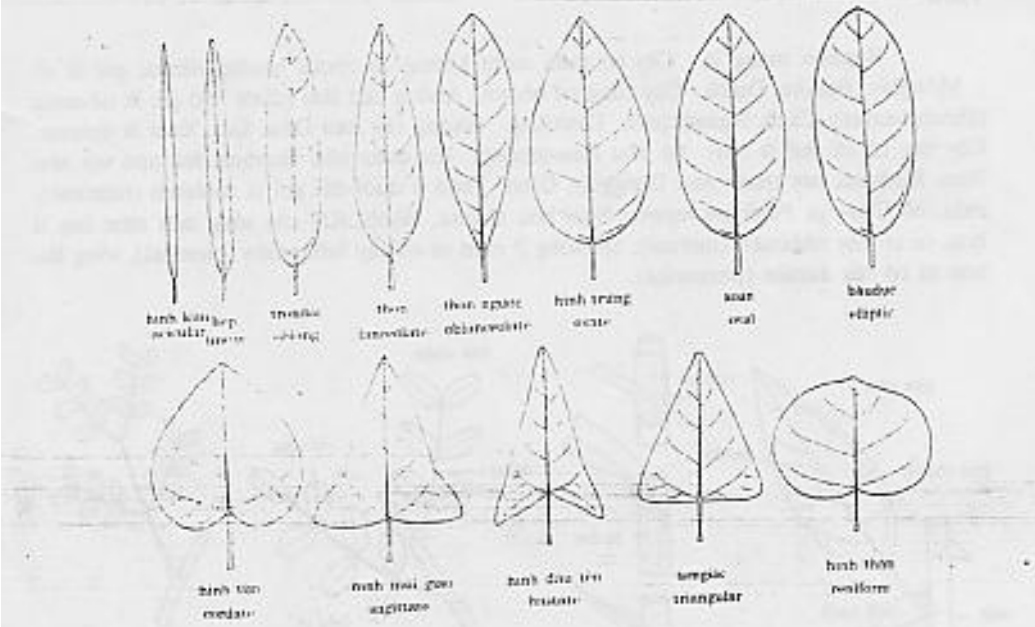
Source: Ho (1993)

Leaf veins patterns

Do một cuống (petiole) mang lấy một phiến (limbe).

a - **Hìnhthể**: đơn khi nào chỉ có một phiến duynhất, vidu như lá Xoài, Dưới ; kép là khi nào phiến do lá nhỏ gọi là lá-phụ (leaflet) làm thành (hình 1), vidụ như Đậu. Lá phụ có thể kép và có tên là thúdiệp (lá-phụ bậc nhất) và mang tamdiệp. Vidu lá Mắccô có 2-4 thudiệp mang nhiều tamdiệp (lá-phụ bậc nhì). Tamdiệp có thể kép và mang tửdiệp (vài Bignoniaceae). Lá đơn có thể nguyên khi bìa thẳng. đều (Xoài, Mận) hay có răng như Hùng... có khía hay thùy (lobate) như Xakê; lá-phụ cũng thế.

Về hìnhthể , xem hình 2 và 3.

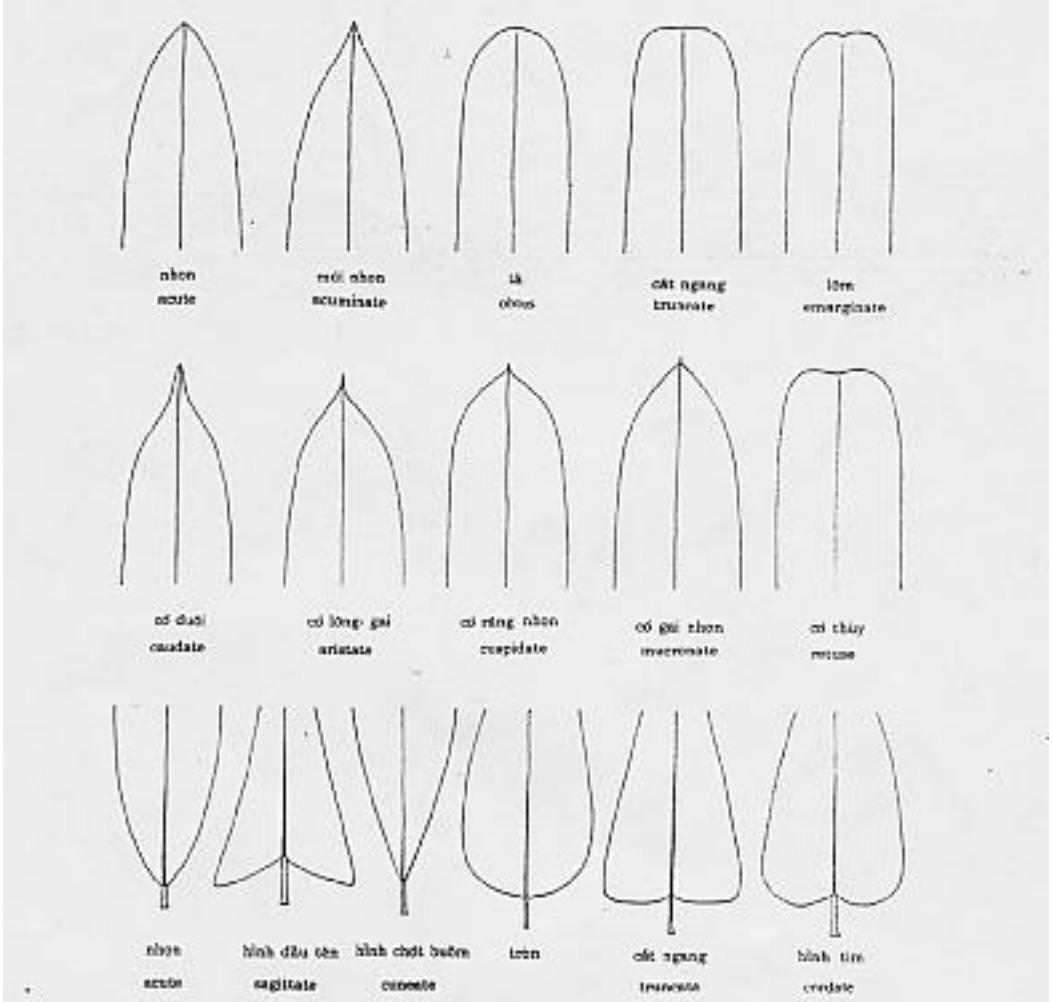


Hình 2 : Hìnhthể của lá.

b - **Gân**: gân là bộ xương của lá. Có hình lông chim (pinnate) khi nào gân phụ đi từ một gân chính. và gân songhanh với nhau, vidụ: đơn: Xoài, Ổi , Ớt; kép: Mắccô. hay theo hình chânvịt (palmate) khi đi từ một điểm như các ngón chân của Vịt; vidụ: đơn. Bimbim: kép, lá Gòn... hay hình lọng (peltate) khi cuống gắn ở trong phiến: Sen, Dạliên. dây Mối *Stephania*

Source: Ho (1993)

Leaf shapes



Hình 3 : Hìnhthế của lá.

LÁ-BẸ

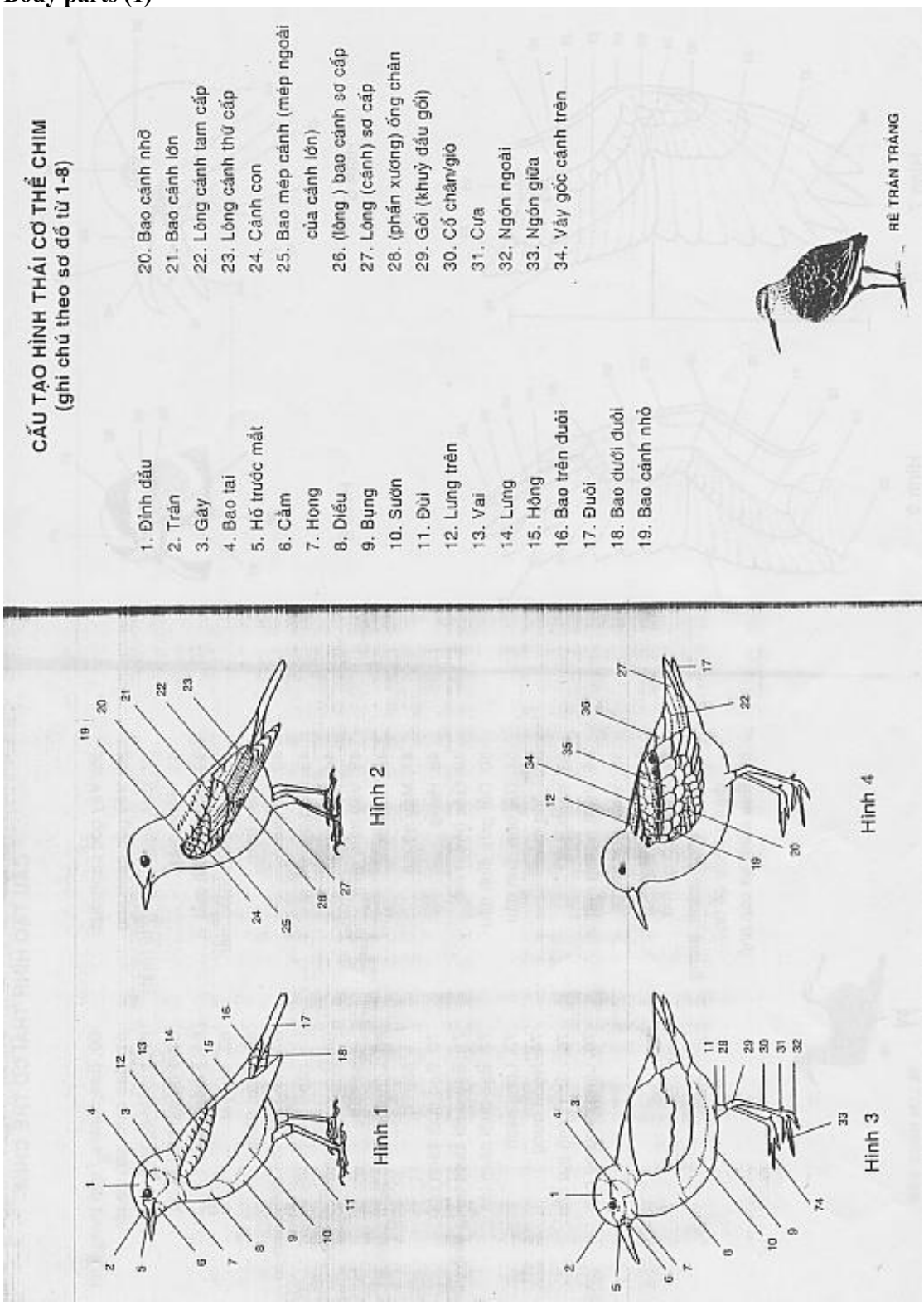
Bẹ (sheath) là phần dáy của cuống dẹp ra và ôm lấy thân (hình 1). Vidu: bẹ Dùa,bẹ Bạc -hà, rau Cần. Lá-bẹ là phiến nhỏ mọc hai bên nách lá (hình 1). Ở Hòaban, chó bẹ tra vào phiến thường có một miếng mỏng ôm lấy thân, gọi là mep (ligule). Ở họ Râm Polygonaceae, có một ống ôm lấy thân (ocrea, hình 1). Ở nhiều loài, lá-bẹ biến thành gai: lúc ấy mỗi lá có 2 gai ở nơi gán, vidu như ở Mâcoô.

Ở nhiều loài họ Đâu, lá-phụ có lá-bẹ phụ (stipelle).

Source: Ho (1993)

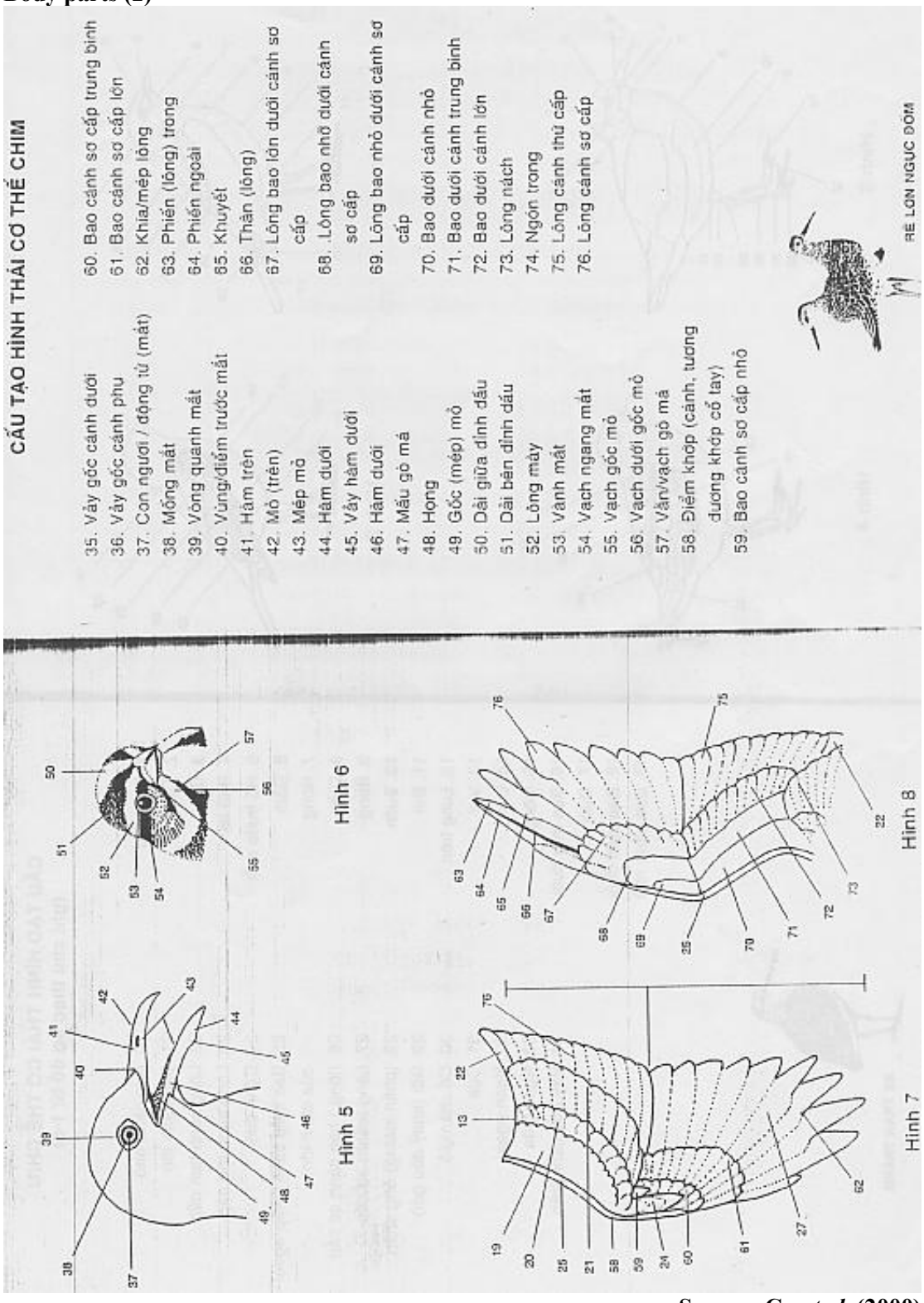
6.1.9 Bird Identification Worksheet

Body parts (1)



Source: Cu *et al.* (2000)

Body parts (2)



Source: Cu *et al.* (2000)

6.1.10 Data Analysis Worksheet

Data Analysis

Birds

Number of species: Total number of species observed at a site

Frequency of occurrence: The number of times a certain species has been observed during a point count or a transect walk

Abundance – five-point scale: A measure of abundance of bird species

Rare (R) – Occasional (O) – Frequent (F) – Common (C) – Abundant (A)

Average Flock size	Number of occasions sighted					
	1	2	3-4	5-8	9-16	>16
1-2	R	R	O	F	C	A
3-8	R	O	F	C	A	A
>9	O	F	C	A	A	A

Trees

Number of species: Total number of species encountered in a plot

Number of individuals: Total number of trees recorded in a plot

Plotting species-accumulation curves:

X-axis: Number of individuals
Y-axis: Number of species

Plot the first individual as a point with X and Y co-ordinates 1
Plot each subsequent individual as a point along X-axis, Y co-ordinate being cumulative number of species
Join all the points in order to obtain a curve – this is species-accumulation curve.

The slope and the asymptote (top portion of the curve) of the species-accumulation curve will be useful for comparison of tree diversity at two different sites

Calculating basal area: Basal area = $\pi (dbh/2)^2$

Calculating height:

$$\text{Tree height} = \text{Distance from the tree at which the angle } (\theta) \text{ has been measured} \times \tan(\theta)$$

6.1.11 Assessments Worksheet

Assessments

You will be assessed on your ability to:

1. Answer questions about biodiversity, conservation, survey and monitoring;
2. Write a survey plan;
3. Carry out fieldwork correctly;
4. Consider health and safety;
5. Make a camp that is safe and minimises environmental damage;
6. Present results;
7. Write a report;
8. Demonstrate appropriate behaviour;
9. Organise your time;
10. Work as a team.

This will be assessed through:

1. Continuous observation;
2. Constructing a survey plan;
3. Answering questions;
4. Writing a report;
5. Giving a presentation.

6.1.12 Report Writing Worksheet

Report Writing

How you write your report depends on what you want to say and who you want to say it to. Usually a report consists of the following elements:

1. ***Summary***
   A short explanation of the purpose, location, activities and key findings of the experiment.

2. ***Acknowledgements***
   A list of people who have helped, but were not part of writing the report.

3. ***Introduction***
   Background information explaining why the experiment was carried out and any other information you think is important (see number 1, Survey Plan Worksheet).

4. ***Aim***
   Explain the purpose of the experiment (see number 2, Survey Plan Worksheet).

5. ***Location***
   You can use a map reference, a map or a description of the location. You should also include a description of the type of area the survey is in including the type of vegetation, the way that the land is formed, typical weather (see number 3, Survey Plan Worksheet).

6. ***Timescale***
   Describes the when you did the work, for how long, and times that the surveys were carried out (see number 4, Survey Plan Worksheet).

7. ***Methods***
   Describes the work you did in enough detail that it can be repeated exactly by someone else. Pictures can be used to describe how the work was done (see number 5, Survey Plan Worksheet).

8. ***Results***
   Describes what you discovered whilst carrying out the work (see number 5, Survey Plan Worksheet). You can use graphs, tables, sketches and maps to present the results (see number 5, Survey Plan Worksheet).

9. ***Conclusions***
   What to the results tell you? Can you make any recommendations from the conclusions?

6.1.13 Giving Presentations Worksheet

Giving Presentations

Your presentation will be about part of the work you are doing.
It will be between 5-10 minutes long.

When preparing your talk:

Decide what subject you want to talk about.

Write down the main things you want to say.

Make sure the presentation has a beginning, middle and an end.
(*useful tip:* say what you are going to say, say it, and say what you have just said)

Can you use aids (pictures, maps, items from the forest) to emphasise what you are saying?

Practice your presentation so that you are confident, and to make sure it is no more than 10 minutes long.

When giving your talk:

Remember who you are talking to and try to make sure they will understand what you are saying.

Speak slowly, clearly and succinctly.

Invite questions from the audience.

6.1.14 Multiple Choice Test Worksheet

Multiple Choice Test

Please circle the answer you think is the most correct:

Bai Tu Long Bay National park

1. Bai Tu Long Bay National Park was established in:
   (a) January 2000
   (b) June 2000
   (c) (c). January 2001
   (d) June 2000
2. Following is NOT a threat a Bai Tu Long Bay National Park's biodiversity:
   (a) Deforestation
   (b) Human population pressure
   (c) Inadequate management resources
   (d) Heavy rain
3. The following tree genes does not naturally occur in Bai Tu Long Bay National Park
   (a) *Syzyqium*
   (b) *Pinus*
   (c) *Litsea*
   (d) *Aglaia*
4. The following bird does not occur in Bai Tu Long Bay National Park
   (a) Vac Rung (Malayan Night Heron)
   (b) Cong (Green Peafowl)
   (c) Tim Vit (Plaintive Cuckoo)
   (d) Chim sau lung do (Scarlet-backed Flowerpecker)

Principles of surveying and monitoring

5. Biodiversity refers to:
   (a) Genes
   (b) Species
   (c) Ecosystems
   (d) All of the above
6. Monitoring biodiversity means:
   (a) To carry out surveys again and again
   (b) To count the number of tree species
   (c) To count the number of bird species
   (d) To carry out GPS surveys
7. Conservation involves:
   (a) Stopping local people fishing
   (b) Protecting endangered species
   (c) Counting the number of tree species
   (d) Regulating access to forests

Planning a survey

8. What do you need to research before planning your survey:
    (a) Previous surveys in the area
    (b) Information in field guides
    (c) Asking experts
    (d) All of the above
9. Making a survey plan is necessary because:
    (a) It looks impressive
    (b) Without it you might overlook something essential
    (c) It helps to attract funding
    (d) It is necessary for obtaining permissions
10. You do NOT need to write in the survey plan:
    (a) Methods
    (b) Conclusions
    (c) Schedule
    (d) Objectives

Equipment

11. GPS can be used for:
    (a) Determining position of a point on the earth's surface
    (b) Measuring distance between two points
    (c) Measuring altitude
    (d) All of the above
12. Which grid system do the national maps in Vietnam normally use:
    (a) Degrees minutes and seconds
    (b) India Thailand
    (c) UTM/ UPS
    (d) Waypoint
13. Binoculars are used for:
    (a) Identifying birds
    (b) Observing birds
    (c) Counting birds
    (d) None of the above
14. DBH tape is used for:
    (a) Measuring the distance between two trees
    (b) Measuring the height of a tree
    (c) Measuring the circumference of a tree
    (d) Measuring the diameter of a tree

Methods

15. Taking field notes is necessary because:
    (a) Human memory is very short
    (b) Field guides are often wrong
    (c) It looks good to others
    (d) It is an art
16 Field illustrations of birds are useful for:
    (a) Imagination
    (b) Observation
    (c) Identification
    (d) Classification

17 Trees are identified based on their leaf types because:
   (a) That is the easiest way
   (b) Classification of trees is based on leaves
   (c) Trees in evergreen forests have leaves all year round
   (d) Species identification based on leaf type is authentic
18 When taking field notes of a bird you must record:
   (a) Nesting habits
   (b) Local or migratory
   (c) Distance from observer
   (d) None of the above

Management

19 Consultation with stakeholders is important because:
   (a) Stakeholders are politically powerful
   (b) Stakeholders' livelihoods are directly affected by National Park management
   (c) Stakeholders have money
   (d) Stakeholders manage National Park
20 When assessing a management plan which aspects do you NOT need to find indicators for:
   (a) Genetic
   (b) Social
   (c) Biological
   (d) Economic

Camp Life

21 Which of the following could pose an environmental hazard
   (a) Swimming
   (b) Cooking
   (c) Surveying
   (d) Littering

Analysis

22 Which of these is NOT a type of analysis:
   (a) Accumulation curves
   (b) Maps based on GPS data
   (c) Field notes
   (d) Vegetation profile
23 The formula to calculate the basal area of a tree is:
   (a) $\frac{\pi d^2}{4}$
   (b) $\frac{\pi d^2}{4} \times h$
   (c) h X tanθ + 1.3
   (d) All of the above
24 A species accumulation curve is used to:
   (a) Find the density of a forest stand
   (b) Find of the abundance ground flora
   (c) Determine sample size of trees
   (d) Calculate the distance between plots

Dissemination of information

25 To tell people about the conservation importance of Bai Tu Long Bay you could:
   (a) Publish a scientific journal
   (b) Write an article on the internet
   (c) Environmental education programme
   (d) All of the above

6.1.15 Feedback Questionnaire Worksheet

Feedback Questionnaire

In the initial classroom session:

State whether you agree or disagree with the following statements:

1. The sessions were easy to understand
Strongly disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

2. The sessions were relevant
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

3. Fieldwork was sufficiently prepared
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

4. You know what is required to construct a survey plan
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

In the field training:

5. Safety and minimizing environmental impacts are important aspects of field training
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

6. The botany and bird experts were helpful
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

7. You are able to set up a vegetation survey
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

8. You are able to carry out a bird survey
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

9. You are able to use a GPS
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

Writing up classroom session:

10. You feel able to analyse the results and draw conclusions from the results
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

11. You know what needs to go into a science report
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

The Training:

12. You felt supported by the trainers?
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

13. The trainers tried to tailor the course to suit your knowledge and needs
Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

14. Your questions were answered to your satisfaction

Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

15. The individual sessions were helpful

Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

Course Content:

16. You were taught what you wanted to learn

Strongly Disagree ☐ Disagree ☐ Agree ☐ Strongly Agree ☐

17. Was there anything else you would like to be taught in future?

18. Are there any other comments you would like to make?

6.2 RESEARCH OUTPUTS

The results of field surveys are presented in this section.

6.2.1 Tree Surveys (Survey methods in *Section 2.2.3*)

Plot sampling

- Trees were surveyed in five vegetation plots of 10x10 m^2 at 20, 50, 80, 110 and 140 m a.s.l.
- All tree ≥ 6 cm were marked, dbh measured, height estimated canopy extent mapped and recorded in field notebooks
- Specimens of leaves were collected, identified, pressed, dried and the herbarium preserved at FPD headquarters
- Ground flora was enumerated and specimens of leaves were collected in two 2x2 m^2 subplots; the abundance of each species was estimated on a five-point scale
- Tree location maps, canopy projections and vertical vegetation profiles were drawn for each plot (*Appendix 7.3.6*)
- Stem density and cumulative basal area was calculated for each plot; no distinct patterns in stem densities or basal areas were observed (*See trainees' report in Vietnamese*).
- Although comparisons could not be made across the five plots due to shortage of time, the trainees have presented their findings in section 4 of the trainees' report (*Appendix 7.3.8*)
- Due to the limited time, trainees were not able to present the results about ground flora in their report

Transect sampling

- Trees were enumerated on two transects – one along a stream and another along a path.
- About 100 trees were enumerated and 33 species were observed on the stream transect; and about 60 trees were enumerated and 29 species of trees were observed along the path transect.
- Species accumulation curve for the path transect did not reach an asymptote, while the curve for the stream transect did (*See trainees' report in Vietnamese*). This suggested that more sampling may be necessary to get a good idea of diversity along the path, whereas 100 trees was a sufficient sample for estimating tree diversity along stream on Cai Quyt mountain.
- It is possible that the turnover of species along the path transect is higher, because the path goes up the mountain and cuts across a range of altitudes and habitats.
- Along the stream transect, many tree species were gregarious (possibly because of their habitat specificity). As a result species turnover was not as high as the path transect.

6.2.2 Bird Surveys (*Survey methods in section 2.2.4*)

- Three groups of 2-3 people each spent five mornings (between 23 and 27 May 2003) observing birds in different areas on Cai Quyt mountain
- Illustrations of birds were made in field notebooks (*Appendix 7.3.6*) and most species observed were identified using Cu *et al.* (2000) and King *et al.* (1975)
- 35 species of birds were observed and 75 individuals counted (*Appendix 7.3.8, Section 5*)
- Estimation of species abundance was not possible because of limitations of the bird identification skills; most of the time during fieldwork was spent getting to grips with watching birds and taking notes of bird observations
- A list of observed species was made along with notes on number of birds sighted, time of sighting, description and name of the observer, in the master data record book
- Species accumulation curve for birds did not reach an asymptote (*See trainees' report in Vietnamese*) suggesting that more effort is necessary in order to get a good idea of bird diversity on the mountain

6.2.3 GPS Surveys (*Survey methods in section 2.2.5*)

- A landscape map of Cai Quyt mountain was made displaying following landscape features (*See trainees' report in Vietnamese*):
    - Campsite
    - Vegetation plot locations
    - Bird survey locations
    - Points along the path transect
    - Points along the stream transect

7. APPENDICES

7 1 RESOURCES

Classroom

Educational Aid

Laptop computer,
PowerPoint presentation
Bird call CD
Pictures of previous expedition
Whiteboard
Markers
Trainees' pack
Interview sheet

Stationary

Name tags
Safety pins
Sticky labels
Rulers
Pens
Paper

Equipment

Compass
GPS
Maps
Clinometer
String 50m

Books

Chim (Birds) Vietnam
Birds of SE Asia
Trees of Vietnam
Bai Tu Long Bay Interim Report
Other reference material

***Note**:* The following teaching resources were translated from English to Vietnamese

PowerPoint presentation
All other presentations
Worksheets
Information sheets
Other outputs

Recce

Equipment

GPS
Compass
Binoculars
Field guide for birds
Field guide for trees
Water
First Aid kit

Field

Camping:
- Tents
- Tarpaulin sheets
- Nylon string
- Machetes
- Hatchets
- Small and big trowels
- Power supply generator
- Fuel

Cooking:
- Utensils
- Jerry cans
- Buckets
- Tumblers
- Rubbish bags

Food:
- Meat
- Fish
- Vegetables
- Rice
- Snacks

Teaching:
- Whiteboard
- Markers
- Field laptop computer
- Paper
- Pencils and pens

Science:
- Trees surveys
  - Plant collection presses
  - Newspaper
  - Plastic bags
  - Tape measures (50m)
  - Compass
  - Dbh tapes
  - Clinometer
- Bird surveys
  - Binoculars
- GPS surveys
  - Maps
  - GPS receiver
  - Altimeter

Books:
- Field guides for trees and birds
- Field notebooks
- Central data record books

Safety:

First Aid kit

Transport:

Ship
Speed boat
Diesel for the speed boat

7 2 PROGRAMME

Preparation 14th – 18th May Hanoi/ Van Don

15.00 – 17.00 (14th) Briefing (LB, LT, CB, SB)
09.00 – 19.00 (15th, 16th, 17th) Preparation (LB, SB, CB, LD, NM)
17.00 – 19.00 (18th after travel to Van Don) Preparation (LB, SB, CB, LD, NM)

Training schedules

Day 1 19th May 2003 Classroom

08.00 – 09.00 Meeting with Vice Director (LB, SB, CB, LD, NM)

09.30 – 10.00 Introductions (all trainees (T) and staff)
10.00 – 10.30 Break
10.30 – 12.00 Information gathering, (CB, NM, T)
- Worksheets 1, 2, 3
- Interviews

12.00 – 13.00 Lunch
13.00 – 16.00 Information gathering, (CB, NM, T)
- Worksheets 1, 2, 3
- Interviews

10.30 – 15.00 Recce (LB, SB, LD)

18.00 - 19.00 Meeting (SB, CB, NM, LD, LB)
- Assessment of worksheets 1
- Assessment of interviews
- Alter course if necessary
- Prepare equipment for the next day

19.00 – 21.00 Party (all)

Day 2 20th May 2003 Classroom

All day Prepare for the field (LB, LD in afternoon)
- Buy remaining equipment

08.00 – 11.30 Translate Worksheets and summarise information (CB, LD)

08.00 – 09.00 Biodiversity (SB, NM, T)
- Web of life game
- Talk

09.00 – 11.30 Survey Planning (SB, NM, T)
- General talk
- Worksheet 4
- Discuss Worksheet 1 (Health and Safety)
- Discuss General field skills
- Discuss programme in the field
- Write a survey plan

11.30 – 13.30 Lunch
13.30 – 16.00 Introduction to field techniques (SB, NM, VN, T)
- Bird session (data, equipment, techniques)
- Plants (data, equipment, techniques)
- GPS and mapping (data, equipment, techniques)

17.00 – 19.00 Meeting (staff)
- Feedback so far
- Mark survey plans
- Translations
- Briefing about the field programme
- Preparation for the field
- Briefing for TN

Day 3 21st May 2003 Field

09.00 – 10.00 Talk about camp logistics (SB, VN, T)
10.00 – 14.00 Party (30 years of FPD)
14.00 – 16.00 Travel to site (all)
17.00 – 18.00 Set up camp
18.00 – 19.00 Dinner
19.00 – 21.00 Talk about camp
- set up
- Health and Safety
- Minimising Environmental impact

21.00 – 12.15 Brief for the next day

Day 4 22nd May 2003 Field

07.00 – 08.00 Breakfast
08.00 – 11.00 Tree survey training (all)
- Talk by TN about good field practice and plant identification and taking specimens

11.00 – 11.15 Assessment discussion
11.15 – 12.00 Tree survey training (all)
- How to set up plots and teansects
- Recording data

12.00 – 16.00 Set up practice plot
16.00 – 18.00 Break
18.00 – 19.00 Dinner
19.00 – 20.00 Addressing issues (LB, LD)
19.00 – 20.00 Brief for TL and revise schedule (SB, CB, VN)
20.00 – 20.15 Brief for the next day

Day 5 23rd May 2003 Field

06.00 – 07.00 Camp jobs
07.00 – 08.00 Breakfast
08.00 – 09.00 Birding training (all)
- Talk by Dr La
- Writing data sheets
- Observations

09.00 – 11.00	Bird watching (3 Groups)
11.00 – 11.30	Data record management
11.30 – 13.00	Lunch
13.00 – 14.30	Group 1 - GPS training (SB, VN, T) Group 2 - Management game
14.30 – 16.00	Group 2 - GPS training (SB, VN, T) Group 1 - Management game
16.00 – 16.30	Bird Data (CB, HK, PL, VN)
16.00 – 18.00	Break
18.00 – 19.00	Dinner
19.00 – 20.00	Group planning session including roles and responsibilities
20.00 – 20.15	Brief for the next day

Day 6 ***24th May 2003*** ***Field***

05.00 – 07.30	Bird Watching (all)
07.30 – 08.00	Identification and recording birds
08.00 – 09.00	Breakfast
09.00 – 14.00	Vegetation Surveys
14.00 – 16.00	Data Recording
16.00 – 18.00	Break
18.00 – 19.00	Dinner
19.00 – 20.00	Tree Data (SB, NH, PP, LD) GPS Data (CB, VN, PD)
20.00 – 20.15	Brief for the next day

Day 7 ***25th May 2003*** ***Field***

05.00 – 07.30	Bird Watching (all)
07.30 – 08.00	Identification and recording birds
08.00 – 09.00	Breakfast
09.00	Failed attempt to get the trainees to talk to each other about records management!!
09.00 – 15.00	Vegetation Surveys
15.00 – 16.00	Data Recording
16.00 – 18.00	Break
18.00 – 19.00	Dinner
19.00 – 21.00	Management Game
21.00 – 20.15	Brief for the next day
20.15 -	Party

Day 8 ***26rd May 2003*** ***Field***

07.00 – 08.00	Breakfast
08.00 – 10.00	Data analysis and programme for the rest of the workshop
10.00 – 11.30	Feedback from management game
11.30 – 12.30	Data review sessions
12.30 – 19.00	Free time
19.00 – 19.15	Brief for the next day

Day 9 ***27th May 2003*** ***Field***

05.00 – 07.30	Bird Watching (all)
07.30 – 08.00	Identification and recording birds
08.00 – 09.00	Breakfast
09.00 – 10.00	Data analysis
10.00 – 11.00	Management and monitoring
11.00 – 14.00	Vegetation surveys (transects)
14.00 – 15.00	Pack Down camp
15.00 – 19.00	Return to Van Don

Day 10	***28th May 2003***	***Classroom***
8.00 – 12.00	Data analysis Individual training and feedback	
12.00 – 13.00	Lunch	
13.00 – 17.00	First draft of report Individual training and feedback	

Day 11	***29th May 2003***	***Classroom***
8.00 – 12.00	Data analysis Individual training and feedback sessions	
12.00 – 13.00	Lunch	
13.00 – 16.45	Discussion of analysis, conclusions and recommendations Individual training and feedback sessions	
16.45 – 17.00	Presentation talk	
17.00 – 17.30	Final draft of report	

Day 12	***30th May 2003***	***Classroom***
07.30 - 08.30	Exam and Feedback Questionnaires	
08.30 – 09.00	Break	
09.00 – 09.15	Summary of achievements	
09.15 – 11.15	Presentations and speeches	
11.15 – 11.30	Feedback with Vice Director, NH	
11.30 – 14.00	Party and depart to Hanoi	

Day 13	***31st may 2003***	***Field***
7:30 – 17:30	Visit to Cuc Phuong National Park (CB, SB)	

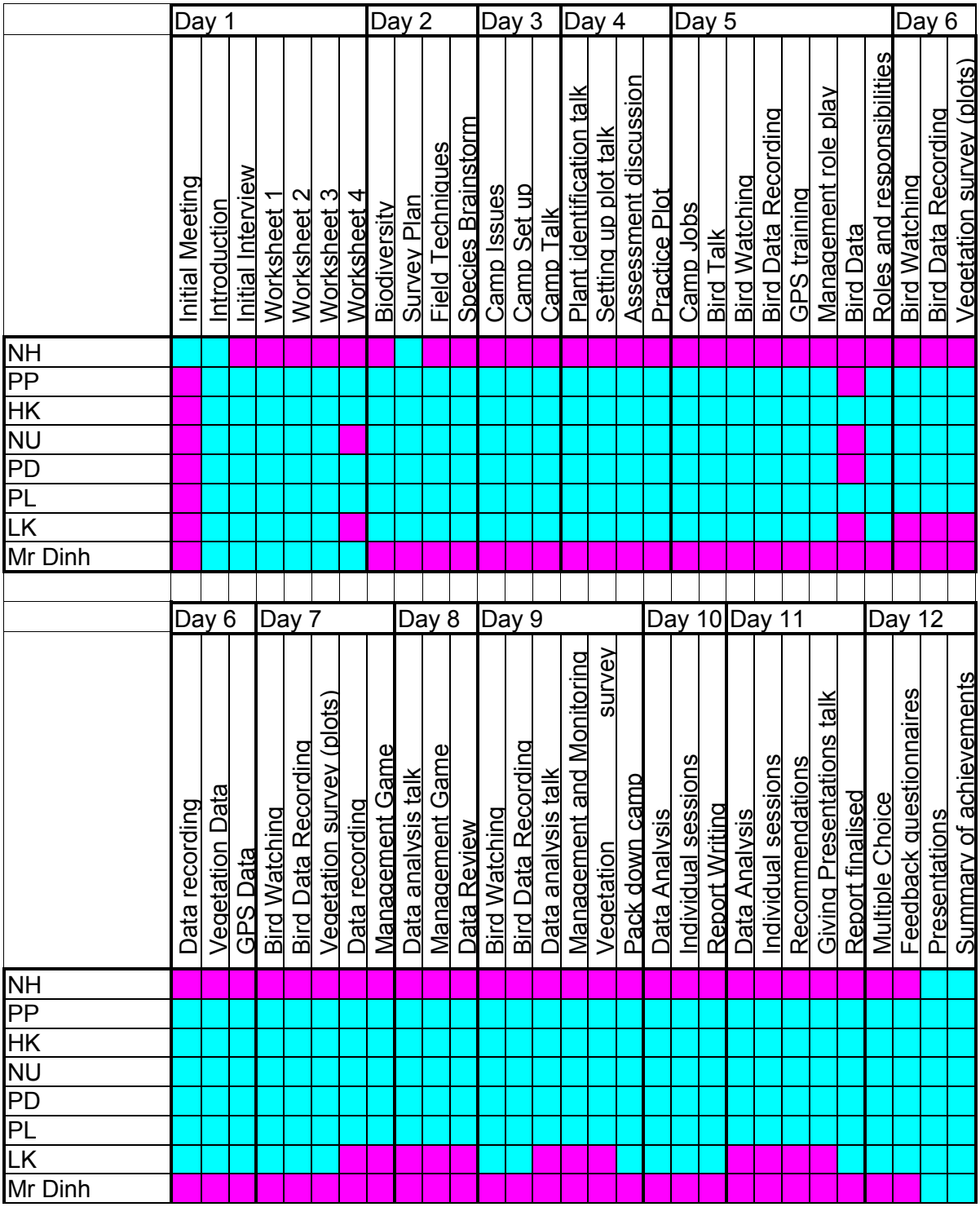
Report writing	***1st – 4th June***	***Hanoi***
09.00 – 19.00	Report writing (CB, SB)	
09.00 – 19.00	Assistance with logistics, translations etc. (LB, LD)	

7 3 EXAMPLES OF TRAINEES' WORK

This is to demonstrate examples of individuals' achievements and the typical standards that the trainees reached during the training.

7.3.1 Completion Record

Results of the 'Completion Record' Assessment (*Section 3.1.1*)



7.3.2 Initial Interviews

Results samples from initial interview (*Section 3.1.2*)

Interview 1
Interviewer ***Catherine Bloxam***
Interviewee ***Hoang Van Khanh (Science Department)***
Translator ***Ngoc Thi Men***
Duration of interview ***Approximately 30 Minutes***

(Initial informal greeting and discussion)

How long have you been working for the National Part?
- About 1 year. In that time I have worked with Frontier.

Really? What were you doing with them?
- I was doing tree surveys so I think it will be easy for me to do that part of the course.
- I think the course will be useful to attend the course to increase the knowledge of how to do surveys.

That's great, maybe you can help the others lean the tree surveys. What else are you good at?
- I know about protection and management.

Is there anything you would like to improve upon?
- Understanding the methods of how to do a biodiversity survey and learn methods that are new to me.
- I have already written a report about the mangroves.

Really, may I see it? (he gets the report). What a shame I am not about to understand it! Can you tell me what is says? (He explains what is written in the report and which sections he wrote). It looks excellent, may I take a photocopy?
- Yes.

Who did you write the report for?
- No one, I did it off my own back.

That's great. What would you like to do with it in future?
- I would like to work on international projects and work with the national park.

Do you know which organisations you may be able to work with?
- When I was a student, a group came to do a bird survey and I helped them. I do not know what the name of the organisation was. They did not stay in the forest.

I have not been to Bai Tu Long Bay yet, can you tell me a little about it?
- The park is 15,000ha; 9,000ha is marine and 6,000 is forest. Ba Mun Island has a mountain that is 300m above sea level. There are many beautiful streams, mangroves and mud flats. There are pigs and monkeys on the island.

Thank you. Because the part is newly established, is there any way you can think of to improve the management of the National Park?
- We need to protect the park from humans. We need more money because we do not have enough petrol to patrol frequently.

Is there anything else you would like to say or questions you would like to ask?
- I know the park well and can find a good campsite for you.
- I have worked with Dr Nghia before.
- I do not eat noodles

Initial Thoughts
Friendly and keen to please. Will probably make a good student. Good basic knowledge. Will probably have to find more advanced work for him to do.

Interview 2
Interviewer ***Catherine Bloxam***
Interviewee ***Pham Xuan Dieu (Conservation Department)***
Translator ***Ngoc Thi Men***
Duration of interview ***Approximately 30 Minutes***

(Initial informal greeting and discussion)

So, how are you finding the worksheets?
- The photocopies are not good enough to be able to identify the species properly (he gives and example).

Yes, sorry about that. The originals are up on the wall if you need to check any of them. If you can't identify them to species level, say the species that they could be. You seem to know many of the species.
- I have worked with Frontier before and I went to college. I have also worked with other experts.

Great, you may be able to help the others with their field skills. How long have you been working for the National Park?
- Since it established

What do you like about working for the park?
- Using the knowledge from college in practice which is very interesting.

Is there anything you dislike about it?
- There are many things we do not understand. The park is newly established.

When you gain more of an understanding about the park, what would you like to do with the knowledge?
- I work for the conservation department. We want to protect natural resources and diversity.

How would you improve the management?
- It is a new National Park. There is limited capacity in scientific and management. WWF organised a training workshop that I attended.

Is there anything you have not yet had the opportunity to learn but would like to?
- Survey methods and orientation.
- I would like to look more deeply at the ecosystem of tropical forests and the intertidal zone.
- I would like to be able to plan a survey and do it when you are not here.

Are there other organisations that may be able to help improve the capacity of the National Park?

- WWF's training workshop on Biodiversity Assessment. They have not yet included Bai Tu Long Bay in their list of survey sights.

The workshop sounds interesting. What was the course about? (he gets the course contents). Is it possible to take a photocopy of it?
- Yes

Do you have any questions, or is there anything else you would like to tell me?
- No

Initial Thoughts
Good knowledge of species. He can use his own initiative to answer the questions. We will have to try to give him responsibility and encourage him to pass his knowledge on.

Interview 3
Interviewer ***Catherine Bloxam***
Interviewee ***Nguyen Van Hung (Forest Protection Department)***
Translator ***Ngoc Thi Men***
Duration of interview ***Approximately 30 Minutes***

(Initial informal greeting and discussion)

How long have you been working for the park?
- Nine months

And what is your role within the park?
- I am with the FPD (Forest Protection Department)

What to you like about working for the park?
- It is my duty to manage and patrol. I also make plans to manage forest fires.

That sounds interesting, what does it entail?
- It is difficult to make a management plan because we are lacking in knowledge.

Is there anything you dislike about your job?
- There is a limited amount we can patrol because we do not have enough petrol. This means we must stay in the office.

Is there anything you would like to change about the management?
- I do not know.

Can you tell me something about the National Park?
- There are 40 small and large islands. The park is 15,000ha, of which 6,000ha is forest and 9,000ha is marine. There are about 400 islands in the bay, 40 of which are in the National Park. Ba Mun Island is a prohibited area and is 22ha. There are many rare and valuable species. No local people live on the island.

What would you like to learn on the workshop?
- How to identify animal and plant species. I want to learn from your knowledge. I have never worked with Frontier before and it will be the first time I have camped in the forest.

How do you want to use the knowledge you gain from the course?
- I will know how to identify plants and animals more accurately and learn how to apply methods to the National Park.

How would you like the National Park to be improved?
- I would like it to be as good as any other National Park.

Is there anything you would like to ask me or tell me?
- Not at the moment, I will have questions later.

Initial Thoughts
Less science understanding than some. Difficult to assess how he will do on the course from this interview.

7.3.3 Initial Worksheets

(*Section 3.1.3*)

Worksheet1 ***Camp Health and Safety (Output 6.1.2)***

Worksheet 1 *Camp Health and Safety*

Please answer the following questions about camp life. Write as many points down as you can think of.

1. What are the possible dangers when camping in the forest? How could risks be minimised? (Table with 'Risks' and 'How to Minimise Risks').

2. What would you need to consider when choosing a campsite?

3. What impacts could a campsite have to the surroundings? How would you minimise these? Table with 'Impacts' and 'How to Minimise Impacts').

4. What equipment will we need to make a good campsite?

Question 1 Risks included poisonous snake, dangerous animal, polluted water source, fire, flood, storm injury, dangerous terrain, being alone, hunter's trap.

Risk minimisation included identifying the snake, first aid, be careful with fire, camp on high ground, have an emergency vehicle, stay in a group, have a team guard, ask hunters about traps.

Other suggestions were 'follow the regulations', 'be prepared for all eventualities' and 'be careful'. The trainees were required to expand on these statements and be more specific.

Question 2 The location of a camp should be near a stream, in a high place, in an open area to minimise risk from fire, flat, have minimum impact on the environment, near the survey location, and easily accessible.

Many trainees did not mention that the site should be near the survey location and placed emphasis on the ease of access.

Question 3 Possible environmental impacts were fire when cooking, water pollution, litter, cutting trees, damage to the topsoil layer, noise that will frighten animals.

Minimisation plans included cook in an open place, bury litter, do not throw waste into the stream, remove or put litter in the bin, do not cut too many trees, do not damage topsoil, do not catch forest animals.

Other minimisation plans were 'be careful', 'choose a camp site that will have minimum impact', 'know the method to prevent fire', 'know the method to prevent pollution'. Many trainees were not aware of how to treat non-biodegradable waste, so this was discussed at length. In practice the trainees were not pro-active about dealing with waste and it took considerable effort to get them to deal with litter.

Question 4 A slight error in translation resulted in a misinterpretation of the question. We were looking for answers such as Food and cooking equipment, tents and tarpaulins, safety equipment, transport, science equipment and personal gear.

Many interpreted the question as what tools are needed for the camp. Answers we got were machete, spade, trowel, tent tarpaulin, water, map, wood, a good location and depends on the location.

Worksheet 2 Species Identification (Output 6.1.3)

The aim of this exercise was to assess the trainee's general knowledge of species found in Vietnam. Animals were taken from Francais and Pain (1998). The Frontier bird list was used to choose the birds and the local names and images were taken from Cu *et al.* (2000). The tree genus that was expected to be found in the park were chosen from Ho (1993), and the local names described by TN.

Worksheet 2 Species Identification

Please fill in the table about the animals and plants shown in the worksheet. The first one is filled in as an example. In the 'other information' column, please write anything you know about the animal, such as where it lives, is it common or rare?, what does it eat? Do people use it? (Table with 'number', 'name' and 'other information').

Answers: Mammals: Leopard cat (meo rung), barking deer (hoang), Asian elephant (voi), Asian sun bear (gau cho), dugong (du gong).
Trees: *Syzygium* (tram), *Macaranga* (ba soi), *Schefflera* (chau chim), *Diospyros* (unknown), *Cinnamomum* (qui), *Dipterocarpus* (cho chi)
Birds: Pacific reef egret (diec den), white-bellied sea eagle (dai bang bien bung tran), purple swamphen (xit), eastern curlew (choat mo cong hong nau), lesser coucal (bim bip nho), white-throated kingfisher (sa dau nau), blue whistling thrush (hoet xanh), scarlet-backed flowerpecker (chim sau lung do), ashy drongo (cheo beo xam).

Worksheet 3 Mapping Questions (Output 6.1.4)

Worksheet 3 Mapping Questions

1. Mark on the map an example of each of the following features:
   Road, Path, River, Village, The top of a hill, a contour 400m above sea level, the boarder of T Bac Can, Highway 256

2. What is the nearest place to grid reference:
   N2442.5, E610.5, N2447.5, E606.5, N2436.0, 612.0

3. What is the nearest place to longitude and latitude:
   N22º01', E106º05', N22º04', E106º04'

4. What is the scale on the map? What does the scale mean?

5. How many kilometres is the length of one square?

6. Estimate the distance between:
   Na Vang (Grid Reference N2435.8, E604.0) and No Tha (N2440.8, 604.0)
   Bac Sen (N2434.9, E609.4) and Na Nen (2438.9, 607.5)

Question 1-6 With one or two exceptions, the answers to this question were identical and correct. We supposed few trainees would have been able to answer the questions independently.

Worksheet 4 Good Science Practice (Output 6.1.5)

Worksheet 4 *Good Science Practice*
1. What skills are needed to carry out good fieldwork?
2. What information would you normally record when carrying out a survey?

Question 1 Qualities included careful, attention to detail, good observation, patient, willing, prepared to work hard, brave, co-operate in a team, take responsibility, practice using knowledge.

Types of fieldwork identified were identifying animal tracks, transects, wildlife photography, using basic knowledge of flora and fauna.

Question 2 Survey work identified by the trainees were habitat typing, behaviour, distribution, abundance or density, information from local people and using the information to form a management plan.

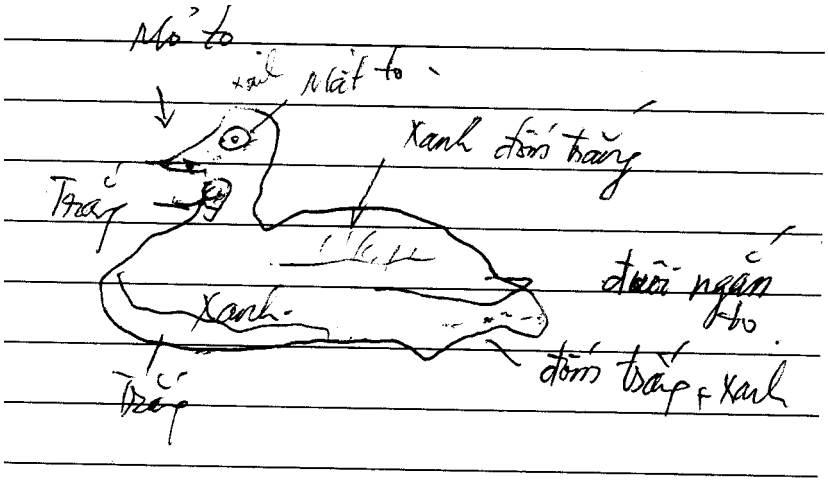
Methods of data recording included illustrations (in colour), detailed observation notes, field observations (to check on the species later), identifying tree characteristics and identifying specimens.

Types of data to be recorded were name of the surveyor, date, time, location, characteristics of the terrain (including slope), family and species name.

One trainee wrote ‘all information necessary for the survey’.

7.3.4 Field Observations

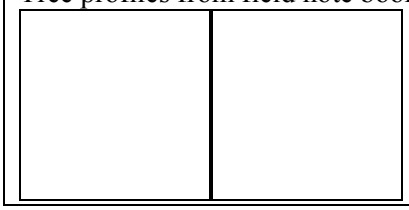
(***Section 3.1.4***)



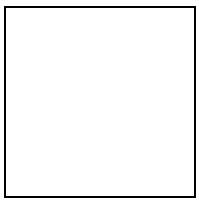
This is a good example of a field drawing that shows good use of an annotated diagram to illustrate distinguishing characteristics of a bird.

7.3.6 Examples of Analysis

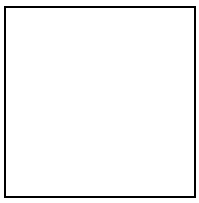
Tree profiles from field note books



Species accumulation curve



GPS Map



7.3.7 The Management Game

The Management Game

Each trainee was assigned a stakeholder that they would need to represent during the game: government representatives in charge of natural resources (CB and SB), ecologists (NH and PP), tourists (PD), logging company (NU) and local people (HK and PL).

Each was given a natural resources map (*Output 6.1.7*), which loosely resembles the situation in Bai Tu Long Bay, and a verbal brief containing the following information:

Management game brief

The area you see on the map is currently unprotected, but the government is considering making some of all of it a protected area. Government representatives from the department of natural resource management will hold a meeting tomorrow night to talk to the stakeholders about the area. This is your chance to explain to the government how your group would like the area to be managed and what benefits of this management would be.

Each stakeholder will have 5 minutes to present their case. Use the map to show the government how you think it managed and explain how that would be of benefit to you and the government. You will need a strong case to convince them, so make your arguments strong and relevant and keep to the point. Try to think about what the other stakeholders might say and be prepared. This is a fictional exercise so you can be as imaginative as you like and use any means you can to help support your case. There are some questions on the back of each map to help you formulate your arguments.

Tourists: What would tourists like about the area? What sort of activities would they like to do? How would you like the area to be managed?

Ecologists: Which of the natural resources are important and why? Is there anything threatening these resources? How would you minimise these threats? How would you like the area to be managed?

Loggers: What do you want from the area and why? How can you justify the potential loss of resources to the area? How will this benefit the government?

Locals: How do you use the natural resources and which are important to you? What resources do you need and what are you likely to need in the future? Is there anything threatening your lifestyle? How would you like the area to be managed?

After the presentations there will an opportunity for you to question each stakeholder and the government representatives will ask you to clarify some points. After that, the government will make its decision based on the strength of each argument and present the management plan to the stakeholders. Good luck.

The Management Game

(based on notes taken during the game)

(CB) Evening gentlemen, and welcome to you all to the meeting. We have come from central government to assess the natural resource use in the area, and make a management plan which

may involve the setting up of a protected area. I know you are all interested in the future of this area, so I would like to hear from each group before I make a decision. You have 5 minutes to present your case and a five minute discussion time for each group. Who would like to go first? (Locals raise their hands) Go ahead.

(PL) The local people use many natural resources and many landscapes. We want to have less impact on natural resources and the environment. We want to set up aquaculture so that we do not take fish from the sea. We will maximize the efficiency of out agriculture to prevent the need to cut down forest and we will build houses for tourists to stay and conduct a community tourism project. We need habitat, fresh water and fresh air, and the sea surface. We want to use the resources to encourage regional regeneration. Our livelihoods are threatened by natural disaster, deforestation would cause a bad landscape, climate change may decrease the amount of fresh water we have available. If the sea is polluted it may affect aquaculture. We would like to adopt sustainable management, increase our awareness of the environment. We think the national park should be divided into protected and functional areas.

Thank you PL. Who would like to be next (Tourists raise their hands).

(PD, taking the large map on the whiteboard)
Firstly, I would like to explain which resources tourists would be interested in. There are nice beaches, coral reef, and good landscape. We want to promote ecotourism in these areas. I propose having an adventure tourism area where people can do activities in the forest containing the waterfall. Near this area, guest houses will be built for retirement homes. Near the beaches, I propose a luxury resort with a sports centre.

(CB) Thank you PD, I am afraid your time is up. Who is next? (After some discussion, CB gave one extra minute to complete the discussion)

I think good management of the National Park is necessary and important. I would insist that guides are trained how to manage the environment and look after the important ecosystems.

(CB) Thank you. Who would like to be next? (Ecologists raise their hands)

(NH) The forest ecosystem is very important. Typical plants representative of forest ecosystems are found here. Especially important is the mangrove, and the rare snake has a high economic value. The turtle is very rare and very valuable and the marine life is good. The natural resources need protecting for a sustainable future. Threats include the settlement, which has a negative impact on the environment. Agri-pollutants, waste, deforestation and hunting are having a negative impact. Management should be undertaken directly and indirectly; through people and political will. All people must be responsible. The forest guards can protect the national park and prevent forest fires. They can prevent deforestation and protect natural resources.

(CB) Thank you NH. How do you know that the ecosystems are very important? Have you undertaken surveys?

(NH) No we haven't but the maps indicate this is the case.

(CB) Hmm… there are old government maps, and they do not contain up to date information. And lastly may I invite the loggers to speak.

(NU) I make help people get valuable timber for construction and furniture. I buy forests to give wood to the local people, and I give the local people jobs. They have very low living standards, and being in gainful employment would keep them away from social evils. If I

chop trees down, they regenerate, so it would not be so bad. It would benefit everybody's needs. I think we should encourage industrialization instead of setting up a national park.

(CB) Thank you. That concludes our presentations. They were very informative. Now you all have an opportunity to respond to what the other stakeholders said. Does anyone have any questions for the local people?

(NU) How come you have such a high awareness of natural resource issues?
(PL) Why, do you think local people are not intelligent or don't know how to develop?
(NU) How are you going to pay for your aquaculture and develop your economy?
(PL) Through tourism.
(CB) There has already been a big tourist proposal from PD, would you prefer to co- operate with the tourists or the timber company?
(PL) Through tourism. We can compete with the other tourist companies if necessary. If the trees have gone we have lost in the long term.
(PD) The aquaculture is a big operation that requires a big budget, how would you find it?
(PL) We have a community fund and we are raising the money.

(CB) I am afraid your time is up. Thank you everyone. Who would like to go next (Ecologist raise their hands). Any questions for the ecologists?

(NU) If no survey work has been done, how do you know that the land has value?
(NH) According to the map and other literature, there is a very diverse area. We would like to ask the government for a grant to do survey work.
(PL) How do you think the local people will impact of the environment?
(PP) Pollution for the aquaculture and agriculture. You did not come to us with your methods.
(PL) Well you did not request our methods before you made that assumption.
(CB) Which areas do you think are the most important to protect?
(NH) It all needs to be protected.

(CB) Any more questions for the ecologist? No? Well thank you NH and PP. Any questions for the tourists?

(NU) Tourism is not a solution for environmental pollution. How will you prevent the tourists having a negative impact?
(PD) All the guides will be trained in environmental laws and protection.
(CB) What methods will you use to control the tourists?
(PD) Through set tourist routes, litter bins and clearly stated regulations.
(NU) What is the tourists still pollute?
(PD) They will be sent out of the area.
(CB) How many tourists are you planning to attract?
(PD) As many as possible.
(PP) If that is the case, the environmental impacts will be impossible to prevent. Why not co-operate with the ecologists?
(PD) But eco-tourism and ecology is the same thing. If the environment is polluted it will affect my business.
(HK) What about the local people, will you make jobs for them?
(CB) Would you be happy to work for the tourist company?
(HK) If there is sufficient capability, we will have our own tourist venture, otherwise we will co-operate with the tourist company.

(CB) Your time is up now, thank you. And, lastly, questions for the timber company?

(PP) If you chop the trees down, they will not regenerate like you said earlier.

(NU) I did not know that, I am not a Scientist.
(NH) But this is logical. As a logger you should know that.
(NU) Money can buy anything, I am interested in a free economy.
(PD) I could use some timber for my houses, can you sell me some?
(NU) Yes, and I will when I do business, I can bring prosperity to the local people by buying timber from the local people and sell at a profit.
(PL) Why do you think that local people would want to chop their trees down? How would that increase our living standards?
(NU) At the moment you only do agriculture and would have plenty of free time to collect wood for me.
(PL) We have not time for logging. We will be busy with our tourism operation.
(PP) There are many modern substitutes for timber in construction. Can you not use those?
(NU) If I do not do it, someone else will.
(CB) After you have chopped down the trees, what will happen then?
(NU) This is business, when all the trees are gone, I will go.
(HK) When all the trees in the world are chopped down, what will you do then?
(NU) Change jobs.
(HK) Don't you think about the next generation?
(NU) I don't care about the future.
(PL) If the local people will not let you chop the trees down, what will you do?
(NU) Pay a higher price, and they will.

(CB) Thank you all, that was a very informative discussion. You have time to make one summary statement.

(NU) As a logging company I could protect the environment by using selective logging.
(PD) The tourists could fund an awareness raising projects for local people.
(NH) Everything needs protecting or have rational use.
(PL) With the tourist development, there will have to be a high awareness of natural resources use and the environment.

(CB) And that concludes the meeting. Shonil and I will make our decision, and we will meet with you tomorrow to discuss the future management of the area.

The management decisions were mostly based on the strength of arguments presented at the meeting, with some others added to highlight other points. We presented the following scenario:

Local people

We were impressed by their environmental awareness and drive for a sustainable future and community spirit. We were concerned that there were impacts that were not stated in the meeting, but because they seemed keen to co-operate, we decided to work closely with the local people.

Decision 1 Set up a local Non Government Organization (NGO) to represent their needs and raise funds for the community projects and ecotourism.
Decision 2 Through the NGO, assign an ecologist and a socio-economist to help them achieve sustainable resource use in land and sea.

The funding for the NGO staff and scientists will be for one year only. We expect the NGO to be able to raise its own funds after that time and if they still require the help of the experts, the NGO will have to fund them independently.

Ecologists

We were surprised by the lack of information available about the area and thought it was an unrealistic request to protect everything and ban all resource use. We agreed that good biodiversity surveys were needed to identify priority areas for protection and would CONSIDER making the uninhabited island a protected area, depending on the results of the surveys. This would not, however, cover the turtle nesting sites and we were surprised a species of such international importance did not receive special management recommendations in the management plan.

Decision 3 Delay the decision to allocate a national park for one year until the results of the surveys have been carried out. The Government will employ a second biologist and a small budget for one year. The biologist will assess the natural resource use in the area, and identify important biological and geological and cultural areas of importance. We must make sure that the findings of the socio-economist and biologist from the local people are incorporated into the findings accurately assess the current and future resource use in the area.

Decision 4 We recommend a special study to investigate the causes of decline of the rare snake, but the Government was not able to find the funds, so the ecologists will have to find funding themselves.

Decision 5 A turtle monitoring scheme should be set up and protection for the nesting sites. We recommend the ecologists train some local people how to monitor and ask for funding from the tourism outfit, because turtles will be a major attraction for the tourists if properly managed.

Decision 6 We predict that we will need to monitor certain sensitive areas, so will approach Frontier to see if they will carry out the surveys.

Tourism

The Government is very keen to promote tourism and welcome the interest of tourism in the area. We were worried however about the unlimited number of tourists proposed by the company and although we were pleased with the offer of an environmental awareness programmed for the local people. There were hopes that the tourism operations would have funded some long term programmed that was mutually beneficial to the tourists and the environment.

Decision 7 There will be a two tiered strategy to appeal to different tourist types.

Luxury tourism	Retirement Homes
	Luxury accommodation
	Sports Centre
	Diving
	Turtle watching
Adventure Eco-tourism	Local accommodation
	Adventure treks in forest
	Canoe trips to the mangroves
	Wildlife spotting and turtle watching

Decision 8 Tourism to fund the ecologists to do an environmental awareness project for 3 years with a review at the end of the project.

With the capital behind him, the tourists companies can develop a good tourist infrastructure and provide boat services. By funding small project they will be able to have a government supported ‘ecotourism’ label and put a premium on their prices to fund the projects. The local

people, without a large amount of capital and an emphasis on sustainable development will organise the adventure tourism. This could be run by the tourist company until the local people are sufficiently trained, but the local people should have a large say in the nature of the operation. If it is to be run co-operatively the tourist company could provide some funds and the community could provide labour until the operation is making a profit.

Logging

The government appreciates the interest in the area for the logging company and recognises that this may be important revenue for the area. It was concerned about the short-term attitude of the loggers, and the opposition by the local people. Because the surveys had not been carried out, the uninhabited island may be a good site for logging, so the company will have to wait one year for a decision. The government is keen for the logging company not to loose interest in the area.

Decision 9 The logging company can clear the areas necessary for the luxury tourism site and the adventure tourism. The wood can be sold to the tourist company who will need construction materials.

Decision 10 If the logging company wishes to work in the area, they will need to demonstrate a larger commitment to the area.

We suggested that the company considers setting up plantation to offset the forest that will be lost as a result of their activities.

Future considerations

We suggested that some issues not discussed may be issues to consider in future:
That a coal mining company had approached the Government requesting to do geological surveys in the area.
Medicinal plant research may be a good future investment for local people.
The marine situation was less known, and it will be important to find out if there are commercial or illegal fishing, and if there are any affects of pollution on the mangrove and the coral reef.

The trainees were all happy with the result. After the game was over, we discussed why the decisions had been taken, how science could be used and the potential problems with the management suggested by the government.

7.3.8 Final Report by the Trainees

Workshop Presentations

1 Introduction

1.1 Bai Tu Long Bay National Park was established on 1st April 2001 by Decree number 85

1.2 The main goal of the National Park is to protect a coastal island system for conservation and recreation purposes.

1.3 Surveying the eco-systems in the national park is very important and necessary. In order to understand the fauna and flora of the National Park better.

1.4 Ba Mun Island is located in the South-West of the National Park. It is one of the largest islands of the National Park, and is uninhabited. It was chosen as the place for the training course for logistic convenience and because fauna and flora of Ba Mun Island are representative of the rest of the National Park.

1.5 The aim of this training course was to improve biodiversity surveying and monitoring ability of the National Park staff.

1.6 In the training course the following activities were carried out:

- Preparation: In-class sessions, introduction to survey equipment
- Field work: Camping in the forest on Cai Quyt mountain, Ba Mun Island from 21 May to 27 May, 2003.
  - Vegetation survey: establishment of 6 vegetation plots along a transect
  - Bird survey: watching and illustrating birds; and recording observations in field note books
  - GPS survey
- Conclusion: In-class sessions for report writing, presentation of results and final assessment

1.7 Participants:

No	*Name*	*Position*	*Office*
1	Dr Tran Dinh Nghia	Botanist	Hanoi National Uni.
2	Dr Truong Van La	Bird Taxonomist	IEBR
3	Dr Shonil Bhagwat	Biodiversity Trainer	Frontier Viet nam
4	Ms. Catherine Bloxam	Biodiversity Evaluator	Frontier Viet nam
5	Mr. Leo J. Bottrill	Camp Manager	Frontier Viet nam
6	Mr. Le Xuan Dung	Interpreter	Frontier Viet nam
7	Mr. Vu Nam	Interpreter	Frontier Viet nam
8	Ms. Nguyen Thi Diem	Cook	Frontier Viet nam
9	Mr. Nguyen Dinh Ung	Trainee	BTL NP
10	Mr. Nguyen Van Hung	Trainee	BTL NP
11	Mr. Hoang Van Khanh	Trainee	BTL NP
12	Mr. Le Van Khai	Trainee	BTL NP
13	Mr. Pham Xuan Dieu	Trainee	BTL NP
14	Mr. Pham Khanh Linh	Trainee	BTL NP
15	Mr. Pham Xuan Phuong	Trainee	BTL NP

2 FPD, Conservation, and Science Department Co-operation

2.1 The co-operation between the Conservation Department, Science Department and FPD in the National Park is necessary in order to organise fieldwork successfully. Conservation and Science department's role is to plan the fieldwork and FPD's role is to provide logistic support, such as transport to the field site by boat. The cooperation among the three departments is the key to effectively surveying, monitoring and protecting biodiversity of the National Park.

2.2 Resources used during the fieldwork of the training workshop

Subject	***Equipment***	***Use***
Tree survey	Machete, tape measure, dbh tape, GPS, altimeter	Setting up the plot, measuring plot size, measuring diameter of trees, locating the plot on the map, and measuring the altitude
Bird survey	Binoculars, notebook, GPS	Watching birds, making illustration of birds and recording observations, locating bird survey points on the map
Camping equipment	Tent, string, spade, trowel, utensils (pots, pans, lids), raw food material	To setup and run the camp
Health	First Aid	To treat minor injuries and ailments
Transport	Speed boat	Transfer of equipment from the ship to the shore, and for emergency use

3 Methodology

3.1 GPS survey

3.1.1 Bird watching
We divided ourselves into 2 groups, used GPS to mark the starting point (base camp) and bird watching locations, and we also recorded altitude and habitat at each bird survey point.

3.1.2 Vegetation survey
We used GPS to mark points on transects and record the location of plots along the transect, we made 2 transects, one of them was along the stream and another along the path.

3.2 Bird survey

3.2.2. Bird illustration
We made a sketch of the bird into field note book and described its colour and typical characteristics; as well as recorded time and date of observation. After returning to the base camp, we compared our bird sketches with the pictures in the book called Chim Vietnam (Birds of Vietnam) in order to identify the species.

3.2.3. Transferring Data
After identifying the species, we transferred the data into the master databooks divided into the following categories:

- Specie name: included Vietnamese name, English name and Latin name

- Description of head, back, belly, tail, wing of bird
- Survey location (GPS) and habitat

At the end of the training course we compiled a list of all the bird species identified, arranged them in the same order as we observed them, and constructed a species accumulation curve.

3.2.4 Bird watching methodology

We used binoculars to do bird watching from 5^h30 am to 7^h30 am following transects:

- Along the path
- Along the stream
- Along the coast

After that we marked all bird observation points on the map using co-ordinates obtained by GPS receiver; we also described and illustrated the habitat around each bird survey point.

3.3 Vegetation survey

3.3.1 Vegetation plots (10 m X 10 m)

Along the path, we made vegetation plots (10 m apart from the path). In these plots we carried out the following activities:

- Dbh measurement
- Canopy measurement
- Tree height measurement
- Tree description
- Taking leaf samples
- Making 2 small subplots (2 m X 2 m) in the corner of each vegetation plot in order to record diversity of ground flora.
- Assist the botanist in identifying tree species

3.3.2 Recording, processing and analysing data

We recorded all data collected from the vegetation plot into field notebooks. We processed and analysed the data in the following ways:

- We counted the basal area of each tree using the formula: $A= \pi d^2/4$;
- We mapped the location of tree the vegetation plot;
- We used canopy diameter measurement to draw a canopy projection of each tree in the plot.

3.3.3 Vegetation transects

We divided ourselves into 2 groups – Group 1 and Group 2. Group 1 walked along the path transect, and Group 2 walked along the stream transect. While walking along the transects, we identified all tree species that were taller than 1.3 m and with a diameter greater than 6 cm, within 1m on each side of the transect. Based on the checklist of species on the transects we constructed species accumulation curves – one for the path transect and one for the stream transect.

4 Vegetation survey

4.1 Location

Cai Quyt mountain, Ba Mun Island, Bai Tu Long National Park.

4.2 Purpose

To understand vegetation structure as well as species diversity, regeneration rate and disturbance due to people, within the survey area.

4.3 Survey methodology

We used two ways of surveying – vegetation plot and vegetation transect (*section 3.3*).

4.3.1 Vegetation plot

In order to evaluate the effect of the disturbance due to people on the structure of the vegetation, we established vegetation plots at different altitudes along a path – on random side of a path and 10 m away from the path. Each vegetation plot measured 100m^2 in area. We measured dbh, height and the extent of canopy of trees. In addition, two small ground flora subplots of 2m x 2m were made in two different corners of the plot in order to assess regeneration in the forest and diversity of other plant species.

4.3.2 Transect survey

We made two transect in different terrains – transect 1 went along the path up to the top of mountain, transect 2 went along the stream. In these transects we collected leaf samples and identified trees (within 1m on each side of the path) which have a diameter greater than 6 cm, in order to understand diversity of tree species by constructing a species accumulation curve.

4.4 Results

Transect 1: 29 tree species identified
Transect 2: 33 tree species identified

Because of the limited time available, the number of sampled trees was not sufficient to evaluate the distribution of tree species in those transects.

4.5 Conclusion

This is secondary forest, regenerating after over exploitation, strong disturbance and low canopy. While woody plant species are low in diversity, ground flora is diverse in species.

5 Bird Survey Result

From 23 to 27 May, 2003 we carried out bird survey work on Cai Quyt mountain on Ba Mun island in Bai Tu Long Bay National Park.

5.1 Survey methodology (*Section 3.2*)

We did bird watching using binoculars. We observed birds at various points along transects transects, recorded bird characteristics, and made sketches of bird observations. After returning to the base camp, we used a book called Chim Vietnam (Birds of Vietnam) in order to identify the observed birds. Furthermore, we also marked on the map the bird survey locations using GPS and recorded information such as: date, time, and name of the surveyor. We recorded this information in the master data record books regularly, usually soon after the bird watching session everyday.

5.2 Results

We observed 75 individuals, and identified 35 bird species. Based on the checklist of species arranged according to the time of observation we constructed bird species accumulation curve.

5.3 Conclusion

- Based on our observations and notebook records, we made a list of common species that are common in the area: *Cu gay, Chich nau, Khuou, Chao mao, Khuou bung nau*.
- There were 75 individuals observed and 35 species identified. This baseline information will be useful for future surveys.
- Due to the limited time available during the training workshop, the estimate of bird species diversity and distribution is not exhaustive.
- The species accumulate curve for birds suggests that the present sample size of 75 individuals is not sufficient to get a good idea of total bird species diversity on Ba Mun Island, therefore more surveys are necessary in the National Park.

6 GPS Survey

6.1 The aim of using GPS in field work

Mapping the location of transects or vegetation plots in the field is important. Therefore, we used a GPS in this training workshop. By using GPS we could record all information of transects and vegetation plots such as: location, altitude, length, and habitat. This will be the basis of survey work in future.

6.2 Applying GPS in biodiversity survey in Bai Tu Long Bay National Park

- Determining the location of vegetation plots, bird observation points and other landmarks;
- Recording the transect route;
- Mapping habitat and survey locations.

6.3 Using GPS in the training workshop (*Section 3.1*)

- In the training workshop we have used GPS for marking transects, and sampling locations along those transects.
- We marked location of vegetation plots on the transect and recorded the altitude
- We marked all bird observation locations and recorded the latitude

6.4 Results

As a result of GPS survey, we obtained and recorded the following information:

Terrain of transects:

- Coastal terrain
- Slope terrain

Habitat of transect:

- Secondary forest
- Bushes near the coast

Mapping

- Map of vegetation plots location on the transect
- Map of tree survey locations on the transect
- Map of birding locations

Such information will be useful for planning future surveys.

7 Conclusions & Recommendation

During the two-week training workshop we were able to do a lot of useful work and improved our knowledge of science, especially field surveys, with a lot of support from Frontier Vietnam's experts and staff. On behalf of Bai Tu Long Bay National Park, I would like to thank Frontier-Vietnam for organising this helpful training workshop, to all the experts, to all Frontier staff and to all participants.

7.1 Achievements

- GPS: All trainees can now use GPS and we have made a map by using GPS, and recorded all transects, bird survey points as well as vegetation surveys plots.
- Vegetation:
  - Vegetation plot: We established 6 vegetation plots along a transect. We measured dbh of trees, mapped all the trees and carried out survey of ground flora in the vegetation plots.
  - Tree survey: We enumerated trees along two transects, collected leaf samples and identified species.
- Bird survey: In this training workshop we did bird survey using two procedures: surveys at points along transects; and opportunistic observations. We observed 75 individuals in 35 species of birds. The species accumulation curve suggested that this sample size is not sufficient to evaluate bird species diversity and distribution on Ba Mun island.

7.2 Limitations of the training course

- Survey equipment: Most of the equipment used during this training workshop such as binoculars, GPS were old, which did not permit us to make accurate observations.
- Training time: Although we are aware that Frontier Vietnam has done their best to organise this workshop, but we would have liked the training course to last longer than ten days in order for us to get more knowledge and experience of field work.

7.3 Survey methodologies for future

To continue survey work in the future the National Park will need to have good experts for leading the work as well as good science equipment. We will carry out field work in future on the basis of what we have learned during this training course.

7.3.9 Individual Performance Summaries

Mr Nguyen Dinh Ung (NU) – Head, Conservation Department

His written work was neat and logically set out. Because he had not recently been to forestry college or been to the field to assist science work showed that his basic background knowledge of conservation and survey work was less than some of the others. Despite this he was able to produce sound written work for the role play and the report. We would like to have had more time to draw out more of the conclusions and recommendations of the science work, as well as the general conclusions of the training.

Mr Ung's level of knowledge improved considerably as the training went on. His responsibility of providing the feedback of the group was extremely helpful to sort of minor misunderstandings and disagreements – an important contribution for the success of the training. He did an excellent job in the management role play, with good empathy, arguments and questions to others. His presentation, although there was some overlap, highlighted some excellent general recommendations.

It was difficult to assess Mr Ung's field skills because we did not often get a chance to observe him carrying these skills out, although we believed him to be competent in practical botany skills, and GPS use.

As team leader, Mr Ung tended to play more of a back-seat role than some other members, which may have prevented him learning as much as we would have hoped. He was effective in the feedback role and as the week went on seemed to have more understanding about what we were trying to achieve and saw the positive improvement of the group members.

As Head of Conservation, Mr Ung has the extremely difficult job of natural resource management for the conservation of ecosystems and development of tourism. He would greatly benefit from encouraging his staff as much as possible to work towards these goals, and actively seek assistance from organisations that could provide financial and technical support. Reading any available material relevant to science, conservation and management would help increase awareness of other organisations and conservation activities, would increase the ability to understand and interpret science reports and would point to way to a robust natural resource management plan. Making information to other members of the science and conservation department and providing circumstances for the participants to practice the skills they have acquired would build a strong science and conservation department.

Mr Pham Khahn Linh (PL) – Conservation Department

His written work was generally excellent; logically set out with high quality answers. The initial work showed a good platform of basic knowledge on biodiversity, species, camp issues and general knowledge about conservation in Vietnam. His survey plan was the best in the group, and his data recording complete and accurate. He was able to grasp complex ideas and was extremely competent at analysis. Although there was room for improvement in the methods section of the final report he wrote, it showed promise; some of the detail was missing but there was a logical structure and layout, all the areas were broadly covered and all the information was relevant. He came joint first in the final multiple choice exam.

His excellent written work was complimented by his ability to express his ideas verbally. He again, demonstrated good background knowledge, including methods of participatory

appraisal (socio-economics) and very good ideas about management of natural resources. During discussions he would often take the lead to explain complex concepts very effectively and his level of contribution was of high quality and frequent. During the management role play he eloquently demonstrated the potential of local people to be able to contribute to conservation efforts and that working with local people is vital for a successful natural resource management plan. His arguments throughout the role play were excellent. Mr Linh's presentation was excellent too; structured, focused and to the point.

His theoretical knowledge was complimented by sound practical skills. He used equipment competently, and showed ability to apply concepts learnt in the classroom to the field. He was particularly good with the botanical survey work. His bird survey skills of observation and taking field notes, and although he would need time to develop those skills he has the ability and patience to become a very skilled birder.

We were very impressed by Mr Linh's professional behaviour throughout the training. He was polite, hard-working, interested and receptive to learning new things. He dealt with the trainers in a frank and honest way without complaining, so any problems were dealt with quickly and without repercussions. He also worked well with colleagues, showing ability for effective team working and leadership. He had the best level of English amongst the group and we were very pleased that he made the effort to communicate in English.

Mr Linh has all the qualities to make an excellent leader in the conservation field; intelligent, talented, hard-working, responsible attitude and an ability to work well with different people and a good foundation of knowledge with which to work on. We highly recommend that Mr Linh be given every opportunity to develop these talents and give him as much experience as possible.

Mr Pham Xuan Dieu (PD) – Conservation Department

The initial worksheets demonstrated that his background knowledge of species was excellent. Mr Dieu, responsible for the GPS data did an excellent job of recording the data and producing a map of the data, reflected in the section of the report he was responsible for. Given more time, we would have been able to apply the GPS data to the surveys more effectively. He came joint first in the multiple choice exam.

He was able to demonstrate knowledge about the GPS and species very effectively and was clearly intelligent enough to acquire a sophisticated level of knowledge in the areas he found interesting. Given his often superior knowledge, we were surprised when in group discussions generally unwilling to make effective contributions. He was extremely competent in the management game and was the only participant to effectively use visuals to support his case. His arguments were well planned and imaginative. His presentation also had good use of visuals and was to the point.

He was very competent at using the GPS and it was clear that he had had previous training. Likewise his practical skills in botany were mostly good, although the standard of his work was sometimes variable and when questioned about this, did not seem willing to learn from his mistakes. The standard of his bird observations were so varied that we suspected he had falsified some of the data for his own gain. The importance of accurate and honest data collection during survey work cannot be emphasised enough. If a small amount of data is not reliable it is likely to completely invalidate the survey. His use of source material was very resourceful.

Although he obviously had the capability of carrying out effective survey work and a passion for knowledge, but his attitude towards it was often not very professional. He displayed

extremely negative body language when the trainers were trying to explain something, and regularly seemed antagonistic during discussions. Although he regularly knew more that other members of the group he seemed unwilling to help others or share information.

Even with his obvious intelligence and capabilities, we would have difficulty recommending him to support other projects or receive further training until the reliability of his work improved, a more positive attitude is apparent and his trustworthiness was established.

Mr Hoang Van Khahn (HK) – Science Department

Mr Khanh's written work was generally of very good quality. The worksheets demonstrated a good knowledge base. The survey plan, although the continuity between the 'why', 'what' and 'how' parts could have been improved, the plan contained some very good ideas and had potential. His data recording ability was excellent, as was the data analysis he did for the report. The section of the report he wrote had some overlap with the methods section, but he understood what the results were and how it what sort of conclusions you could draw from them.

Mr Khanh showed a good background knowledge. It was clear that he had learnt a lot from projects he had worked on prior to the training, which is a good indication that he would work well with future projects. During discussions he contributed well and although he was not very vocal during the management game, his comments were good. He did an excellent presentation with good use of visuals.

He was excellent at the practical elements of the course, and excelled in his observation and field notes, taking accurate bird descriptions and good attempts at identification. He took on the responsibility for managing the bird data well. He was also extremely practically competent on the botanical side.

We were very impressed with his behaviour throughout the training. He always seemed keen, interested and adaptable, volunteering to carry out tasks. He was also mindful of other people looked after the equipment well, where many people were not so careful.

We were very pleased to have taught Mr Khanh; a keen, sincere and competent participant. We believe he is extremely well suited to providing support to future science and conservation projects and recommend that he be included in future training to improve his developing skills.

Mr Pham Xuan Phuong (PP) – Science Department

His written work was generally logically set out and well structured. The initial worksheets contained some good ideas but indicated that he had had less experience than some of the others; having not been to forestry college. His survey plan was generally good but could have been improved with more detail. The data recording was excellent, although he would benefit from more practice to increase the speed of his work. He was responsible for writing the results section of the report, and did an excellent job of analysing the data for this and presenting the work in a structured way. In the results section however, there is some overlap with the methods and the results that could have been rectified had we had more time.

He was generally good at the practical side f the work, and we were confident of his capabilities in the botany survey and using the GPS. His observation skills and his ability to take field notes need time and practice to develop, but we were confident that he was able to reliably record the data and make honest judgements when making identifications.

As he gained confidence during the training, his ability to express his ideas, some of which were very astute. His contribution to discussions also greatly improved throughout the week. He made some very good statements in the management role play, demonstrating that he was aware of other issues besides fisheries. Although there was some overlap of his presentation, he made some good observations of the results.

He has an extremely hard working and had a friendly, polite attitude. He was very willing to undertake work and would keep trying to improve. He took responsibility for analysing the tree data (with the most complex analysis and with the most data) admirably.

We were very pleased with My Phuong's progress through the training and we hope that this training will provide good broad foundations for his future work in the fisheries. He has had less experience and opportunity than some of the others, so should be given the time, opportunity and help to develop and learn new skills. If this were to happen, he would be a significant asset to the department.

Mr Nguyen Van Hung (NH) – Forest Protection Department

Mr Hung's written work was generally fair. Coming from the Forest Protection Department, we did not expect him to have detailed knowledge about science or conservation issues, although the worksheets and survey plan showed some background knowledge of the issues. He took on the responsibility of the vegetation data very well, and recorded the information very accurately with good presentation. The introduction to the report that he was responsible to write improved considerably with guidance.

His excellent progress during his training was reflected in increased ability to explain concepts throughout the course. Although he did not normally dominate discussions he was able to participate. He performed his part as the ecologist in the role play well and provided a good introduction to the presentations.

He worked hard throughout the training and was very competent at the practical aspects of the botany surveys and was able to use the core GPS functions. Although he has the potential, his observations skills and his ability to take field notes need more time to develop to be able to do an effective bird surveys.

He conducted himself in a quiet, uncomplaining and disciplined manner, appearing competent and able. He worked got on well with others in the group and treated the training in a professional manner. Because he tended not to dominate discussions and activities more time was needed to properly assess his potential.

We would encourage Mr Hung to seek training and advice that will help him learn more about management.

Mr Le Van Khai (LK) – Forest Protection Department

It was not able to assess Mr Khai in the same way as the others. Because of problems with the boat, unfortunately he missed a significant part of the training and a number of important activities.

As a long standing member of the Forest Protection Department and no previous background in science or conservation, we did not expect Mr Khai to have the level of background knowledge of some of the others. Despite this, he was able to complete a fair survey plan and

a section of the report about the potential role of the Forest Protection Department in assisting with science and conservation. He also identified the resources necessary to carry out a survey and the use of the resource.

Mr Khai was competent at using the GPS and carrying out the botany survey work. Although very good at the observation of birds, he was unwilling to try to take field notes.

He was a friendly member of the group who got on well with the other participants. He participated well in a group and had a helpful attitude. Mr Khai generally did not contribute to discussions and it was difficult to enter into a discussion with him about the training. He did however give a good presentation.

Mr Khai played a vital role during the training and a good team member when there were difficulties with the boat. Even though he missed a significant amount of the course, we felt he learnt some useful aspects.