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STRENGTHENING PROTECTED AREA MANAGEMENT IN VIET NAM-SPAM PROJECT

BIODIVERSITY CONSERVATION SURVEY, MONITORING AND TRAINING NEEDS FOR SPECIAL-USE FORESTS

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Sincerely thank you.

Authors

Xuan Mai, October 2001

ABBREVIATIONS

ARDD	Agriculture and Rural Development Department
BD	Biological Diversity / Biodiversity
CHEF	Cultural, Historical and Environmental Forest
CRES	Center for Resources and Environmental Study, Hanoi National University
E	Endangered
FFI	Fauna and Flora International
FPD	Forest Protection Department
ICDP	Integrated Conservation & Development Project
IUCN	World Conservation Union
K	Unknown
LINC-WWF	Phong Nha-Hin Nam No Link project of WWF
MARD	Ministry of Agriculture and Rural Development
MOSTE	Ministry of Science, Technology and Environment
NEA	National Environment Agency
NP	National Park
NPAWG	National Protected Area Working Group
NR	Nature Reserve
NTFP	Non Timber Forest Products
NWGP	Provincial level National Working Group
PFPD	Provincial Forest Protection Department
R	Rare
RAS-WWF	Sub-Regional Biodiversity Forum Project (RAS/93/102), WWF
SPAM	Strengthening Protected Area Management in Viet Nam
SWOT	Strength, Weakness, Opportunity and Threat
T	Threat
TNA	Training Need Assessment
UNDP	United Nation Development Programme
UNEP	United Nation Environment Programme
V	Vulnerable
WWF	World Wide Fund for Nature

PREFACE

Vietnam is considered as a high BD country that is one of 10 important BD centers in the world. It is indicated through its abundance of gene sources, number of species, habitat types, ecosystems and biological geographical regions.

From thousand years ago up to now, BD of Vietnam has been being contributed the importance not only for maintenance and development of the biological world but also for development of socio-economy, society, culture and education of the human being, (supply of food, foodstuff and medicine sources, and material sources for many industrial sectors). Beside the economic value, BD still has a big ecological and environmental value (regulating water source, climate and controlling pollution of the environment etc.,) Another important value of BD is that helps people creating beauties on their virtue, aesthetic education, rest, health saving and religion.

It has passed through the months and years with historical upheavals on politics, economy and society, BD of Vietnam has been being degraded and this degradation is taking place with a very fast speed in recent years. There are many reasons causing BD degradation of Vietnam, but the main reason is the loss of natural forest, over harvesting and limitation of knowledge on BD role and value. Eventually, the origin of all reasons causing the degradation of BD is due to contradiction between supply capacity of biological resources and needs for use by people.

Being aware of the natural resources value and necessity to be conserved, right in the beginning of 1960s, Vietnam has started up important activities to conserve its BD. Many different policies and measures were applied and one of the important measures is to establish a special use forest system. Following the planning, organization and management of special use forest report presented at the workshop in November 1997 of MARD in Cuc Phuong NP, until 1995, Vietnam has established at least 90 protected areas with an area of 952,822 ha included 6 NPs (178,400 ha), 52 NRs (677,255 ha) and 32 CHEFs (96,167 ha). The MARD is preparing a draft to submit to the Government for approval of 112 areas under 4 different special use forest categories with a total area of 2,704,407 ha including 20 NPs (654,419ha), 59 NRs (1,818,836 ha), 14 areas for species / habitat conservation (75,612 ha) and 19 areas for landscape protection (154,540 ha). After nearly 40 years long, the special use forest system has contributed for BD conservation activities of Vietnam and many precious and rare plant and animal gene sources have been saved from of extinction. Beside the obtained achievements, the management work of special use forest system in Vietnam is still of many remaining problems. Apart from the small area and fragmented forest of protected areas of Vietnam, the personnel organizing in provincial forest protection departments and special use forest areas still has more non-up to dated things.

In order to help provincial forest protection departments, NPs and NRs to implement their assignments, with the assistance of SPAM project, the consultation group of Vietnam Forestry University in collaboration with Forest Protection Department, Forest Inventory and Planning Institute and Institute of Ecology and Biological Resources have carried out their consultancy.

Purpose of consultancy is to propose recommendations of methods and specific activities in order to strengthen professional capacity to carry out survey and monitoring activities, collection and sharing of BD information in protection areas of Vietnam.

This consultative activity was implemented from July 26 to October 26, 2001.

CHAPTER I: CONTENT, METHOD, LOCATION AND STAFF FOR IMPLEMENTATION OF CONSULTATIVE ACTIVITIES

1. Consulting content.

Based on requests of SPAM project office, the consultative group has selected and implemented the following contents:

1.1. Collection of existing BD information in protected areas and plant and animal specimens which are stored in the museum of the country.

In order to establish the feasibility study / the investment project of the NPs and NRs, most of organizations should carry out survey and collect basic data on BD (number of plant and animal species, forest types /status). But may be due to inaccurately copying or supplementary researches, so these data are commonly quoted differently in different reports. Otherwise, data quality on forest resources, forest plant and animal resources in Vietnam is actually issues that should be further discussed about its reality. Collection and review of BD information of some representative NPs and NRs can give a overview picture useful for building up a database and sharing that information.

1.2. Requirement assessment for BD survey and monitoring.

BD survey and monitoring is an important activity for the conservation but until now, there is no or very few NPs and NRs do it. So, assessing the requirement for BD survey and monitoring is to carry out a general evaluation on the personnel organizing at the Provincial ARDDs, FPDs, the education level, present knowledge, technical and capability of the staff for carrying out the BD survey and monitoring.

1.3. Recommendation of content and method for BD survey and monitoring.

Based on analysis of information and practical needs, the consultative report will recommend contents, techniques, time as well as repeated time for BD survey and monitoring times in the NPs and NRs throughout the country.

1.4. Recommendation of content and curricula for training courses on BD survey, monitoring and conservation.

Based on consolidation of information obtained from survey forms, the talks with staffs who have been working in the BD field inside and outside the country in Hanoi, members of provincial level working group of SPAM project interviewed staffs and forest protection rangers in provincial forest protection departments, NPs and NRs, the consultative group defined contents on knowledge and skills requested for BD survey and monitoring work, defined needs, target groups, and the most appropriate and economic training type and measure.

2. Implementing method

In order to implement setout contents, the consultative group has used methods:

2.1. Discussion and interviewing through questionnaires

- Contact meetings were directly or through questionnaires organized with management staffs, scientific staffs of the central institutions and international organizations.
- Collected information and data on specimens in five museums: the Natural Science University (Hanoi National University); Institute of Ecology and Biological Resources Hanoi; Vietnam Forestry University, Xuan Mai; Forest Inventory and Planning Institute Hanoi; the Plant Museum of the Tropical Biology Institutes in Ho Chi Minh city and Da Lat Town.

2.2. Field survey

The mission has exchanged with the staffs of one provincial ARDDs, six provincial FPDs, seven NPs & NRs in four typical provinces of the project (Lao Cai, Thua Thien Hue, Gia Lai and Ba Ria Vung Tau) and some provinces together with other NPs and NRs. Total time was used for field survey as 108 person / days. Specific steps for implementation as follows:

- Talked with leaders of the departments, provincial FPDs, SPAM provincial working groups, leaders, technicians, forest protection rangers of NPs and NRs to collect opinions, consolidate data related to BD.
- Collected information on forest protection work from annual summary reports of provincial FPDs or provincial ARDDs, and Department for Science, Technology and Environment and in research reports of inventory collectivities.
- By using semi-structure interview method and exploratory questions to define present standard and capacity of technicians and forest protection rangers, investigate demands and standard of requested basic knowledge and training need in order to implement BD survey and monitoring works.
- Approached into local people community who live in and surrounding the protection area in order to investigate the participatory capacity in BD survey and monitoring activities.

2.3. Synthesis and analysis of information

Information obtained from talks and interview sessions; data collected from reports were integrated according to each content and specific demand. Total time spent for consolidation of data and writing of field result report of groups take 90 person days.

3. Staff for implementation, locations and working schedule.

In order to conduct survey for collection of information in localities, 9 members of the consulting group were divided into 3 subgroups, each subgroup consists of 3 persons and they conduct at the same time in 3 regions: the Northern, Central, Southern parts and Central Highland. Total time for field survey is 96 person days (Annex I) and it is specifically summarized in Table 1:

Table 1. Itinerary, target groups and content on field survey of 3 subgroups

Working partners	Working content	Group in the North	Group in the central	Group in the South
Starting up		28 July	26 July	26 July
Tropical Biology Institute	Specimens and BD research			26 July
Leaders, functional chiefs, Forest Protection Stations, Technicians of the NPs and NRs	- To collect data on BD by NRs -Situation of national park management. - Staff's qualification and experience - Training need on BD for staff	29-30 July	27-28 July	29 July
Representatives of local people	To define possibility of peoples' participation in BD conservation	31 July-1 Aug	29 July	30 July
Leader of Agriculture and Rural Development Department, PFPDs, Provincial working group (+ Leaders of functional divisions)	- BD management situation in the PAs; - Personnel organization work, present knowledge and skills standard and BD training need of the province	2-3 Aug.	30 July	28 July
Leaders, Chiefs of functional divisions, Forest Protection Stations, Technicians of Cat Tien national park	- To collect data on BD of the NRs - Situation of management of the national park - Staff qualification and experiences - Training need of BD staff			31 July

Shifting of working places		4 Aug.	31 July	31 July
Da Lat tropical Biology Sub-Institute	- BD researches - Plant and animal specimens			1-2 August
Leaders of PFPD, Chiefs/Deputy chiefs of related functional divisions	- BD management situation of the NRs; - Personnel organization work, present knowledge and expert standard and training need on biodiversity of province	5 August	1 August	6 August
Leaders, Chiefs of functional divisions, Forest Protection Stations, Technicians of the NPs and NRs	- To collect BD data of the NRs - Management work situation of the national park. - Staff's qualification and experiences - Training need on BD of staff	6 August	2-3 August	3-4 August
Representatives of local people	To define possibility of peoples' participation in BD conservation	7 August	4-5 August	5 August
Leader of PFPD, Chiefs/Deputy chiefs of related divisions in Kon Tum FPD	- BD management situation in the NRs; - Personnel organization work,, present knowledge and expert standard and training need on BD of the province			7 August
Back to Hanoi		7 Aug.	5 Aug.	8 Aug.

Collection of information from institutions in Hanoi was conducted by two ways: directly meeting and answering questions noted down in interview forms. Meeting time with experts and the State institutions (Forest Protection Department, Environment Department, Hanoi National University, Institute of Ecology and Biological Resources, Forest Inventory and Planning Institute, CRES, etc.,) and Non Government Organizations in Hanoi (WWF, IUCN, FFI, BirdLife International) is 40 person days (Annex II).

After necessary information was collected, based on field reports that were edited by groups, based on the outline of report that were commented and corrected, the expert and counterpart group consolidated and edited draft of the first report. Time spent for report edition is 160 person days (Annex 1).

CHAPTER II: BIODIVERSITY IN SOME NPS AND NRS OF VIETNAM

1. Hoang Lien Sa Pa NR

1.1. Basic information

Hoang Lien Sa Pa NR was decided to be a NR since 1986 (Decision 194/CT August 9, 1986) but only established since January 11, 1993 (Decision 25/QDUB- Lao Cai Committee) [6, 43]. This NR is covered with a total natural area of 2,281 ha, under 4 communes: San Sa Ho, Lao Chai, Ta Van and Ban Ho, Sa Pa district, Lao Cai province. High mountain is the most outstanding characteristics in this NR, average figure is from 1,500 - 2,500 m, the highest peak is Fansipan (3,143m). Terrain is strongly divided steep slopes with many ranges and ravines. Annual mean temperature is 15.4^{o}C. Average rainfall is 1,918mm. Annual average humidity is 86%. Every year it falls snow on chilly cold day. Wind direction is southwest and northwest.

1.2. BD information of Hoang Lien Sa Pa Nature Reserve

1.2.1. Fauna

Results of vertebrate species survey under 4 classes: Mammals, Birds, Reptile and Amphibian are indicated in Table 2.

Table 2. Fauna composition in Hoang Lien Sa Pa NR

Class	No. of Order	No. of family	No. of species
Mammals	9	24	57
Birds	14	44	140
Reptiles	2	10	56
Amphibian	1	5	25

+ Animal species recorded in the Red Data Book of Vietnam in Hoang Lien Sapa NR include 5 mammal species, 5 bird species, 17 amphibian and reptile species [12, 42] *(Petaurista petaurista, Petaurista elegans, Nycticebus pygmaeus, Macaca arctoides, Hylobates concolor, Myotis siligorensis, Cynocephalus variegatus, Arctictis binturong, Chorogale owstoni, Selenarctos thibetanus, Cuon alpinus, Neofelis nebulosa, Panthera pardus, Capricornis summatraensis, Ceryle lugubris, Buceros bicornis, Picus rabieri, Garrulax milleti, Garrulax maesi, Trimeresurus cornutus, Trimeresusus monticola, Platysternum megacephalum, Gecko gecko, Acanthosaura lepidogaster, Physignatus cocicinensis, Ptyas korros, Bungarus fasciatus, Naja naja, Bombina maxima, Leptobrachium papebralepidospinosa, Megophrys feae, Megophrys longipes, Ranamicrolineata, Rhacophorus nigropalmatus, Rana spinosa).*

+ Species which are characterized for the subtropical micro climate, only found in Sa Pa and some of them are also endemic to Vietnam are 12 bird species such as *Pellomerneum albiventre, Pomatorhinus albiventer, Brachypteryx leucophrys, Brachypteryx fuscus, Myiophoneus caeruleus, Tarsiger chrysaeus, Erithacus indicus, Phoenicurus auroreus, Phoenicurus frontalis, Hodgsonius phoenicuroides, Enicurus maculatus*.

Hoang Lien Sa Pa NR is also a place where many animal species were first discovered by scientists such as *Leptobrachium pelodytoides,Rana fansipani, Hemidae chapaensis, Mabuya chapaensis, Pararhabdophis chapaensis, ...*

1.2.2. Flora

Plant components of Hoang Lien Sa Pa NR is recorded in Table 3 [12, 42]

Table 3. Flora composition of Hoang Lien Sa Pa NR.

Divisions	Number of families	Number of species
Equisetophyta	1	1
Lycopodiophyta	2	6
Polypodiophyta	21	62
Gymnospermae	6	11
Angiospermae		
Monocotiledonae	17	188
Dicotiledonae	112	196

Species were in the first time in the world discovered in Hoang Lien NRs are *Ilex chapaensis* Merr, *Primula chapaensis* Gaynep, *Quercus chapaensis* H. et Ca, *Habeneria chapaensis* Gagnep, *Liparis chapaensis* Gagnep, *Chrysoloessum chapaensis* Gagnep, *Peryotilus chapaensis* Gagnep, *Castanopsis chapaensis* Luong.

Rare and valuable species include 65 species, Species to be strictly protected: 7 woody species: *Forkienia hodginsii* Henry, *Podocarpus nerifolius* D.Don., *Tsuga yunnanensis*, *Dacrydium pierei* Hickel, *Burretiandenron hsienma* Ch., *Gacinia fragracoides* Achev. There are 10 species used for medicinal proposes.

2. Tam Dao NP

2.1. Basic information on Tam Dao NP

Tam Dao NP was decided as NP since 1977 (Decision 41/TTg, January 24, 1977) but its Investment Project only signed by Prime Minister on March 6, 1996 [44]. Tam Dao NP is under the territory of 3 provinces: Vinh Phuc, Thai Nguyen and Tuyen Quang, it is situated in Tam Dao mountain range going more than 80 km along the Northwest - Southeast direction from Son Duong district (Tuyen Quang) to Me Linh district (Vinh Phuc). Area with forest occupies 23,333ha (63%), of which natural forest is 21,982ha (59.6%), plantations occupy 1,351ha (3.7% total area).

Tam Dao mountain range acts as screen stopping the Northeast wind from the delta, it includes over 20 mountain peaks with altitudes more or less of 1,000m. The highest is the Tam Dao North peak (1592m) and 3 well known peaks are: Thien Thi (1,375m), Thach Ban (1,388m), Phu Nghia (1,300m), the width of the mountain block is 10-15km, mountain slope is steep and terrain is strongly divided.

Tam Dao belongs to the monsoon humid tropical climate, annual mean temperature is 23.7^{o}C, annual average rainfall is 2,600 mm, and annual average humidity is 85%.

2.2. Information on BD of Tam Dao NP

2.2.1. Fauna

The existing document on Tam Dao National Park showed that there were 394 vertebrate animal species recorded here, they belong to 4 classes on mammals, birds, reptiles and amphibians [44, 49].

Table 4. Fauna composition of Tam Dao National Park

Class	No. of orders	No. of families	No. of species
Mammals	8	21	66
Birds	15	56	249
Reptiles	2	13	49
Amphibians	3	7	30

Among number of species put in the statistic data, there are 24 mammal species, 10 bird species, 16 reptile species and 8 amphibian species that have their names in the Red Data Book of Vietnam and Decree No 18 HDBT (Revised).

Beside the temperate high mountainous factor (Himalayan factor), China subtropical factor, Tam Dao fauna is characterized for the tropical zoogeography (India - Malaysia factor) with the presence of some species such as: *Viverricula indica, Tragulus javanicus*, *Capricornis sumatraensis*, *Bandicota indica,* etc., The important endemic species of Tam Dao NP is Tam Dao salamandra *(Paramesotriton deloustali)*.

Some species were very common in the past but they are now either locally extinct or have become rare and very rare such as Lesser Oriental Chevrotain, Black Gibbon, Francoi's langur, macaques and squirrels.

2.2.2. Flora

Tam Dao is known with two main types of forest [44, 49]:

- *Type of closed evergreen tropical monsoon-rain forest that is distributed on the altitude under 700m. This type includes many broadleaf species belonging to Fabaceae, Meliaceae, Euphorbiaceae, Burseraceae, Myrtaceae, Dipterocarpaceae, Annacardiaceae etc., Due to large impacts of people, the virgin forest no longer exists but the secondary forest and restored forest status exist in Tam Dao NP.*
- Type of closed evergreen subtropical monsoon-rain and low mountain range forest that is distributed on the altitude from 700 to 1,500m. Characteristics of this type of forest are many species appeared belonging to the following families: Lauraceae, Fagaceae, Aceraceae, Theaceae, Podocarpaceae, Magnoliaceae, Ericaceea. A lot of species fall their leaves in the winter, some species are stunted, early branching, their bark with moss and lichen. Impact of people in forest resources on this altitude belt is less than the lower belt [40, 49] .

Table 5. Flora composition of Tam Dao NP.

Division	No. of families	No. of genus	No. of species
Equiserophyta	1	1	1
Lycopodiophyta	2	3	14
Polydosiophyta	24	35	61
Gymnospermae	8	10	17
Angiospermae			
Dicotinlodoneae	119	480	919
Monocotiledoneae	25	131	270
Total	**179**	**660**	**1,282**

3. Proposed Phong Nha - Ke Bang NP

3.1. Basic information on Proposed Phong Nha-Ke Bang NP

Phong Nha - Ke Bang NP [45]) is situated in the Northwest of Quang Binh province, belonging to district Bo Trach. Total natural area of the NP is about 86,200 ha. Limestone mountains occupy most of area, other mountains only occupy a small part. Average altitude is 600-700m; going along about 150km. Phong Nha NP proposed is known with a system of 20 different caves, of which Vom cave with the length of 15 km together with other caves created out special habitats.

Mean temperature is 24^{o}C, average humidity is in our country at a rate of 83-84%. Rainfall is 2000-2500mm/year.

3.2. BD information of Phong Nha - Ke Bang NP

3.2.1. Fauna

Up to now, the statistic data have been listed 113 mammal species in Phong Nha - Ke Bang NP[28, 45]. Phong Nha Ke Bang mammal fauna consist 41 rare and valuable species such as tigers (3-4 individuals), Gaur (2 small groups remain, about 4-8 individuals). There are 324 bird species [28, 45], 26 rare and valuable bird species recorded in Phong Nha - Ke Bang area. The most important is endemic pheasant species in the North of the central part i.e. *Lophura imperialis*, *Lophura edwardsi*, *Lophura hatinhensis*, *Aceros nipalensis* etc. About 60 reptile species, 22 amphibian species [28, 45], of which 18 rare and valuable species have been recorded in the research works.

In Phong Nha - Ke Bang area is known with 259 day-time butterfly species under 11 families [20, 45], of which 4 phoenix butterfly species are in form of proposal for putting in the rare and valuable species list of the Red Data Book of Vietnam and Decree No18/HDBT issued on January 17, 1992 (revised version).

3.2.2. Flora

Up to 1998, over 800 tree species belonging to 8 groups with different functions [24, 45], of which 751 species in 140 families, 427 genera under Cormobionta were stastically recorded. There were 36 plant species got name in the Red Data Book of Vietnam and the world: *Annamocaria sinensis*, *Cymbidium sp*, *Aquilaria crassna*, *Ardisia silvestris*, *Excentrodendron tonkinensis*, *Calamus platyacanthus*, *Calamus poilanei*, *Cephalotaxus mamii*, *Chukrasia tabularis*, *Coscinium fenestratum*, *Cycas balansae*, *Dacrydiumelatum*, *Dalbergia oliveri*, *Dalbergia tonkinensis*, *Dendrobium sp*, *Drynaria bonii*, *Dialium cochinchinensis*, *Fokienia hodginsii*, *Fagraea fragrans*, *Helicia grandifolia*, *Hopea hainanensis*, *Hopea siamensis*, *Madhuca pasquieri*, *Markhamia stipulata*, *Hopea ferrea*, *Morinda officinalis*, *Nageia fleuryi, Platanus kerrii, Podocarpus neriifolius*, *Pterocarpus macrocarpus*, *Rauvolfia chaudocensis*, *Schoutenia hypoleuca*, *Sindora tonkinensis*, *Smilax glara*, *Tarrietia javanica*, *Senna siamea*.

4. Bach Ma NP

4.1 Basic information on Bach Ma NP

Bach Ma NP was established following the decision No. 214/CT (July 15, 1991) and is situated in the domain of two districts: Phu Loc and Nam Dong, Thua Thien Hue province. Area under the NP is 22,030 ha with the strict protection zone of 7,123 ha, ecological restoration zone of 12,613 ha and administration & service zone of 2.295ha. Bach Ma is in the Southern part of the North Truong Son range with many high mountain ranges such as Truoi peak (1154m), Nom peak (1186m), Dlip peak (1200m), Bach Ma peak (1450m).

Mean temperature in Bach Ma is 25^{o}C, (the area with altitude over 900m 18-23^{O}C) and rainfall is heavy up to 2440-3000mm/year, average humidity is 85%. Bach Ma is the national park with many special characteristics for biological geographic zone of the North Central Truong Son range.

4.2. BD information of Bach Ma NP

4.2.1. Fauna

There are several studies related to the Bach Ma's fauna [6, 11, 15, 22, 35]. Up to now, Bach Ma NP is statistically known to have 119 mammal species of which 39 mammal species were listed in the Red Data Book of Vietnam. In fact, data on rare and valuable mammal species of Bach Ma are not sufficient, may be backward compared with present situation. Population of siki gibbon (*Hylobates leucogenys siki*) is very much poorer than before. Status of tiger, leopard

and many other mammal species are also not clear.

About 330 bird species were recorded through 17 bird survey works in Bach Ma NP [11, 14, 35]. The outstanding point of the bird fauna of Bach Ma is of a high endemic with 4 pheasant species that are Edward's Pheasant *(Lophura edwardsi)*, Annamese Hill Partridge *(Arborophia merlinii)*, Beli Silver Pheasant *(Lophura nycthemera beli)*, Rufous throated Hiil Partridge *(Arborophila rufogularis guttata)*. In addition, there are also 8 endemic bird species for Indochina region. 21 rare and valuable bird species were discovered for Bach Ma, of which Crested Argus density is 0,3-2,5 heads/km^2 [14]. Three bird species may be disappeared in Bach Ma including *Lophura edwardsi*, *Halcyon chloris* and *Ploceus philippinus*.

Reptile, amphibian and fish of Bach Ma have not carefully surveyed so a few species were collected (29 reptile species, 18 amphibian species, 30 fish species), 7 reptile species and 1 amphibian species are rare and valuable [15, 35].

In Bach Ma NP, 3 insect groups were researched as Lepidoptera (255 species), termite (28 species) and Coleopteran (179 species). There are maybe 8 species in terms of rare and valuable species according to the draft of Decree No 18/CP (Revised Version).

4.2.2. Flora

At present, the botanical list of Bach Ma NP consists of 1,460 species in 635 genera, 170 families [6, 9, 34, 35]. About 47 species are considered as rare and valuable ones, of which some species have an important significance for the region as *Nageia fleuryi* (Hick.) de Laubf, *Dacrydium elatum* Pierre, *Parashorea chinensis* Wang Hsie, *Calophyllum inophyllum* L., *Madhuca pasquieri*, *Tarrietia cochinchinensis* Pierre, *Scaphium lychnophorum* Kost., *Aquilaria crasna* Pierre et Lecomte.

Figures on species, genera, families and number of rare and valuable species have said about plant diversity and its value. However, regarding the plant species, the experts also realized there are still some issues to be further discussed.

5. Kon Ka Kinh NR

5.1. Basic information on Kon Ka Kinh NR

Kon Ka Kinh NR was decided as a NR since 1986 (Decision 194CT, August 9, 1986) but not established until September 4, 1999. The Kon Ka Kinh NR is situated in Pleiku plateau, belongs to the administration domain of 3 districts: Dak Doa, K'Bang and Mang Yang, Gia Lai province. Natural area is 41,710 ha. Terrain of Kon Ka Kinh NR is rather complicated. It is divided strongly in the East with many high mountains and steep and short slopes. The terrain is rather much gentler in the South and West. Altitude varies from 570 m (Ba River valley) to 1748m (Kon Ka Kinh peak). Two big rivers in Kon Ka Kinh NR are Ba and Dak Pne with many different streams.

In Kon Ka Kinh NR, about 33,565 ha over a total of 41,710ha are covered by natural forest. There are 3 main vegetation types: The low mountain closed evergreen tropical humid rain forest is distributed on the altitude from 900m upward; Type of closed evergreen tropical humid rain forest appears mainly below 900 m; Subtype of human impact forest including closed evergreen poor-degraded forest and restoration forest following shifting cultivation.

5.2. Biodiversity information of Kon Ka Kinh NR

5.2.1. Fauna

Results of the primary survey showed that the forest fauna in Kon Ka Kinh NR consists of 221 vertebrate animal species **in** 74 families, 23 orders, of which 35 are rare and valuable species [2, 6, 37]. Fauna of Kon Ka Kinh NR is characterized by the tropical zoogeography of Me Kong delta, but there are some species dispersing from the North Truong Son tropical region into this area. Some large mammal species are understanding as gene conservation, economic and commercial values are also present in this such as *Ursus thibethanus*, *Panthera tigris*. Attention worth to be paid to as *Pygathrix nemaeus cinereus* and *Canimuntiacus truongsonensis are* newly discovered and they are endemic species to the Central Truong Son area.

5.2.2. Flora

Type of close evergreen tropical humid rain and low hilly forest that occupies most of area in the NR [3, 6, 37]. Attention special to be paid is there are about 2,000ha mixed forest between broad leaf species and coniferous species, in which there is *Fokienia hodginsi* is a unique type of forest, found in this area. Result of the primary survey showed that about 652 Kormobionta vascular species in 452 genera, 132 families. About scientific value, there are 10 endemic species such as: *Pinus dalatensis*, *Craibiodendron scleranthum*, *Afzelia xylocarpa*, *Dalbergia cochinchinensis*, *Dialium cochinchinensis*, *Alchornea annamica*, *Baccaurea sylvestris*, *Calamus poilanei*, *Bulbophyllum hiepii*, *Dendrrobium ochraceum*. Otherwise, there are 34 species listed in the Red Data Book of Vietnam and the world.

6. Cat Tien NP

6.1. Basic information of Cat Tien NP

According to Decision No 360/TTg on July 7, 1978 by the Prime Minister of the Government, "Forbidden forest of the South Cat Tien" was formed, Decision No 08/CT on January 13, 1992 officially gave the birth for Cat Tien NP. Up to February 16, 1993, Cat Tien NP was managed by the army (Division No 600). At present Cat Tien NP is direct under MARD [6, 30, 42, 48] .

Total natural area of Cat Tien NP is 73,878 ha consisting of 3 parts: The South Cat Tien under Dong Nai province (38,100 ha), the West Cat Tien under Binh Phuoc province (5,143 ha) and Cat Loc under Lam Dong province (30,635 ha). Terrain of Cat Tien NP consists of 5 main different types: Type of high mountain and slope terrain in the North; Medium terrain with less slope in the Southwest; Gentle and low hilly terrain; Type of Dong Nai river terraced terrain; Type of stream terraced terrain interlaced with lakes and swamps. System of abundant rivers, streams and ponds.

6.2. BD of Cat Tien NP

6.2.1. Fauna

Cat Tien NP is known with 86 mammal species under 31 families, 12 orders; 340 bird species and subspecies belongs to 62 families, 18 orders; 37 reptile species under 18 families, 3 orders; 14 amphibian species of 4 families, 1 order; 71 fish species in 21 families and 439 insect species [2, 30, 42, 48]. There are 25 mammal species and 20 bird species and 16 reptile species considered as rare and valuable species.

The fauna of Cat Tien NP is characterized by the tropical fauna of the dominance with ungulate and some large mammal species, especially valued such as Rhinoceros sondaicus annamiticus (Vietnamese Rhino), Panthera tigris (Tiger), Bos gaurus (Gaur), Bos javanicus (Banteng), Elephas maximus (Elephant). Cat Tien NP is may be the place where still occurs the nature Crocodile (Crocodylus siamensis) in Vietnam. Cat Tien NP is situated in the endemic bird zone of the low land of Vietnam with 3 endemic species.

6.2.2. Flora

Cat Tien NP is known with 3 main vegetation covers: Closed evergreen tropical humid rain forest; closed semideciduous tropical humid rain forest; closed deciduous tropical humid rain forest [6, 30, 42, 48].

About species composition, up to now about 1.366 Kormobionta vascular plant species under 73 orders, 151 families, 638 genera were recorded in Cat Tien NP including the divisions:

* Lycopodiophyta:	10 species	3 genera	2 families.
* Polypodiophyta:	40 species	31 genera	18 families.
* Pinophyta	1 species	1 genera	1 families.
* Cycaophyta*:*	2 species	1 genera	1 families.
* Gnetophyta*:*	3 species	1 genera	1 families.
* Magnodiophyta:	1310 species	601 genera	128 families.

+ There are 39 rare and valuable plant species belonging to 13 families. The endemic gene consists of 22 species in 13 families, especially *Dalbergia bariaensis, Afzelia xylocarpa*, *Dialium cochinchinensis, Pterocarpus macrocarpus* [3].

7. Binh Chau Phuoc Buu NR

7.1. Basic information on Binh Chau Phuoc Buu NR

On July 12, 1993, Chairman of Ba Ria Vung Tau Provincial People Committee signed the Decision No 1017/QD-UBT on establishment of Binh Chau Phuoc Buu NR. This NR is situated in the coastline of Xuyen Moc district under the administrative of 5 communes: Binh Chau, Bung Rieng, Bong Trang, Xuyen Moc and Phuoc Buu [6,16,19].

The specific characteristics of terrain of Binh Chau Phuoc Buu NRs is flat land, altitude is varied from 60 to 160m with 3 groups of main hills: Hong Nhung group (118m) in the North, Ho Linh group (162m) in the South and Mo Ong group (120m) in the West. Stream system is poor here, particularly there is a Binh Chau hot mineral water stream (with temperature of 60-80^{0}C) and many lagoons and lakes (Nhom lagoon, Tron lagoon, Coc lake, Linh lake).

7.2. BD information of Binh Chau Phuoc Buu NR

7.2.1. Fauna

Results of survey in 2000 by the zoologists of Institute of Ecology and Biological Resources Hanoi [2,6,16,19] were recorded:

- Amphibian:	12 species	4 families	1 order	no rare and valuable species;
- Reptile:	38 species	14 families	3 orders	5 rare and valuable species;
- Bird:	106 species	44 families	16 orders	5 rare and valuable species;
- Mammal:	49 species	21 families	9 orders	10 rare and valuable species;

7.2.2. Flora

Binh Chau Phuoc Buu NR is known with a type of "closed deciduous tropical humid forest" with many subtypes (Subtype of vegetation region close relative to Malaysia - Indonesia flora and India – Myanmar flora, Subtype of soil, Subtype of secondary human impact) and many dominant composition of different plants [6,16,19].

Plant composition: About 750 species in 123 families of which 732 vascular plant species were identified:

* Pteridophyla:	17 species
* Dicontyledoneae:	550 species
* Monocotyledoneae:	165 species

There are 17 rare and valuable species, particularly *Xylopia pierrei*, *Dalbergia bariensis*, *Afzelia xylocarpa*, *Rhodoleia championii*, *Vitex ajugaeflora*, *Markhamia stipulata* that are endangered species threatened with extinction.

CHAPTER III: DATABASE AND BD INFORMATION SHARING SITUATION

1. Data on specimens and information sharing possibility

Plant and animal specimens are very important and necessary factors not only for BD research works of a country but also for the training programme for human resources development on BD conservation.

In Vietnam, there are a lot of institutions where plant and animal species are preserved. It is a pity that no one knows so far specifically which institution preserves these specimens; what about number and types of specimens are now existed on how is the usefulness of specimen preservation. Due to limitation of time, the consultative group only investigated the situation of plant and animal specimen preservation and sharing this information with some institutions. This is a base helping us to investigate the realistic situation and recommend the direction for exploitation and utilization of the specimen labs usefully.

1.1. Plant specimens

Apart from the existing plant and animal specimens in the NPs and NRs, the consultants have visited a plant museum.

Results of information collection on plant specimens were recorded in Table 06.

What we have realized is number of plant specimens are not so many and probably, there are not enough shown for all 12,000 vascular plant species of Vietnam. Otherwise, no specimen preservation locations could provide statistic data on plant species and specimens that these species are existed. In most of specimen labs, there are no full time staffs who are responsible for research, identification of specimens without names. Staff working in the specimen museums have not worked out clearly their jobs and what should they do. Only some persons who work in the plant museum of the Tropical Biological Institute in Ho Chi Minh City could understand what should they do and they are experts.

The plant museums that we surveyed are mostly lacking of finance for operation. The specimens are day by day degraded because they have not been maintained and repaired.

Due to no complete list of species in the books available, so there was no information sharing at all. In the plant museums, no ones know how many do they have and what species are there?

Table 6. Plant specimens in preservation localities.

No	Address	Σ Specimen	Σ Species	Information sharing possibility
1	Hoang Lien NR			No specimens and museum available
2	Tam Dao NP	About 2000	About 700	Forest trees, medicinal herbs. Medium quality. Museum still lacks of equipment
3	Phong Nha Ke Ban NP			No specimens and museum available
4	Bach Ma NP	About 1200	650	No museum and cabinets for specimen preservation available
5	Kon Ka Kinh NR			No specimens and museum available
6	Cat tien NP			No specimens and museum available
7	Binh Chau Phuoc Buu NR			No specimens and museum available
8	Plant Museum, Tropical Biological Institute in HCM city: 85 Tran Quoc Toan, district 3 (Tel: 08.9327085; Email:herbarium@hcm.vnn.vn	100.000	7000 species, 246 families	It is the most important preservation center of the Southern part. Up to 2002, the inventory and rearrangement work will be completed. It can become an education and training center.
9	Specimen Museum, IEBR, Nghia Do, Cau Giay, Hanoi	200,000	9628 species, 291 families	It is a very good plant research center: Education, training, excursion and material borrowing etc. ..
10	Forest resources museum, FIPI, Hanoi	6,000	2.000	To serve for research and excursion
11	Plant Museum, Natural Science University, Hanoi National University	>30,000	>8000 species	To serve for study and research of teaching staff and students inside and outside the university
12	Forest Biological Museum, Vietnam Forestry University, Xuan Mai, Ha Tay	9.000	2.200	To serve teaching (practice, exercise), research and excursion of teaching staff and students inside and outside the university.

1.2. Animal specimens

Animal specimens (Table 7) look very similar with plant specimens at different museums. The specimens seem to be mainly keeping in the store. There are no specialists or museum experts working in animal museums. The data related to the number of specimens, number of species was simply listed in the notebook but how many species kept in the museum is not known. The museum keepers did not know absolutely how many specimens of fish and insect they have. The general situation occurs with near all museums is lack of finances for improving the old specimens. If these museums have not some effective solution in preserving and maintaining of existing specimens, especially precious and rare species, we can not get new specimens because there is no more in the wild.

Table 7. Animal specimens in preservation locations

No	Address	Σ Specimens	Σ Species	Possibility of sharing information
1	Hoang Lien NR			Specimens and museum are not available
2	Tam Dao NP	About 300	About 200	It's mainly insects, less vertebrate animals. No sharing capacity
3	Phong Nha NR			Specimens and museum are not available
4	Bach Ma NP	About 400	271	It's mainly beetles and butterflies. Museum and preservation cabinet are not available → no sharing capacity
5	Kon Ka Kinh NR			Specimens and museum are not available
6	Cat Tien NP			Specimens and museum are not available?
7	Binh Chau Phuoc Buu NR			Specimens and museum are not available
8	Animal museum lab in Da Lat, 116 Xo Viet Nghe Tinh road (Tel: 063 823452)	Mammal:374 Bird: 299 Reptiles: 22		No cooperation is available, less sharing, it is possible to visit, conduct training and research.
9	Animal museum lab, IEBR; Nghia Do, Cau Giay, Hanoi	>59,000	≥1,500 species of 12 Classes	It is a very good research center on animals: Education, training, visiting and borrowing materials
10	Forest resources museum, Forest Inventory Institute, Van Dien, Hanoi	Mammal: 70 Bird: 154 Insects:>9,000 specimens	Mammals: 20 Birds & Entomology: Not listed	Up to 2002 it will become a place for visiting, training. The museum is now carrying out inventory rearrangement
11	Natural Science University museum, Hanoi National University	Insects: 13,000 vertebrate animal ~ 11,500	4200 in 215 families, no precise data	For serving study, research for staffs, teachers and students inside and outside the university
12	The forest biological museum, Vietnam Forestry University, Xuan Mai – Ha Tay	733 (Amphibians, reptiles, birds & mammals Insects ~ 2000	299 ~ 500	Education, training, visiting for teachers, staffs, students and pupils inside and outside the university

2. BD research in NPs and NRs

2.1. BD researches in NPs and NRs

BD researches are commonly started by basic research to provide the prerequisite for building up of the feasibility study for protection areas. Majority of the feasibility study was established by the professional institutions such as the FIPI, Hanoi (including sub-Institutes) Forestry Science Institute Hanoi, Vietnam Forestry University Xuan Mai - Ha Tay, Hanoi Institute for Ecology and Biological Resources, Hanoi National University etc., or research institutions as mentioned above co-participated in establishment. Apart from research works related to the feasibility study, it should be regarded to the specialized research works from institutions and organizations inside and outside the country such as:

In the Northern part, There were researches of the Society for Environmental Exploration (Frontier) on flora and fauna in Hoang Lien area; researches of the BirdLife International in Ba Be national park and surrounding area: Research on primates in Ba Be NP, Na Hang NR and Cat Ba NP of

the Vietnam Forestry University; Research on Madhuca species of the Vietnam Forestry University; Researches on *Fokienia horginsii*, nonteamber forest products (the Forestry Science Institute), Researches on useful species of Hanoi Institute for Ecology and Biological Resources, Researches on Camelia species, Fungi and insects etc., of Hanoi National University, and Medicinal herb of the Medicine Institute etc.,

In the Central part area, it has been considered and researched by the scientists from Vietnam Forestry University, FIPI, IEBR, Hue University, Bach Ma NP, Project experts of WWF/EC (VN0012.01), Russian and Vietnam Tropical Center, Vinh University. The research target groups mostly include contents of BD. Many researches were concentrated on some target groups as endemic animal and plant species of Pu Mat and Vu Quang NRs, Bach Ma NP, Phong Nha and Phong Dien NRs such as some bird species belonging to Phasianidae family, primates, Tiger, Sao la, Gaur and medicinal herb species etc.,

In the Southern part, there were many researches of FIPI (Sub-Institute No II), the Natural Science University in Ho Chi Minh city, the BirdLife International and the IEBR with diversity research target groups.

2.2. Quality of BD data

Assessment on data quality of each national park and NRs was shown in details by experts in regional reports. BD information on protected areas consists of 4 basic parts:

1. Information related to building up of the feasibility study
2. Results of specialized research on vertebrate animals
3. Specialized research on insects
4. Specialized research on plants.

Quality of BD information on the feasibility studies is in general not sufficient. In one way, due to the short research time and limited survey scale, therefore it has not reflected completely the diversity of plant and animal species of the region. In other way, some information on presence of these or those species is not sufficient for reliability, because it lacks of scientific evidences (lacking of specimens and photos etc.,) or it has become bout of data.

Specialized researches on each animal/ group in each NP & NR obtained results in different levels. Some research was considered as rather good ones on birds conducted in Bach Ma, Phong Nha and Cat Tien. Research on mammal fauna in NPs and NRs provided worthy precious findings on precious, rare and endemic species of each region. However, in some case, the presence of some mammal species (particularly big mammals) should be resurveyed and identified.

Species list of 4 sources above still has some shortcomings such as wrong identification of names, synonymous names were used replacing for scientific names, and many synonymous names are usually used so number of species in the list is more than actual species. Some animal groups have not been researched carefully such as reptiles, fish or omitted such as many insect orders. Species names used are not consistent; this difference is rather large between reports of foreign experts and reports of Vietnamese scientists. The information on rare and valuable species is not precise. Data on population status of important protection

objects are deficient or out of data in comparison with the present knowledge. Quality of present data in protection areas has not reached requirement compared with the existing reality, it is necessary to reassess the status of animal and plant resources in those NPs and NRs.

The biggest remaining problem is that research works are independently characterized without references to previous studies or overlapping problems that the previous researches have not solved yet. Many research projects are interlaced and duplicate each other. Furthermore, results were not published broadly, so the effectiveness of research themes is still low.

Reasons causing limitations on data quality are:

- Identifying species is based on visual method, lacking specimens
- The NPs and NRs have not any full time staff or staff qualification is still weak and they lack contact with the scientists.
- The NPs and NRs have not any or have few scientific materials used for taxonomy (except Cat Tien and Bach Ma NPs where there are big projects).
- Budget for field survey is very limited and time for research is not sufficient.
- There is a lack of consistent guidance from the central institutions to the management boards of the NPs and natural reserves.

3. Solutions for building up and sharing BD information in Vietnam

3.1. Status of preservation and sharing of BD information

At present, BD information of protected areas consists of documents in terms of the feasibility study, scientific reports, and project documents with different printing quality. Apart from the scientific reports and project documents supported by foreign donors in good printing quality with many colour illustrated pictures, the rest are mostly preserved in terms of photocopy in the NPs and NRs, and offices of some central institutions such as the research institutes, universities, and natural conservation labs (the Forest Protection Department and Environment Department). Provincial FPDs, ARDDs and some offices of NGOs (WWF, FFI, IUCN, BirdLife International etc.,) with limited number.

In the NPs & NRs, very rare publications still remain as their original filed in the computer, there are no information in form of discs or CDs. Due to the characteristics of Vietnam with many Vietnamese font systems, so computerized documents are very difficult to share, especially among the Northern, Central and Southern parts. At present, list of species has not been put into databases for information sharing. Each NP & NR commonly has the list of plant and animal species of its own.

In surveyed areas, no NPs and NRs have any a complete biological museum. Very few protected areas own their specimens, because they have not enough condition to collect, treat and preserve them. Number of staffs capable to do this job are very few, nobody or if there are any ones then they only work part time. Some protected areas with specimens available such as Tam Dao and Bach Ma NPs have few specimens and they are preserved in the store.

Information in form of photos is still very limited.

3.2. Building up database and sharing BD information

It is very essential to share BD information. It does not only stop at the scale of exchange of information to know what occurring here and there but it includes many different issues in the field of information collection, treatment management, research cooperation and BD etc.,

Recommendation:

In order to make it possible to share BD information, it is necessary for Vietnam to build up *a software programme in computer* for *database system* management so that everybody can quickly search this and they can have what information they need. For example for this species, where it appears, what biological characteristic does it have, what research on this species has been done, experiences on species preservation etc., It is needed to have *a center for management of this programme* (For example Universities, Research Institutes) and information should frequently be updated in form of database files then put in the web and programme is preserved in form of CD for protected areas without web link. New BD information should be provided from protected areas to the programme management center. For example: discovery of a new species, its distribution, specimens and photos etc.,

The database file is structured so that it can show BD information in the table as follows:

No	Vietnamese name	Scientific name	Threat level	Linage = Link	Protect area X_1	.....	Protect Area X_n
I	**Order**						
H1	**Family**						
1	Species 1			**Link1**			
2	Species 2			*Link2*			
....							
n							
II							
H2							
n+1				**Link**			
n+2				*Link*			
....							

Link detail information on species

Link detail information on protection area

Column Link ("Linkage") and the places with "link symbol" (normally are blue colour underlined letters, curser has hand shape) it allows programme user transfer into detail information on an object that is concerned.

Development of a programme that operates as a website and it is very necessary to design a website on BD conservation of Vietnam but it is requested to have a budget and staff and SPAM project (in the present and following phases) could provide financial and technical supports to implement this programme.

CHAPTER IV: NEEDS OF BD SURVEY AND MONITORING

1. Needs for BD survey and monitoring in NPs and NRs

Results of interviews by groups in 3 NPs and NRs showed that concept of BD survey and monitoring is very new and most of these NPs and NRs do not have these activities. However, thanks to the support of projects, the BD survey work in Bach Ma and Cat Tien NPs was carried out rather well, particularly Cat Tien NP. The BD monitoring work has not yet done in these two parks.

1.1. Hoang Lien Sa Pa NR

Since the foundation until now, some research on resources and plant and animal BD was done in Hoang Lien Sa Pa NR, but these researches were not consolidated into a consistent document. Furthermore, those reports were not preserved in the NR therefore BD information of Hoang Lien Sa Pa NR is mainly quoted from the feasibility study established in 1993. The feasibility study of this NR briefly introduced plant and animal resources (mammals, birds, reptiles and amphibians) but this is the primary notice in order to serve for establishing a natural area. Furthermore, the field surveys for collection of data to build up the feasibility study were carried out in 1993, so the scientific significance and information updating were out of data. Surely names of many plant and animal species were not recorded in the list, but in other way although some animal species' names, particularly big mammals, were recorded in the list, in reality they do not survive these any longer.

Results from exchanges and interviews with leaders and technicians of Lao Cai FPD and Hoang Lien Sa Pa NR showed that it is necessary to have a basic survey programme on BD in this NR. Data recorded in the reports showed that majority of BD surveys and researches are mainly concentrated on the altitude under 2500m. Recommendation on BD survey and monitoring for Hoang Lien Sa Pa NR by the consultant group following priority order below:

- To assemble research done in Hoang Lien Sa Pa NR (the feasibility study of Hoang Lien Sa Pa NR, 1993; Report of the Society of Environment Exploration Frontier, 1994; Studies of the Institute for Ecology and Biological Resources, 1995; Studies of Hanoi University (Hanoi Natural Science University), 1996 and some other research works in Sa Pa).
- To survey BD from the altitude of 2500m upward.
- To set up a BD survey and monitoring programme, particularly in the areas where there were strong impacts by people, in the locations where tourists commonly visit and in the *Amomum aromaticum* planted areas. The repeat time for survey and monitoring programme is 3 months.
- To conduct a basic survey on plant and animal resources, forest structure characteristics. It is needed to have a coniferous species study programme *(Fokienia horginsii, Isuga dumosa, Calocedrus macrolepis*, *Podocarpus pilgeri,* and medicinal herb species). Study on relationship between the living habitat and population of Black Gibbon, Bear, Pheasant, Great Indian Hornbill species. Insect group, rodents and bats (no study was taken) should be taken into account for supplementation.

1.2. Tam Dao NP

Compared with Hoang Lien Sa Pa NR, BD information of Tam Dao NP is partly more abundant because there are many research themes conducted by organizations inside and outside the country (FIPI, IEBR, Hanoi National University, Hanoi pharmacy University, Hanoi pharmacy institute and Vietnam Forestry University etc.,).

Report on forest resources survey and evaluation of Tam Dao NP published in 2000 is a integrated document with rather sufficient information on plant and animal list (including fish and insects) and rare and valuable species distribution. This is a document with synthesis and updating characteristics so it has a good reference value. This report also recommended a strategy for BD conservation for Tam Dao NP in the coming years.

However, the BD monitoring programme was not carried out and existed in Tam Dao NP. In order to help for implementing the conservation strategy, the consultant group recommends:

- To set up a BD monitoring programme in all habitats of the national park, particularly in areas where there were strong impacts

caused by people and tourists. Repeat time of the monitoring programme is 6 months.

- Although many BD research works are available and data showed number of plant and animal species increased, the reliability and accuracy are low. In order to ensure the scientific characteristics a research programme should aim to confirm the presence and densities of some rare and valuable species such as Francoi's langur, Black gibbons, Binturong, Three striped palm civet, Otter civet, Tiger, Leopard, Clouded Leopard, Asiatic Black Bears, Lesser Mouse Deer, Burmese Peacock Pheasant, and Tam Dao Salamandra. Basic research on BD (flora, fauna and ecosystems) of Tam Dao NP will be conducted when the financial condition is sufficient.

1.3. Phong Nha Ke Bang NP

Before 1995, apart from the feasibility study, no BD research is available in Phong Nha. After 1995, many research themes and programmes have been started up. The important research works such "A Survey for Ha Tinh langur by Pham Nhat, Do Tuoc and Truong Van La, 1995; BD survey by RAS-WWF programme, 1996-1997; BD (mammal) survey by the FFI, 1998; Project on investment for establishment of Phong Nha Ke Bang NP proposed by FIPI (1998); Primates survey and monitoring, Linc-WWF Project, 1999 etc. It is a pity that these research works have not been synthesized so the BD data of Phong Nha Ke Bang NP is very dissimilar. Quotation of BD in this NP sometimes caused mistakes about data co-collecting both research works of Ke Bang area. Impact of people over the past years can affect the distribution status and number of some plant and animal species but generally, in Phong Nha NR there were basic researches on BD, particularly animals. Otherwise, two training courses and a programme on mammal survey and primates monitoring were conducted in Phong Nha Ke Bang NP.

Based on results of exchanges with leaders and technicians of Quang Binh provincial FPD and Phong Nha Ke Bang NP, the consultant group has recommended some activities on BD survey and monitoring activities for Phong Nha Ke Bang NP as follows:

- To assemble BD researches in Phong Nha NR & NP conducted from 1992 until now, check the reality of information and correction of mistakes in the plant and animal species list, define specifically rare and valuable species recorded in the Red Data Book of Vietnam.

- Based on the adjusted information, to set up a BD survey and monitoring programme for species that indicates for limestone forest ecosystem and rare and valuable species. It should take into account in rare and valuable species (*Diospiros mun, Dalbergia remosa*, primates). The repeat time of the survey programme is 3 months.

- To conduct a basic survey on plant and animal resources in the forest area along the border between Vietnam and Laos. It is necessary to have a separate survey programme on Gaur and Tigers in the South of Phong Nha.

1.4. Bach Ma NP

BD in Bach Ma NP was well known a long time ago. Apart from the feasibility study, since the foundation day (1991) until now, particularly since WWF/EC-VN 001201 project on "Participatory development of Bach Ma NP by community 1995-1997", BD of Bach Ma NP was mentioned by many programmes and research themes. The integrated reports of researches under WWF/EC-VN 0012 01 Project (Catalogue des especis vegetales et animal Parc de Bach Ma) provided a lot of information on plant and animal species BD of Bach Ma NP. However, the report has still many remaining problems as mentioned in item 2.2 under Chapter III and BD monitoring activities are not available. Based on opinion of the provincial working group and opinions of the leaders and staff of Bach Ma NP, the consultant group recommends:

- To set up a BD monitoring programme in all the habitats of the national park, attention should be paid to the areas where there are more activities of people, tourists and visitors; the places where there are more rare and valuable or hunting value plant and animal species (Pheasant, Sao la, Red shanked Douc langur, Gibbon and Bears etc.,). Repeat time of the monitoring programme is 6 months.

- Although report on collection up of BD research works is available, it is needed to revise in the aspects of reality, taxonomy and scientific names.

- Some BD survey programmes were done in Bach Ma NP, but not basically, supplementary surveys should be done. Group of plant species to be put in priority is species in the Red Data Book and medicinal herb species. For animals, awareness of entomological fauna is at present very poor, particularly the insect group that is active at night. Therefore, it is necessary to conduct a basic insect survey. For vertebrate animal group, amphibian and reptile, survey should supplementary conducted. There should be a research programme on Tigers and its prey species in the South Bach Ma area.

1.5. Kon Ka Kinh NR

Kon Ka Kinh NR was established on 4 September, 1999, the latest established one of 7 NPs and NRs that was surveyed by the consultant group. Therefore, the investment project for Kon Ka Kinh NR is the unique document to provide BD information. Data on plant and animal components are simple; it has not reflected completely the BD value of Kon Ka Kinh.

From results of exchanges with the provincial level working group, leaders and technicians of Gia Lai Provincial FPD and Kon Ka Kinh NR, The consultant working group recommends:

- To conduct a BD basic survey programme on existing forest types / habitats and plant and animal species distribution, particularly attention should be paid to the endemic, rare and valuable species in Kon Ka Kinh NR.
- To establish a BD survey and monitoring programme (in the future) for species indicating the forest ecosystem, especially high mountainous forest.
- The present BD monitoring programme should be to monitor the impacts of people in the forest. Repeat time of the monitoring programme is 3 months.

1.6. Cat Tien NP.

Up to now, there were a lot of BD research programmes in Cat Tien NP. Furthermore, the scientific staff of Cat Tien NP have their rather competent qualification and they also have a close cooperation with the scientific institutions inside and outside the country, therefore research results ensure the scientific characteristics. Thus, it can be said that the BD research in Cat Tien NP was basically completed. The following should be done for further **research:**

- Survey programme: Survey and investigation for the distribution, ecology of Vietnamese Rhinos and densities of some large mammal species such as Gaur, Banteng, Tiger, Elephant; primate species (Black shanked Douc langur, Silvered langur, Yellow cheeked crested gibbon); some rare and valuable bird species such as Lesser Adjutant Storck, Woolly-necked Storck, Green Peafowl, Germain's Peacock Pheasant, David's Tree Partridge; Rare and valuable reptiles (fresh water crocodile).
- Supplementary survey for the animal list should be conducted in Cat Loc area of Lam Dong where BD data are still poor.
- Monitoring programme for Cat Tien NP: to monitor impacts of people in the NP and monitor BD for indicator species (main species) belonging to primate group *(Primates)*, Ungulate mammals *(Bovidae, Cervidae*, *Rhicocerotidae)* and Pheasant family *(Phasianidae)*. Repeat time is 6 months.

1.7. Binh Chau Phuoc Buu NR

Binh Chau Phuoc Buu NR is very typical of position and topography for a coastal low land NR. Value of Binh Chau Phuoc Buu NR is known thank to the rather high BD with many endemic species, particularly plant species. Although the plant and animal BD data are available, some further research issues should also be conducted. Based on information assessment and exchange opinions between the consultant group, the provincial working group and Ba Ria Vung Tau Provincial FPD, it is recommended:

- BD survey programme:
  - Fresh water fish and Insect: To resurvey on land vertebrate composition (based on signals ensuring the precision, particularly defining the presence, distribution and densities of Slow Loris, Silvered langur, Pig tailed macaque).
  - Distribution and number of endemic, rare and valuable plant species, attention should be paid to narrow endemic species *Dalbergia bariaensis* that is only distributed in low land areas.

- Biodiversdity monitoring programme:

  - To monitor impacts of people in the reserve areas;

  - To monitor forest animal resources through representatives as pheasant, primate and older species.

  - Repeat time is 6 months.

Summary

Although 3 NPs and 4 NRs were only surveyed by the consultant group, it can be said that majority of the NPs and NRs in Vietnam (they were established and have management committees) have basic BD information. This is primary survey data on plant and animal species composition, characteristics of forest types (status/ecosystem)in special topics of the feasibility studies or investment project for building up the NPs and NRs. Very few NPs and NRs where research was done can meet requirement of basic information for BD conservation work. Otherwise, No NPs and NRs implemented a BD monitoring programme and it is one of the reasons that limit the effectiveness of the BD management work in the NPs and NRs of our country (due to the uncertainty of resources, changing tendency and reasons of impacts). So, the BD survey and monitoring is not only conducted in 7 surveyed NPs and NRs but it is very necessary to conduct it in all the NPs and NRs of Vietnam.

2. BD survey and monitoring method.

BD survey and monitoring is a term that indicates activities aimed ***to following up a variation process of biological resources according to the time and reasons affecting that process***. This is one of the important tasks not only for the NPs and NRs but also for other natural landscape areas. In this report, we only mention some principles, content and method to conduct a BD survey and monitoring programme for the NPs and NRs of Vietnam at present and in the future.

2.1. Principles of selection of species and habitat for BD survey and monitoring.

Establishment of special use forest in the world and in Vietnam aim to reach the main objective of protecting resources and environment. However, apart from the general objective, most of the NPs and NRs of Vietnam were at present established to reach two specific purposes i.e. 1) To conserve the normal patterns of ecosystems and plant and animal species of Vietnam contained in them and 2) to conserve some gene bank of rare and valuable endemic plant and animal species. However, one NP or one NR does not only have some species but hundreds (even if thousands) of different plant and animal species and BD survey and monitoring activities can not be done for hundreds, thousands of species living in different habitats and forest types. So, selection of species and habitats for implementing the BD survey and monitoring programme is the work that should be done in advance. It is impossible to point out specifically species, habitats or ecosystems requested for survey and monitoring of all the special use forest system of Vietnam, because the characteristics of special use forest areas are very different. For a NP or NR, it is maybe the species and habitat selected for survey and monitoring are also really the purposes that the NP or NR aim to obtain. Some guidelines on species and habitat selection for monitoring are as follows:

- The NPs and NRs were established, apart from the general objectives as conservation of natural resources and environment, the main goal is to protect an ecosystems which are important for a large variety of plants and animals which are representative for Vietnam, the most important content of survey and monitoring will be:

  - To define main habitats that formed the whole ecosystem of that forest.

  - To define indicating species (or main species) representative for each form of habitat.

  - To follow up the trends of that indicator species and main reasons (threat) causing.

  - To find out solutions for minimizing the threat as mentioned above.

- The NPs and NRs were established, apart from the general objectives as conservation of natural resources and environment, the specific goal of building up is to protect an important plants or animals that are in danger for extinction then the task and content of BD survey and monitoring will be:

- To define population and status of that species.
- To define relationships between that species population, living habitat and factors affecting the survival and development of that species population.
- To monitor changing tendencies on dimension of that species population.
- To seek appropriate measures to prevent or minimize threats

Thus, the issue that is concerned by the NPs or NRs is to define different forms of habitats and main species in order to introduce into the monitoring programme. Basic steps should be taken as follows:

a. To build up a map of major habitats. Forms of main habitats or main forest types are defined basing on:

+ Information available in the feasibility study or investment and construction project of NPs or NRs;
+ They were bound and drawn up in forest resources status map of the national park or NRs.

b. To transfer information / data recorded from the feasibility study or investment and development project of the NP or NR or from the latest review missions into the habitat classification map (both information on plant and animal distribution of the NP or NR in the past and at present). Information transferred into map should be based on the set out BD survey and monitoring programme.

c. Selection of species for monitoring is based on principles as:

+ They are easily observed, trapped or collected (day-time subsistence animals, indicating plant species or interested species for harvesting by people).
+ They are neither rare species and nor too abundant species, if the abundance of that species thank to the presence of people. For rare species, there should be a separate survey and monitoring programme.
+ Selection of specialized food species or special food or species group of sharing the ecological needs (food and living place).

2.2. Design of BD survey and monitoring programme

An important principle for implementation of BD survey and monitoring programme is **to be absolutely consistent when you repeat your survey.** This means implementation of BD survey and monitoring programme in the future times has to be correct according to the regulation (time, staff and method) as implemented the first time. It is only completely executed that principle then data of the survey and monitoring missions can be useful and they can be compared to each other in every aspects.

In order to establish a BD survey and monitoring plan it is necessary:

- To have a detail understanding of species and habitats existing in the area in the aspects: distribution, threatening factors and levels and species succession through years.
- To set up content and method for implementation; decide what species, habitat or threat to be taken into account.
- To define resources for implementation (people, time finance).

The most requirements for well implementing a BD survey and monitoring programme is to lay out survey and monitoring alignment. The alignment laid out should satisfy some conditions:

+ It can go through as more representatives selected habitats;
+ The alignments do not cut each other and the best intervals between them are (>100m);
+ Possibility of recording the monitoring species is highest;
+ Easiest to be recognized (they are marked and the marks will not be lost by rain or wind);

Monitoring techniques on the alignment is the second important requirement, specified as:

+ Survey and monitoring staff group should be organized stable (non or very limiting of staff changing) and there should be basic knowledge and skills;
+ To identify quickly and exactly species, particularly the selected species for monitoring in the site;

+ To have basic understandings of biological and ecological characteristics on selected species;
+ To have skills on survey and noting down of information.

➢ In order to share information and compare data when necessary, *Agreement upon forms writing results of BD survey and monitoring on the alignment is extremely important*. Some BD survey and monitoring forms are given by the consultant group for references in Annex IV.

2.3. Repeat time of BD survey and monitoring programme

Repeat time of BD and monitoring programme or interval between two monitoring times depend on the basic conditions as follows:

- Human resources
- Pressure of threatening factors (cause by people).
- Biological characteristics of monitoring species group in the relationship with the climate of the area.
- Financial support sources.

Normally the BD survey and monitoring programmes are designed according to the repeat cycle as 3, 6 or 12 months according to 4 seasons of the year. The BD monitoring programmes is repeated after 3 months to help managers for updating information and starting up solutions on BD conservation in time. For the NPs and NRs where resources are not sufficient, pressure of people is not so big or weather is divided into 2 seasons, it is possible to build up a BD survey and monitoring programme with a repeat time of 6 months. However, time of monitoring repeated much longer then updating of information is low and accurate definition of reasons or factors causing BD variation is less accurate and difficult to find out appropriate conservation solutions.

2.4. Peoples' participation in BD survey and monitoring

People's participation is considered as an important factor for the success of BD conservation activities. Experience has shown that in any NPs and NRs, peoples' participation is willing and positive then the BD conservation work in those areas will obtain results. On the contrary, in the place where there has not been any cooperation for management by people with the management board of the NPs and NRs then the pressure of people on resources is the issue that is always set out. Results on interviews of local people in 7 NPs and NRs shown that majority of peoples' participation in management of special use forest has not happened or if it happens then they are a few village conservationists.

People's participation in BD survey and monitoring is not similar to the conservation activities but it is mainly to develop their past hunting experiences and their forest travelling experiences. These experiences help the BD survey and monitoring programme to operate conveniently and may be give good results. In other way, BD survey and monitoring activities contribute for helping them to enhance their awareness of BD conservation.

CHAPTER V: TRAINING NEEDS OF STAFF FOR BD SURVEY AND MONITORING WORK

1. Theoretical basis and practice

1.1. Basis of training need survey on BD

According to the point of view on present curriculum development, one of the most important things to be considered in analyzing the situation is to define training needed by learners.

Training need exists when what have been given by training will help to overcome the gaps, weak points in a specific professional field. There are 3 main fields, which on the term of *"training need"* can be applied.

- Training need in provincial organization, national park and NRs levels.
- Professional training needs.
- Individual need.

At the organization level, training needs emerge when it becomes apparent that implementation of functions of that organization cannot be done well. Analyzing the situation carefully and thoroughly can show these problems.

In professionally level specific works or tasks require certain knowledge, skills and attitude. These knowledge, skills and attitudes should be defined through situation analysis process including analysis of works and tasks.

It is very difficulty to meet the personal need for curriculum development serving for training; because the objects participated in different training, so their training needs are also different. Otherwise, each one also has different knowledge, experiences and learning motivation etc., One of the biggest tasks of the course designer should be facing is to build up an adequate flexibility for the whole training course so that everyone can reach the general objectives of the course set out on BD survey and monitoring work, but it is not to point out "*high achievement persons*" in the training course.

1.2. Training cycle

A training cycle consists of 5 basic steps:

- ***Step 1:*** To analyze situation including policy environment, works, working and survey condition and training need assessment.
- ***Step 2:*** To define the objectives including raise reasons, purpose and specific objectives to be reached after training.
- ***Step 3:*** To develop curricula including design of training course, material development of materials, teaching aids and teaching methods.
- ***Step 4:*** To conduct teaching is communication and facilitation activities (learners centered training) between teachers and learners.
- ***Step 5:*** Control and evaluation are the follow up activities

In this cycle, all steps of activities include participation of related parties (Target groups of training need assessment survey: Forest protection department, Departments, related boards and sectors, forest protection stations management personnel and staff of the NPs and NRs, farmers, teachers and donors etc.,).

1.3. Necessity for training need assessment

In the past, based on the old approach, the training need assessment is less to be concerned. It is normally only to conduct training courses according to decided plan in advance in form of transfer of technology, transfer of knowledge to the trained target groups. At present, training in the agriculture and forestry development field in general and BD survey and monitoring in particular is step by step being transferred into participatory approach in which training need assessment is a very important step.

Training need assessment is really considered as the most important step, decisively to reach the training objective in order to ensure the training can meet the realistic needs. Training need assessment is also a valuable tool to provide important information on participants before training. Otherwise, TNA lets trainers know in advance information on the topics to be discussed and hope to do in order to implement it based on characteristics of the participants. The effective training need assessment will

promote the learner centered training and make it possible to establish training courses that are based on learners' knowledge and experiences. Training need assessment aims to find out knowledge and skills that learners need and not what the trainers can provide for them. In order to assess the training needs, it is necessary to go through many steps with the participation of many different target groups (trainers, learners, curriculum developers, people, donors and training result and users etc.,).

Procedure and content of training need assessment is detailed in Annex V.

2. Status of personnel organization work in Provincial FPDs, NPs and NRs.

To gather opinions from members of provincial level working group, Forest Protection Departments, and Agriculture and Rural Development Departments of Lao Cai, Vinh Phuc, Quang Binh, Thua Thien - Hue, Ba Ria- Vung Tau and Gia Lai provinces; Leader's staff, Forest protection rangers and divisions and boards of the NPs and NRs of Hoang Lien, Tam Dao, Phong Nha - Ke Bang, Bach Ma, Binh Chau - Phuoc Buu, Cat Tien, Kon Ka Kinh on organization issues and professional capacity in the following tables:

2.1. Personnel organization and arrangement in Provincial FPDs, NPs and NRs.

Table 8. Personnel organization and arrangement work in Provincial FPDs

Target / PFP Department	Total staff	Present qualification				Full time perssonnel			
		MSc	BSc	Tec	Not educated	Plant	Animal	Ecology	Biodiver-sity
Lao Cai	173	0	45	107	21	MJ	MJ	MJ	MJ
Vinh Phuc	54	0	13	30	11	MJ	MJ	MJ	MJ
Quang Binh	239	0	44	116	79	0	0	0	0
Thua Thien- Hue	201	0	87	87	27	0	0	0	0
Gia Lai	297	0	78	159	60	0	0	0	0
Ba Ria- V. Tau	90	1	21	17	57	0	0	0	0

Note: MJ. doing multiple jobs

Table 9. Status of personnel organization and arrangement work in NPs & NRs

Target / NPs, NRs	Total staff	Present qualification				Full time personnel			
		MSc	BSc	Tec	Not educated	Plant	Animal	Ecology	Biodiversity
H.Lien SaPa	11	0	7	3	1	0	0	0	0
Tam Dao	76	2	20	34	30	0	0	0	0
Phong Nha	20	0	6	10	4	0	0	0	0
Bach Ma	70	2	30	21	17	4	2	5	30
K.K.Kinh	12	0	7	5	0	0	0	0	0
BC-PB	60	0	3	8	49	0	0	0	0
Cat Tien	181	0	25	47	109	0	2	0	0

Evaluation of status of personnel organization and arrangement work in provincial FPDs, NPs and NRs was shown that:

- Number of personnel in provincial FPDs are not many. They were staffed into the professional divisions but they still do multiple jobs. Completely no full time staff follow up and guide conservation activities in the NPs and NRs within province.
- Some NRs are not under direct management by the provincial FPD but by ARDD, so the management work has been overlapped.
- Number of personnel in most of units are deficient, not enough staffing compared with the feasiblility study, investment and development projects of the NPs and NRs that were approved, particularly it is seriously deficient in the NRs managed by province such as Hoang Lien - Sa Pa NR, Phong Nha Ke Bang NP, Kon Ka Kinh NR.
- Due to lack of staff, so many NRs take contract with staff for doing protection, pay salary for them from the former programme No. 327 and present programme No. 661. These contracted staff are in one way not sufficient of their legal capacity to execute the forest protection duties, in other way due to their uncertain thinking, their working effect is not high.
- About staff qualification, number of staff in postgraduate conpetence are very few, number of untrained staff and technician level are of rather big amount. Especially, number of staff who work full time in plants, animals, forest ecology, BD in the provincial Forest Protection Departments, NPs annd NRs are mostly nil or if they exist, they are in charge of other works. One technician does multiple jobs in many different professional fields.

Recommendation:

Thus, personnel organization and planning work is really an urgent matter and it should be carried out early, particularly training activites for staff to meet BD survey, monitoring and management work should be organized in all units.

2.2. Present capacity on BD survey and monitroring in the NPs and NRs.

The inadequacy of quantity, qualification and personnel organization work in provincial forest protection departments, NPs and NRs caus limitations not only for forest resources management activities but also for BD survey and monitoring.

There are no full time staff passing training and refresher courses on professional knowledge i.e. plants, animals, ecology, BD in institutions available. Furthermore due to lack of staff, they have to be assigned to do multiple jobs causing the task force to be dispersed and stretched out resulting in low effectiveness in work. Generally speaking, the new organization structure can only develop in a large aspect, not in deeper dimension. The staff have not adequate capacity to organize, survey, discover and identify plant and animal species by themselves. They have an independent competence to organize research on ecological characteristics, biological behavior and monitoring of species variation and components of ecosystem etc., Otherwise capacity on training management, sharing of BD information should also be consolidated and further supplemented in order to help personnel staff of institutions fulfilling their tasks according to the requirement on the present resources and environmental conservation work.

Results of SWOT analysis showed opportunities, advantages as well as constraints and challenges on present BD survey, monitoring work in localities as follows:

Table 10. Results of SWOT analysis

Strengths	Weaknesses
- Forest Protection and Development Law and guidelines of the Ministry of Agriculture and Rural Development, and Forest Protection Department are available. - The close coordination between sectors, levels and organizations/associations from the central - provincial - district etc., levels is available - Personnel staff are enthusiastic in their work, especially fieldwork. - More organizations inside and outside the country are interested in BD issue. The advocates and policies issued by the Government are rather timely.	- Terrain is large, complicated and difficult to traverse. - Inhabitants are crowded surrounding and inside the NRs and NPs and they still consider forest as endless resources. They are not fully aware of forest role and necesity to protect forest. - Scale of peoples' participation is still low, mainly based on material motivation. - Personnel taskforce are few, unsufficient to start up other activities out of forest protection, they do multiple jobs. - Lack of trained staff on BD management. - The staff living standard is still low, no adequate incentive mechanism is available. - In some places, people's living condition still relies on forest.
Opportunities	**Threats**
- There are support from projects inside and outside the country to improve knowledge and skills. - There is renovation on advocacy and policy onBD conservation for the NRs and NPs. - Rural economy develops increasingly day by day, people's living condition less rely on forest. - Number of trained staff with expertise and knowledge on BD can be raised meet the requirement of their work. - People's awareness of BD management and conservation increases day by day. - Personnel staff have a good survey and monitoring method, necessary facilities and good facilitating method and approach in their work.	- Need of forest products (plants & animals) increases day by day. - Ilegal exploitation and hunting pressure increases day by day. - Many gene banks lost due to calamity, forest fire. - Investment does not meet the requirement for BD conservation and BD survey and monitoring. - Scale and boundaries of the NRs and national parks are divided and not indicated in the field. - Management agency of the NRs and NPs can be transferred. - Trained staff are transferred from their work.

3. Training needs of BD staff

3.1. Identification of training needs

It is very necessary to carry ou training for BD survey and monitoring staff in the present context. The most important activity at present for all Provincial FPDs, ARDDs, NRs and NPs is still the protection work to prevent losses of resources (except Cat Tien NP). Based on working directly with each target group, the consultancy group has evaluated their present functions and responsibilities; evaluated requested knowledge, skills and atitude of each target group in order to find out the gap to be trained so that they can meet the BD survey and monitoring task in the stage of 2000 and the following years.

Table 11. Training needs on BD

Training need	Training target group			Form of training	Training duration
	PFPDs	NRs -NPs	People		
1. Knowledge					
- Characteristics and identification of species: + Plants + Birds, mammals + Reptile, amphibian, fish + Insects	 + + + +	 ++ ++ ++ ++	 + + + +	Full time learning of theory with field practice	From 3 to 4 weeks
- Introduction to Bio-diversity and neccesity of BD conservation	++	++	+	Full time for theory	02-03 days
- Method of BD survey and monitoring		++	+	Field training	03-04 weeks
- Agroforestry	+	+	+	Full time, theory is combined with field	Each course is 1 week
- Silviculture techniques for poor secondary forest	+	+	+		
- Foreign language	+	+		Full time	From 3 months to 1 year
- Informatics	+	+			
2. Skills					
- Skills on identification & description of species. - Skills on survey, sampling and preserving specimens	+ +	+ +	+ +	Short term in the field & laboratory	Each course is 03 - 04 weeks
- Skills on communication, facilitation in working with community - Insect and disease management - Forest fire management	+ + +	+ + +	0 + +		03 days each course is 01 week

3.2. Identify the necessary knowledge for training on BD survey and monitoring

Table 12. Definition of necessary knowledge for training

Present status	Supplementary knowledge
1. Knowledge: Few staff were trained or they do multiple jobs. No specialized staff on zoology and botany are available. No training course on knowledge related to BD survey and monitoring Some training courses on foreign language, informatics are only focused on provincial officers and forest protection department staff. Staff of the NRs and NPs have not any opportunity for improving their standard.	**1. Knowledge:** To recognize, describe and identify plant and animal species. Survey method on species biological characteristcs Non timber forest product management with community participation Agroforestry in the buffer zone BD survey and monitoring. Silviculture techniques for poor forest in the buffer zone. Participatory NRs management. Design of short term courses. Foreign languege. Informatics
2. Skills: Skills on recognition, identification of species, organizing survey, sampling and making specimens are still weak. Communication and facilitation skills have not been equipled in working with community as well as skill on organizing short training courses.	**2. Skills:** To train skills on recognition and identification of species and preparing specimens. To train skills on organizing BD survey and research process. To train skills on communication and facilitation. Skills on establishment and multiplication of models on silviculture techniques, agroforestry, non timber forest products, pest and disease control, forest fire etc., Skills on integration, sharing of BD information.
3. Attitude: Some staff have not had correct and sufficient awareness of BD as well as BD monitoring, management and conservation work jet.	**3. Attitude:** Education and dissemination on role and significance of BD conservation, organization and management of BD conservation.

4. Recommendation of BD training curricula

4.1. Training curricula and option for target groups

Curriculum development on BD is not simple because it depends on a lot of factors, for example target groups of participants, present education level, knolwedge need, necessary time, participant's participation posibility and financial possibility etc., Project VIE 91/G31/A/1G31 (Vietnam: Conservation training and BD Action Plan) were designed and organized to train leaders of Provincial FPDs, Directors of the NPs and NRs on BD conservation. In general, content of training courses is useful for BD conservation activities in the NPs and NRs. The shortcomings that we found are:

- It is only focused on general concepts of BD, species and ecosystems;
- Other components of the forest but they are very important for BD stability NTFPs and how to exploit and develop them were not addresed;
- No curricula for refresher courses on silviculture basic knowledge;
- BD but more related issues were not found in contents of training courses (pest and disease control, forest fire management,.).
- Target groups participating in training coourses are not even on knowledge;
- Compilation of curricula for training coourses was not based on the needs and gaps of knowledge from units;
- No training course has followed deeper specialisation (taxonomy and identification of plant and animal species, and techniques on BD survey and monitoringetc.,).
- There is completely no knowledge of forest restoration, BD restoration in ecological restoration subzones and buffer zones.
- Attention has not been paid to conservation activities with community participation.

Starting from the gaps of knowledge as well as skills as analyzed above, Based on limitations of the training courses organized by Project VIE 91/G31/A/1G31, the consultancy group recommended some training courses that are listed in Table 13. Training courses (and training curricula Table 14) recommendations include many fields and target groups, it is not only related to survey and monitoring activities but also to BD restoration and development work. What training course to be organized and what need to be served completely depend on the options of target groups invited for learning.

Table 13. Training courses and options for target groups

Title of training course	Leader ofPFPDs	Organiza-tion staff	Technicians	Leaderof NRs & NPs	FP rangers	Farmers
1. Recognition and identification of rare, precious and commonly- met plant and animal species			+		+	+
2. BD survey & monitoring			+		+	+
3. Establishment and management of specimen laboratory			+			
4. Participatory non timber management			+	+	+	+
5. Participatory forest management and protection	+		+	+	+	+
6. Silviculture techniques for poor forest			+	+	+	+
7. Agriculture			+	+	+	+
8. Introduction to policy system related to forest management and protection and BD conservation	+	+	+	+	+	+
9. Communication and facilitation skills in working with community		+	+	+	+	
10. Foreign language (English)	+	+	+	+	+	
11. Applied informatics	+	+	+	+	+	
12. Design of short term courses	+	+	+	+		

4.2. Recommendation for organization of training courses.

Table 14 is listed 10 training courses suggested by the consultancy group. These training courses include a lot of fields closely related to BD conservation, restoration and sustainable management.

General training method is applied flexibly “Micro”- Teaching methods for adults.

The above training courses are very necessary because the general objective should be reached is to strengthen ***knowledge and skills*** for personnel of the Provincial FPD, NPs and NRs when they start up activities related to BD survey and monitoring, forest management and protection etc.. From these training courses that can be extended and transferred to people inthe areas so as to make it suitable to natural, socio-economic characteristics in each specific locality.

Table 14: Recommendations of some curricula for training courses on BD survey, monitoring and conservation

Title of training course	Objectives of training course	Main contents of training courses	Form	Duration	Suggested teacher group
Recognition of some main forest plant species	- To be able to describe species characteristics; - To be able to use identification keys; - To be able to recognize common species	- Concept of species, common name, scientific name, local name and its significance; - Recognize species thorough phenotype characteristics - Ecological and distribution characters; - Principle of checking up and identification	Full time, theory and practice	3 weeks	FUV, FIPI, HN-NU HN-IEBR
Recognition of some main forest animal species	- To be able to describe species characteristics; - To be able to use identification keys; - To be able to recognize common species	- Concept of species, common name, scientific name, local name and its significance; - Recognize species through phenotype characteristics - Ecological and distribution characters; - Principle of checking up/ identification	Full time, theory and practice	3 weeks	FUV, FPD FIPI, HN-IEBR
Biodiversity survey & monitoring	- To be able to develop, organize, implement BD survey and monitoring programme; - To be able to sum up, evaluate BD variation.	- BD and necessity for BD conservation - Plant diversity, rare and valuable plant species in Vietnam. - Animal diversity, rare and valuable plant species in Vietnam. - NPs, NRs and management work; - BD survey & monitoring techniques; - Wild plant & animal conservation: CITES convention, Vietnam Law, conservation measures and techniques etc.,	Theory and field practice	4 weeks	FUV, FPD FIPI, IEBR, HN-NU
Establishment and management of plant and animal specimens laboratory	- To be able to organize, establish a medium scale specimen laboratory in the national park and NRs; - To be able to collect, make specimens of plants and small animal species.	- Method of plant collection and specimen making; - Method of animal collection, treatment and specimen making (according to different group); - To file data, arrange and preserve specimens;	Practice visiting	10 days	IEBR, FUV, Da Lat ITBI

Sustainable utilization of non timber forest products	- To be able to explain the role of non timber forest products for BD conservation; - To be able explain sustainable use techniques of NTFPs	- Concept of NTFPs; - Classification & recognition of NTFPs; - NTFPs according to utility groups; - Sustainable use techniques of NTFPs; - Role of participatory NTFPs management in the NPs, NRs and buffer zones for BD conservation.	Theory practice and visiting	1 week	FSIV, FIPI, FUV, TBI
Law and policy on forest management and protection	- To strengthen effect of the law; - To provide basic knowledge on the law related to forest management and protection for forest protection force; - To help forest protection force to understand, explain and apply policies of the Party and Government in forest management and protection	- Forest protection & development law - Government decrees (Decree No 18 HDBT, Decree No 77/CP, Instructions No 359 / TTg, Decision No 08/TTG.,). - Programme No 661, programme No 135 etc.,	Full time, report, visiting	5 days	FPD
Agro-forestry	- To transfer techniques helping community to increase income, stabilizing living condition and contributing for BD conservation; - To be able to make land use plans.	- General principle of agro forestry; - Measures of sloping agriculture land techniques; - Land use techniques in agro forestry; - Design and evaluation of agro forestry systems.	Theory visiting models	1 week	VFU
Silviculture techniques for poor secondary forest	- To be able to define some main siviculture practices for poor secondary forest; - To apply creatively some main silviculture methods for poor secondary forest.	- General perception; - Status of poor secondary forest in Vietnam and in ecological restoration zones of the NPs and NRs. - Silviculture practices for poor forest; - Forest restoration by closure for nurturing; - Forest enrichment techniques; - Design, organization, implementation	Theory practice, visiting	1 week	VFU
Communication and facilitation skills in working with community	- To be aware of the importance of communication and facilitation in working with community; - Staff, forest protection rangers are able to use skills on communication and facilitation with community;	- What is communication skill; - Communication factors with community; - Communication skills with community; - Facilitation skill and its significance; - Some basic facilitation skills;	Theory practice	3 days	VFU

CONCLUSIONS AND RECOMMENDATIONS

After more than 3 months implementing the consultant mission, based on collected information, through analysis and consolidation, the consultant group has come to some conclusion as follows:

1. BD information*:* Related to this content, two issues should be included, (1) BD in the NPs and NRs, and (2) information on plant and animal specimens and information sharing.

- *BD in the NPs and NRs:*

- Most of the NPs and NRs of Vietnam in general and 3 surveyed NPs, 4 NRs in particular have basic information on BD. Majority of these data are primary surveyed results aimed to serve for setting up the feasibility study/investment and development project of the NPs or NRs.
- This BD information is not sufficient yet; majority of it is mainly regarded to timber plant group and vertebrate animal group. Thallobionta groups, invertebrate animal (insects) and fish group have mostly not been taken into account or if have, it is very poor (except some NPs or NRs with foreign projects).
- Quality of BD information of majority of the NPs and NRs is not really good, its reliability is not high. There are still many mistakes on identification of scientific names, using synonymous names for one species, using different name of species so it caused affected increase of species number of the national park and NRs. Rare and valuable species information is not accurate yet.

Recommendation: There should be survey programmes to confirm the accuracy of BD information in the NPs and NRs of Vietnam. Content and requirement of survey are needed specifically for each national park or NRs.

- *Preservation situation of BD data, plant and animal specimens and information sharing issue:*

A good number of research institutions, universities, NPs and NRs in Vietnam are now preserving BD data, plant and animal specimens, these are precious information. However, due to no sharing, so this information has not been brought into full play.

Recommendation: Database should earlier be established in order to facilitate for sharing BD information. It is obviously necessary to establish a national plant and animal museum in order to preserve standard specimens on the national plants and animals and set out Websites for usefully exploiting and utilizing BD information of Vietnam.

2. Need of BD survey and monitoring and participation of local people:

- The BD monitoring programme has not been conducted in the NPs & NRs in general and 7 survey sites in particular, this caused limitations to results of the conservation work due to lack of knowledge of resources variation and profound reasons resulting in this degradation.
- People's participation caused impacts in results of BD conservation. Their experiences and knowledge on forest resources will contribute remarkably for results of BD survey and monitoring activities

Recommendation: BD survey and monitoring is a need as well as a necessary work in the NPs and NRs of Vietnam at present. Requirement and survey fields should be considered specifically for each NP and NRs. Priority should be given to survey groups that have no or poor information (Thallobionta, insects, fish and even both amphibian and reptiles).

Recommendation: BD monitoring programme and repeat time should be designed to make it suitable to condition on resources and other requirements (pressure of people, characteristics and situation of species variation, financial assistance.,). In establishing a survey and monitoring programme, attention should specially are paid to selection of species, habitats and method for implementation

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3. Recommendations for contents of training on BD survey, monitoring and conservation:

- The gap on quantity and inadequacy on qualification as well as no full time staff available of the personnel staff of agriculture and rural development departments, provincial forest protection departments, NPs and NRs are the biggest problem for the BD survey and monitoring work at present.
- The issue on faculty development should be combined between qualitative and quantitative strengthening and personnel organization work. This issue should be considered by the Ministry of Agriculture and Rural Development and provincial authorities.
- In order to get BD survey and monitoring work done, it is necessary to have training activities. Apart from the professional training (forestry engineers, technicians), foreign language (English), informatics, staff of the NPs and NRs should be trained in short courses on basic knowledge and skills for BD survey and monitoring.
- The consultant group recommended 10 training curricula related to BD survey, monitoring and conservation. These curricula should be selected according to the working requirements of the target groups as well as their knowledge standard.

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ANNEXES

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Annex III: Plant & animal species recorded from the studied national parks and nature reserves listed in the Red Data Book of Vietnam

Note: RD: Red Data Book; HL: Hoang Lien NR; TD: Tam Dao NP; PN: Phong Nha Ke Bang NP; BM: Bach Ma NP; KK: Kon Ka Kinh NR; CT: Cat Tien NP; BC: Binh Chau – Phuoc Buu NR.

1. ANIMALS

No	Scientific Name	RD	HL	TD	PN	BM	KK	CT	BC
1	*Cynocephalus variegatus*	R	+		+	+		+	
2	*Cynoptertus brachyotis*	R						+	+
3	*Rhinolophus paradoxolophus*	R			+				
4	*Rhinolophus borneensis*	R						+	
5	*Ia io*	R			+				
6	*Myotis siligorensis*	R	+		+	+			
7	*Nycticebus coucang*	V	+	+	+	+			+
8	*Nycticebus pugmaeus*	V			+	+		+	+
9	*Macaca arctoides*	V	+	+	+	+	+	+	+
10	*Macaca assamentis*	V			+				
11	*Macaca nemestrina*	V			+	+	+	+	+
12	*Trachypithecó francoisi hatinhensis*	V			+				
13	*Pygathrix nemaeus nemaeus*	E			+	+			
14	*Pygathrix nemaeus nigripes*	V						+	
15	*Pygathrix nemaeus cinereus*	E					+		
16	*Hylobates leucogenys leucogenis*	E			+				
17	*Hylobates concolor*	E	+	+					
18	*Cuon alpinus*	E	+	+	+	+		+	
19	*Helarctos malayaus*	E			+	+		+	+
20	*Selenarctos thibetanus*	E	+	+	+	+	+	+	
21	*Aonyx cinerea*	V	+		+	+		+	
22	*Lutra lutra*	T	+	+	+	+			+
23	*Lutra perspicillata*	V			+	+		+	
24	*Mustela strigidorsa*	R				+			
25	*Melogale personata*	R			+	+			
26	*Arctictis binturong*	V	+		+	+		+	
27	*Arctogalidia trivirgata*	R			+		+		
28	*Chrotogale owstoni*	R	+	+					
29	*Viverra megaspila*	E			+	+	+?		
30	*Viverra tainguyensis*	?					?		
31	*Felis chaus*	E				+			+
32	*Felis marmorata*	V			+	+			
33	*Felis temmincki*	V			+	+		+	+
34	*Felis viverrina*	R				+		+	
35	*Neofelis nebulosa*	V	+	+	+	+		+	
36	*Panthera pardus*	E	+	+	+	+		+	+
37	*Panthera tigris*	E	+	+	+	+	+	+	
38	*Elephas maximus*	V			+	+		+	
39	*Rhinoceros sondaicus annamiticus*	E						+	
40	*Tragulus javanicus*	V			+	+		+	+
41	*Cervus porcinus*	E						+	
42	*Bos gaurus*	E			+			+	
43	*Bos javanicus*	V						+	

No	Scientific Name	RD	HL	TD	PN	BM	KK	CT	BC
44	*Bubalus bubalis*	E						+	
45	*Capricornis sumatraensis*	V	+		+	+	+	+	
46	*Manis javanica*	V			+		+	+	+
47	*Hylopetes alboniger*	R	+		+	+			
48	*Hylopetes phayrei*	R	+						+
49	*Pentaurista pentaurista*	R	+	+	+	+		+	
50	*Petaurista elegans*	R	+						
51	*Callosciurus finleysoni*	R							+
52	*Vandereuria oleracea*	R				+			+
53	*Pelecanus philippensis*	R			+				
54	*Mycteria leucocephala*	R						+	
55	*Ciconia episcopus*	R						+	
56	*Ephippiohynchus asiaticus*	E						+	
57	*Leptoptilos javanicus*	R						+	
58	*Pseudibis papillosa*	V						+	
59	*Cairina scutulata*	V						+	
60	*Nettapus coromandelianus*	T			+			+	
61	*arborophila davidi*	E						+	
62	*Lophura nycthemera ssp*	T	+		+	+	+	+	+
63	*Lophura diardi*	T					+	+	+
64	*Lophura imperialis*	E			+				
65	*Lophura hatinhensis*	E			+				
66	*Lophura edwardi*	E			+	+			
67	*Polyplectron germaini*	T						+	
68	*Polyplectron germani*	T	+		+	+			
69	*Rheinartia ocellata*	T			+	+		+	
70	*Pavo munticus*	R			+	+		+	
71	*Columba punicea*	T							+
72	*Treron seimundi*	R			+	+			+
73	*Carpococcyx renauldi*	T			+	+			
74	*Pholdilus badius*	T						+	+
75	*Bubo zeylonensis*	T		+		+		+	
76	*Strix leptgrammica*	R					+		
77	*aerodramus brevirostris*	R			+			+	+
78	*Ceryle lugubris gutlata*	T	+	+	+	+			
79	*Alcedo hercules*	T				+			
80	*Pelargopssis capensis*	T				+	+	+	
81	*Berenicornis comatus*	E			+				
82	*Ptilolaemus tickelli*	E		+	+	+	+		
83	*Aceros nipalensis*	E			+				
84	*Aceros undutalus*	T			+	+		+	
85	*Buceros bicornis*	T	+	+	+	+	+	+	
86	*Picus rabieri*	T	+		+	+			
87	*Corydon sumatranus*	R						+	
88	*Psarisomus dalhousiae*	T			+	+	+	+	
89	*Psarisomus dalhousiae*	T			+	+			
90	*Pitta nympha*	R				+			
91	*Pitta cyanea*	R			+				
92	*Pitta elliotii*	T			+	+		+	
93	*Jabouilleia danjoui*	T			+	+	+		
94	*Garrulax milleti*	R					+		
95	*Garrulax merulinus*	R					?		
96	*Garrulax maesi*	T	+	+	+				
97	*Garrulax yersini*	R	+	+					
98	*Sitta solangiae*	T					+		
99	*Temnurus temnurus*	T			+	+	+		

No	Scientific Name	RD	HL	TD	PN	BM	KK	CT	BC
100	*Corvus torquatus*	E							
101	*Gekko gekko*	T	+	+	+		+	+	+
102	*Acanthosaura lepidogaster*	T	+	+	+	+	+		
103	*Physignathus cocincinus*	V	+	+	+	+			
104	*Leiolipes gutala*	T						?	+
105	*Physignathus cocincinus*	V					+	+	+
106	*Varanus nebulosus*	V					+	+	+
107	*Varanus salvator*	V			+		+	+	+
108	*Python molutus*	V	+		+	+	+		+
109	*Python reticulatus*	V							+
110	*Achalinus spinalis*	R	+						
111	*Elaphe prasina*	T						+	
112	*Elaphe porphyracea*	T	+						
113	*Gonyosoma oxycephalum*	T						+	
114	*Gonyosoma oxycephalum*	T						+	
115	*Ptyas korros*	T	+	+	+	+	+	+	+
116	*Ptyas mucosus*	V	+		+			+	+
117	*Bugarus fasciatus*	T	+	+	+	+	+	+	+
118	*Naja naja*	T	+	+	+	+	+	+	+
119	*Ophiopphagus hannah*	E	+	+	+			+	+
120	*Trimeresurus monticola*	R	+						
121	*Trimeresurus cornutus*	R		+					
122	*Deinaglistrodon acutus*	R	+						
123	*Chelonia mydas*	E							+
124	*Platysternum megacephalum*	R	+		+				
125	*Cistolemmys galbinifrons*	V			+	+			
126	*Cuora trifasciata*	V			+				
127	*Cuora amboinensis*	V						+	+
128	*Geoemyda grandis*	V						+	
126	*Indotestudo elongata*	V			+			+	+
127	*Manoouria impressa*	V			+		+		
128	*Crocodylus siamensis*	E						+	
129	*Leptobrachium palpebralespinosa*	R	+	+			+		
130	*Megophrys feae*	R	+	+					
131	*Megophrys longipes*	T	+	+			+		
132	*Bombina maxima*	R			+				
133	*Bufo galeatus*	R			+		+	+	
134	*Rana andersoni*	T			+	+	+	+	
135	*Rana spinosa*	T	+	+					
136	*Rana microlineata*	T	+						
137	*Rhacophorus nigropalmatus*	T						x	

2. PLANTS

No	Scientific Name	RD	HL	TD	PN	BM	KK	CT	BC
1	*Abies delavayi*	R	x						
2	*Acanthopanax trifoliatus*	T	x	x		x			
3	*Actinodaphne eliptibacea*	T	x	x					
4	*Adenia banaensis*	R				x			
5	*Adinandra megaphylla*	T	x	x		x			
6	*Adinandra microcarpa*	R					x		
7	*Afzelia xylocarpa*	V					x		x
8	*Alleizettellia rubra.*	R				x			
9	*Alniphyllum eberhardtii.*	R	x			x			
10	*Altingiaa chinensis*	R	x						
11	*Altingiaa poilanei*	R					x		
12	*Amentotaxus argotania*	R	x	x					
13	*Amentotaxus yunanensis*	T	x						
14	*Amomum longillgulata*	x	x						
15	*Annamocarya sinensis*	V		x	x				
16	*Anoectochilus chapaensis*	R	x	x		x			
17	*Anoectochilus roxburghii*	E					x		
18	*Anoectochilus setaceus*	E	x	x	x	x			
19	*Aquilaria banaensae*	T				x			
20	*Aquilaria crassna*	E		x	x	x	x		
21	*Arcangiopteris subintegra*	R	x						
22	*Ardisia mamillata*	T	x	x					
23	*Ardisia silvestris*	V	x	x	x	x			
24	*Asarum caudigerum*	V	x	x					
25	*Asarum maximum*	E	x	x					
26	*Berberis julianae schneid*	E	x						
27	*Berberis wallichiana*	E	x						
28	*Bretschneidera sinensis*	T	x						
29	*Bulbophyllum hiepii*	R					x		
30	*Caesalpinia sappan*	T		x					x
31	*Calamus platycanthus*	V	x	x	x	x			
32	*Calamus poilanei*	K			x		x		
33	*Calocedrius macrolepis*	E	x						
34	*Camellia fleuryi*	T				x			
35	*Caryota bacsonensis*	R		x					
36	*Casearia annamensis*	R					x		
37	*Cephalotaxus mannii*	R			x	x	x		
38	*Chukrasia tabularis*	K		x	x		x		
39	*Cibotium barome*	K	x	x					
40	*Cinnamomum balasnae*	R	x						
41	*Cinnamomum parthenoxylon*	K					x		
42	*Codonopsis jaoanica*	V	x						
43	*Coptis chinensis.*	E	x						

44	*Coptis guiguesecta*	E	x						
45	*Coscinium fenestratum*	V	x	x	x	x	x		
46	*Craibiodendron scleranthum*	R					x		
47	*Cybotinum barometz*	K		x	x	x	x		
48	*Cycas chevalieri*	LR				x			
49	*Cycas pectinata*	V				x			
50	*Dacrydium elatum*	K			x	x	x		
51	*Dalbergia bariaensis*	V				x			x
52	*Dalbergia cochinchinensis*	V			x		x		
53	*Dalbergia tonkinensis*	V		x	x				
54	*Delavaya toxocarpa*	R	x						
55	*Dendrobium amabile*	R			x	x			
56	*Dendrobium daoensis*	R		x					
57	*Dendrobium ochraceum*	R					x		
58	*Dialium cochinchinensis*	K			x		x		x
59	*Dipsaais japonicus*	V	x						
60	*Dipterocarpus grandiflorus*	K			x	x			
61	*Disporopsis longifolia*	V				x			
62	*Docynia indica*	R	x						
63	*Drynaria fortunei*	T	x	x	x				
64	*Elsholtzia penduliflora*	R	x						
65	*Enkianthus quiqueflorus*	R				x	x		
66	*Epigeneium chapaensis*	R					x		
67	*Ervatamia granulosa*	T				x			
68	*E rythrofloeum fordii*	K							
69	*Euonymus chinensis*	T	x	x		x			
70	*Facpes longipetiolata*	R	x						
71	*Fokienia hodginsii*	K	x	x	x	x	x		
72	*Franxinus chinensis*	R	x						
73	*Garcinia fragraoides a*	R	x		x				
74	*Geranium nepalense*	R	x						
75	*Haldina cordifolia*	T							x
76	*Helicia grandifolia*	R		x	x				
77	*Helwingia japonica*	R	x						
78	*Hopea hainanense*	K			x				
79	*Hopea pierrei*	K			x	x			
80	*Illicium parviflorum*	R			x	x			
81	*Illicium tsaii*	R	x						
82	*Indonisia involucrata*	T				x			
83	*Irvingia malayana*	V							x
84	*Isuga dumosa*	R	x						
85	*Itoa orientalis*	R	x						
86	*Keteleeria evelyniana*	V				x			
87	*Lindera myrrha*	V				x			
88	*Liparis chapaensis*	R					x		
89	*Liparis petelotii*	R	x						

90	*Liriodendron chinense*	T	x						
91	*Madhuca pasquieri*	K		x	x	x			
92	*Mahonia japonica*	V	x						
93	*Manglietia fordiana*	V	x	x					
94	*Markhamia stipulata*	V		x	x				x
95	*Melanorrhoea usitata*	R							x
96	*Meliantha suavis*	K		x	x				
97	*Morinda officinalis*	K	x	x	x				
98	*Nageia fleuryi*	V		x	x	x	x		
99	*Nageia wallichiana*	V			x	x			
100	*Nepenthes annamensis*	R				x			
101	*Pachylarnax praecalva*	V				x	x		
102	*Panax pseudoginseng*	E	x						
103	*Paphiopedilum appletonianum*	R				x			
104	*Paphiopedilum callosum*	R				x			
105	*Paphiopedilum grantixianum*	R		x					
106	*Parashorea chinensis*	K	x	x	x	x			
107	*Paris polyphylla*	R	x	x					
108	*Petrosavia sinii*	T	x						
109	*Pinus dalatensis*	R					x		
110	*Platanus pierre*	T			x				
111	*Pleioblastus baviensis*	R					x		
112	*Podocarpus neriiolius*	R	x	x	x				
113	*Podocarpus pilgeri*	R	x	x					
114	*Polyalthia plaginonneura*	R	x	x					
115	*Polyalthoa petelotii*	R	x						
116	*Polygonatum kingianum*	V	x						
117	*Polygonum multiflorum*	V	x	x					
118	*Primillaceae diapaensis*	R	x						
119	*Psilotum nudum*	K	x						
120	*Pterocarpus macrocarpus*	V			x		x		
121	*Raupholia cambodiana*	T					x		
122	*Raupholia indochinensis*	T				x			
123	*Raupholia verticillata*	V			x				
124	*Raupholia balansae*	E		x					
125	*Reineckea carnea*	R	x						
126	*Reynoutria japonica*	R	x						
127	*Rhamnouron balansae*	V		x					
128	*Rhizophora apiculata*	V							x
129	*Rhododendron fleuryi*	R					x		
130	*Rhodoleia championii*	V	x				x		
131	*Rhodoleia championii*	V							x
132	*Rhoiptelea chiliantha*	T	x						
133	*Rhopalocnemis phalloide*	R				x	x		
134	*Rubia cordifolia*	T	x						

135	*Sargentedoxia cuneata*	R	x	x					x
136	*Sasa japonica*	T	x	x					
137	*Scaphium macropodium*	K				x			
138	*Schefflera kontumensis*	R					x		
139	*Schoutenia hypoleuca*	V			x				
140	*Sedum sarmentosum*	E	x						
141	*Semecarpus caudata*	R					x		
142	*Sindora siamensis*	K							x
143	*Sindora tonkinensis*	V			x				
144	*Smilacax petelotii*	T	x						
145	*Smilax glabra*	V	x	x	x	x			
146	*Stephania brachyandra*	R	x						
147	*Strophanthus divaricatus*	T		x		x			x
148	*Strychnos nitida*	R							x
149	*Tarrietia javanica*	V			x				
150	*Tetrameles nudiflora*	K		x					x
151	*Tetrapanax papyriferus*	T	x						
152	*Thalictrum foliolosum*	V	x						
153	*Tinospora tomentosa*	K		x					
154	*Toricellia angulata*	R	x						
155	*Valeriana hardoickii*	R	x						
156	*Vietsenia scaposa*	T				x			
157	*Vitex ajugaeflora*	V							x
158	*Xylopia pierrei*	V					x		x
159	*Zenia insignis*	R			x				

Annex IV: Some data sheet forms used for biodiversity survey & monitoring

Form No. 1. Wildlife records ON line transect Page*: .....*

Day..... Month..... Year..... Time Start: ..... Time End: .....

Observer: ..... Line transect name: .....

Area name / Locality name: .....

Weather before survey started.....Other weather change: .....

Time	Species	No.	Sex	Dist. (m)	Sight angle	Measur-ement of animal foot print	Latitude & Longitude	Habitat	Note

Explanation for noting:

1. Time: The time when animal is observed (hour, minute);
2. Species: Literature name or Scientific name;
3. Number: The number of individual seen;
4. Sex: Sex Ratio (Number of male / number of Female0;
5. Distance: Estimate sighting distance (from observer to animal);
6. Sighting angle (α): Angle formed by sighting direction and line transect direction;
7. Measurement of animal foot print: The size of foot of the animal;
8. Latitude & Longitude: Geographical position where the animal occurred;
9. Habitat: Forest Type, Habitat type (in which the animal inhabit);
10. Note: Add some note if needed.

Form No. 2. Data sheet for small mammal trapping Sheet No*: .....*

Day..... Month ... Year..... Trapping Equipment: ..... No:....

Line transect name: ..... Locality name: .....

Trapper: ..... Collector.....

Weather before putting trap.....Other weather change: .....

No.	Species	Habitat	Age	Sex	Reproductions	Weight	Measure-ment	Note

Explanation for noting:

1. No: Serial number of specimen;
2. Species: Literature name or Scientific name;
3. Habitat: Forest Type, Habitat type (in which the animal inhabit);
4. Age: Juvenile, Sub adult, Adult (Mature);
5. Reproduction: Reproductive status;
6. Weight: The body weight (gr);
7. Measurement: Size of Body, Tail, Hind Foot, Ear;
8. Note: Add some not if need.

Form No. 3. **Data sheet for Insect Records** Sheet No.*: .....*

Line transect name: ..... Sampling No.: ..... Date: …….....

Surveyor: …….....…….....

Weather: .....

Tree No	Species	Number of individual	Role (damage to root, leaves, flower, trunk, branch,)	Place collecting of species (cover, trunk, root, soil,)	Species Label

Form No.4 **Data sheet for survey and monitoring trees**

Line transect No..... Sampling No. ..... Date..... Sheet No*:* .....

Surveyor:.....

Forest Type / Habitat type: .....

Tree No.	Name of Tree	Distance r (m)	Bearing angle (α)	High (m)	Diameter $_{1,3}$ (cm)	Note

Explanation for noting:

- Tree No.: List the tree number follow the number in the sampling (in diagram);
- Tree name: Country name / Scientific name;
- Distance r: distance from the center to the tree (meter);
- Bearing (α): Is the angle formed between the true north-south line and tree direction;
- High: The tree high measurement from the stump to the top of canopy (m);
- $D_{1,3}$: Diameter measurement at level of 1,3 m high (cm).

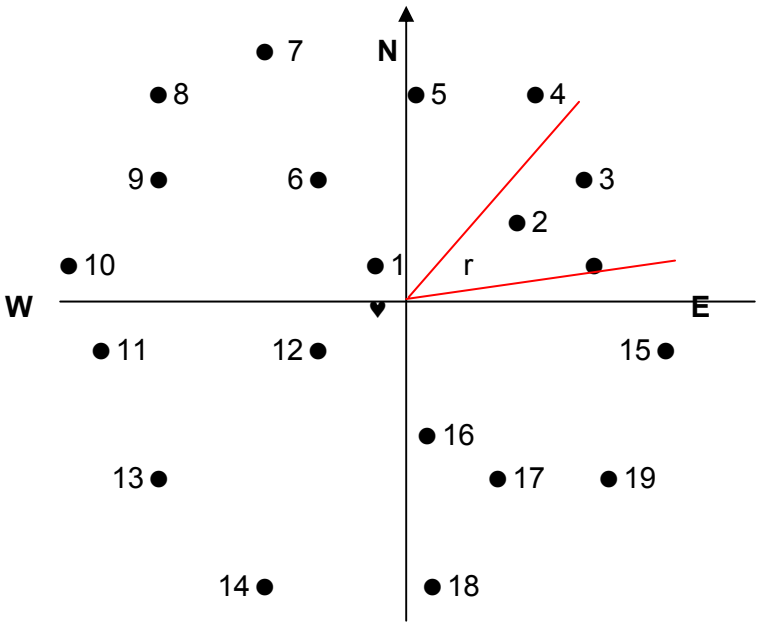


Diagram which shows the place of different trees-number in the circle sampling (400 m^2) and measuring method

Form No.5 Data sheet for survey & monitoring regeneration trees

Line transect No. ..... Plot No. ..... Date..... Sheet No. .....

Surveyor: .....

Forest type / Habitat type: .....

Quadrate Samp.	Species name	H<0,5m	H:0,5-1m	H > 1m	Original regeneration	Growing status

Explanation for noting:

- Quadrate sampling: Number of quadrate sampling ($1m^2$) in the vegetation sampling plot;
- Species name: Country name or Scientific name;
- H < 1m, H: 0,5 – 1 m, H > 1m: The high of the regeneration tree (from stump to top);
- Original regeneration From seed or shoot;
- Growing status: bad, medium, good.

Form No.6 **Data sheet for human & livestock impact data**

Sheet No....

Date ..... Month ..... Year ..... Start Time: ..... End Time: .....

Surveyors:.....

Route name: ..... Area name: .....

Mesur. **No.**	Distance **(m)**	**Impact Signs**					**Other feature**
		Tree Cutting	Lopping	**Grazing Dung**	**Fire Clearing**	**Wildlife signs**	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
....							

Explanation for noting:

- Distance: Distance between sampling on the route (in general 100, 200, 300, ...m);
- Tree cutting: The signs show that the trees were cut;
- Lopping: The signs show that people came and cut branches, collect fire wood,);
- Grazing / Dung: The signs show the presence of the livestock;
- Fire and Clearing: The signs show that fire was there or clearing forest for cultivation;
- Wildlife signs: The signs show that wildlife occurred there;
- Other features: Some other information need to record.

Annex V: Procedure and content of training need assessment

Procedure and content of training need assessment is presented in a TNA cycle. In this cycle, all steps of activities have participation by the related sides (target groups of training need assessment survey: Provincial Forest Protection Department, Agriculture and Rural Development Department, related boards and sectors, Forest Protection Stations management personnel and staff of the NPs and NRs, farmers, teachers and donors etc.,).

Step 1: To define surveyed target groups:

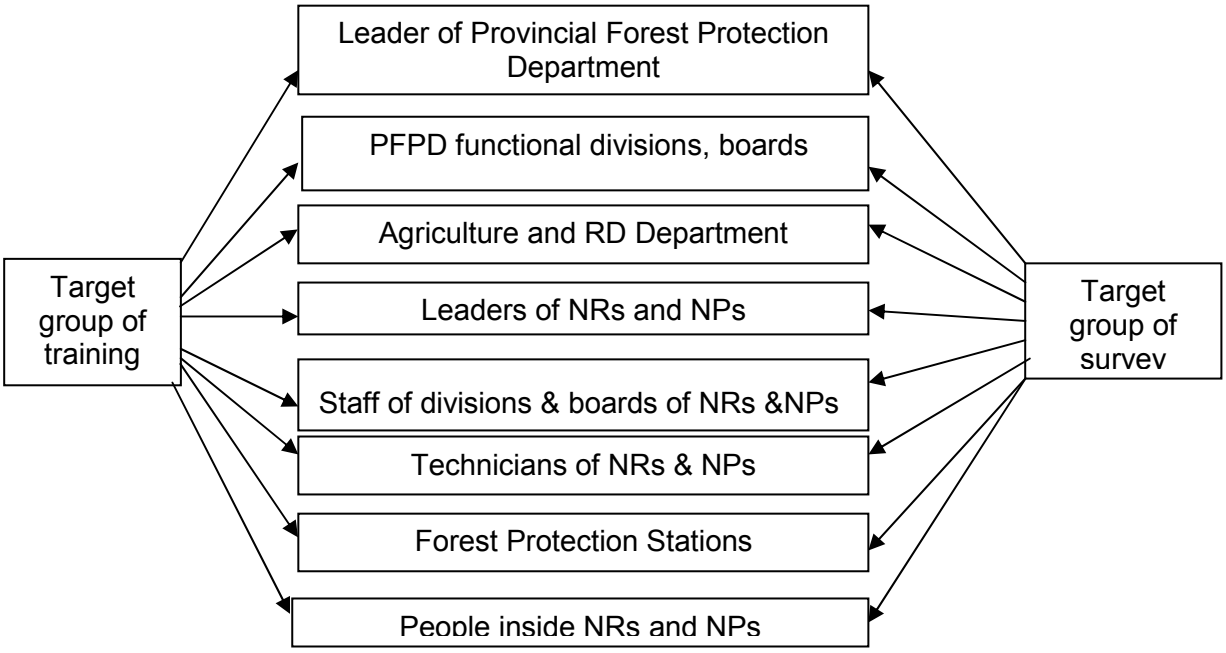
In this step, it is defined:

+ Who need to be trained?

+ What are their training objectives and motivation ?

+ Who are target groups to be surveyed ?

Results of survey from 3 working group (Provinces in the Northern part, provinces in the central part, Provinces in ther Southern part) in this step, it is outlined in diagram below:



Step 2: Making a survey plan.

- To define survey contents:
  - To analyze advantages, constraints, opportunities and challenge to the work that TNA survey objects are doing and will do.
  - Knowledge, skills and attitude requested to implement that work.
- Selection of survey method:

+ Survey forms.

+ Semi-structural interview.

+ Group discussion: With leaders of Agriculture and Rural Development Departments, provincial Forest Protection Departments, NPs, NRss, functional divisions and boards

(of NPs, NRss,, provincal Forest Protection Departments, Forest Protection Stations, farmers etc.,) to exploit information on training needs in the field of BD survey and monitoring.

To establish a TNA survey group

Step 3: To conduct survey.

The training teams go to the places according to assignment, use agreed survey methods, meet with Training need assessment survey subjects (TNA) to carry out collection of necessary information serving for training need assessment.

Step 4: To Synthesize information.

After survey and investigation of information related to TNA, it is needed to synthesize scattered information and conduct topic analysis in form of forms and table. Analysis and consolidation process includes:

- To consolidate field information.
- To analyze and consolidate information according to forms and table:

  - Advantages, constraints, opport+unities and challenges of BD survey and monitoring in localities (SWOT analysis table).

  - Information consolidation table on institution, standards and BD training needs.

  - Consolidation table on training need aassessment (TNA).

Step 5: Evaluation and report writing.

- To organize workshop to let different groups present their survey results. Recommend training courses and discuss and agree with participants.
- To conduct writing report. Consolidation report on training need assessment process to give speciffic recommendation on titles of training courses, objectives and main contents of each course, organizing form, particitating target groups, duration, training venues and suggestion for consultant group (Teachers).