

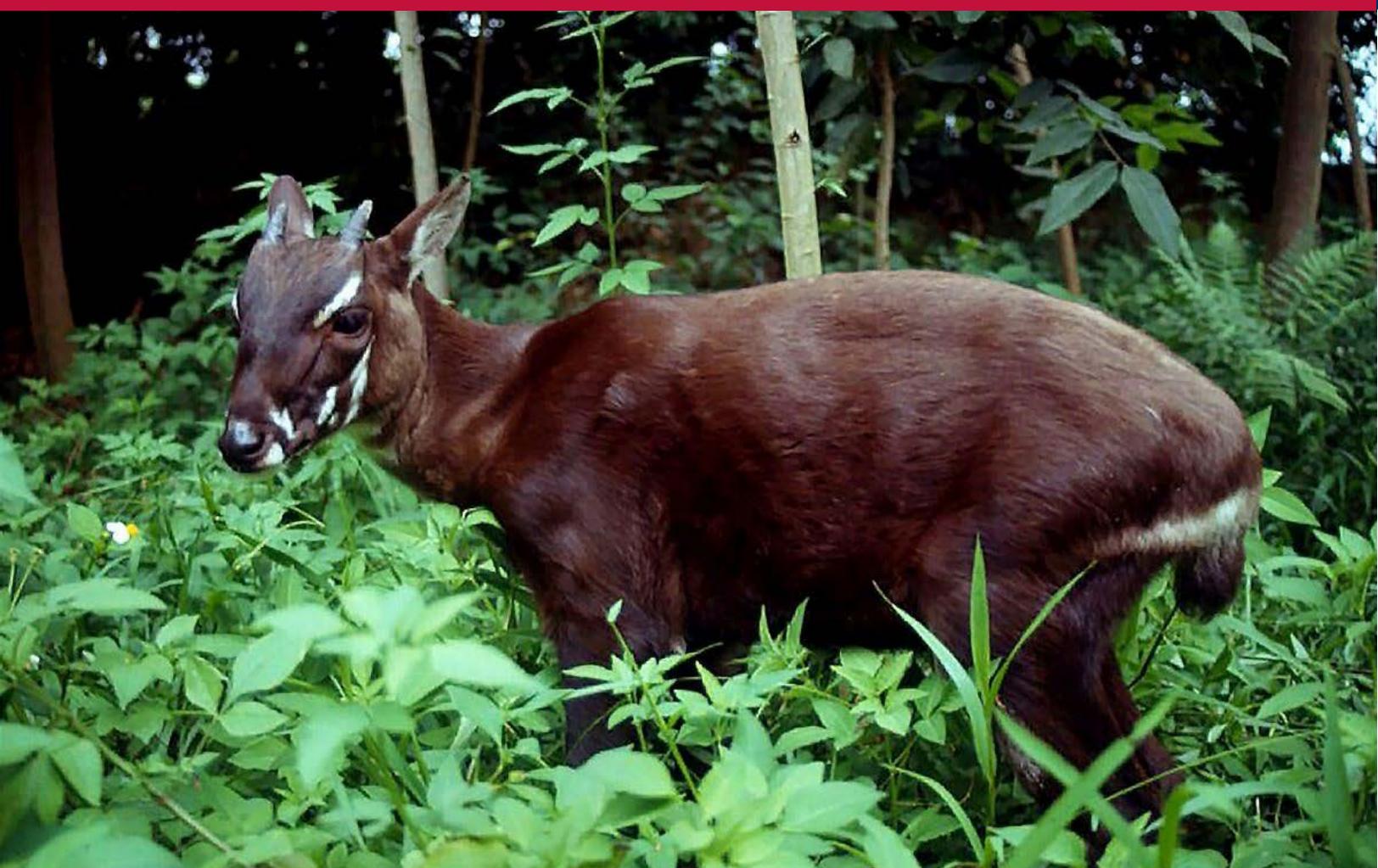


USAID
FROM THE AMERICAN PEOPLE

DESK REVIEW

USAID GREEN ANNAMITES

BIODIVERSITY CONSERVATION DESK REVIEW SUMMARY



July, 2017

This document was produced for review by the United States Agency for International Development (USAID). It was prepared by ECODIT for USAID Green Annamites.

USAID GREEN ANNAMITES

BIODIVERSITY CONSERVATION DESK REVIEW SUMMARY

July, 2017

TASK ORDER NO. AID-440-TO-16-00001
Under REPLACE IDIQ No. AID-OAA-I-14-00002

Cover Photo: Thua Thien Hue Provincial Forest Protection Department

DISCLAIMER

This document is made possible by the support of the American People through the United States Agency for International Development (USAID.) The contents of this document are the sole responsibility of ECODIT and do not necessarily reflect the views of USAID or the United States Government.

TABLE OF CONTENTS

LIST OF TABLES.....	ii
LIST OF FIGURES.....	ii
ACRONYMS AND ABBREVIATIONS	iii
I. INTRODUCTION	I
I.1. BACKGROUND	I
I.2. PURPOSE OF THE BIODIVERSITY CONSERVATION DESK REVIEW	I
2. BIODIVERSITY CONSERVATION IN VIETNAM	2
3. BIODIVERSITY IN THE CENTRAL ANNAMITES	4
3.1. BIOGRAPHIC REGIONS	4
3.2. FOREST HABITATS	5
3.3. SPECIES DIVERSITY	6
4. THREATS TO BIODIVERSITY	8
4.1. HUNTING OF WILDLIFE	8
4.2. ILLEGAL EXTRACTION OF TIMBER AND NON-TIMBER FOREST PRODUCTS (NTFP).....	9
4.3. INFRASTRUCTURE DEVELOPMENT	10
4.4. GOLD MINING.....	10
5. BIODIVERSITY CONSERVATION EFFORTS IN THE CENTRAL ANNAMITES	I
5.1. LANDSCAPE APPROACH.....	11
5.2. BIODIVERSITY CORRIDORS.....	12
5.3. PROVINCIAL CONSERVATION EFFORTS IN QUANG NAM AND THUA THIEN HUE	13
5.4. PROJECTS/ PROGRAMS RELATED TO THE GREEN ANNAMITES PROJECT	18
6. LESSONS LEARNED AND WAY FORWARD	21
6.1. LESSONS LEARNED	21
6.2. THE WAY FORWARD	21
7. REFERENCES	24

LIST OF TABLES

Table 1. Mammals in Thua Thien Hue	8
Table 2. Motivation for hunting different animals	9
Table 3. Conservation priorities in Quang Nam.....	16
Table 4. The biogeographic regions of Quang Nam and their distribution within FMUs.....	16
Table 5. Programs and Projects Related to the Green Annamites Project.....	18

LIST OF FIGURES

Figure 1. BCI biodiversity corridor	12
Figure 2. Green Corridor project area and state forest enterprise	15

ACRONYMS AND ABBREVIATIONS

BCC	Biodiversity Corridor Conservation
BCI	Biodiversity Corridor Initiatives
CarBi	Carbon sink and biodiversity project
CBOs	Community Based Organizations
DARD	Department of Agriculture and Rural Development
DONRE	Department of Nature Resource and Environment
FCPF	Forest Carbon Partnership Facility
FPD	Forest Protection Department
FFI	Fauna and Flora International
FIPI	Forest Inventory and Planning Institute
FMU	Forest Management Units
EBA	Endemic Bird Area
GIS	Geographic Information System
ICRAF	World Agroforestry Center
IEBR	Institute of Ecological and Biological Research
LLS	Livelihoods and Landscapes Restoration Strategy
M&E	Monitoring and Evaluation
MARD	Ministry of Agriculture and Rural Development
METT	Management Effective Tracking Tool
MONRE	Ministry of Natural Resources and Environment
NGO	Non-Governmental Organization
NP	National Park
NR	Nature Reserve
NTFP	Non-Timber Forest Product
PA	Protected Area
SMART	Spatial Monitoring And Reporting Tool
TT Hue	Thua Thien Hue
WCS	Wildlife Conservation Society
WWF	World Wild Fund for Nature

I. INTRODUCTION

I.1. BACKGROUND

Forests play a critical role in Vietnam in protecting watersheds, preventing soil erosion, mitigating climate change, and building resilient communities. Forests in the Annamites region of Vietnam are home to rare and endemic species found nowhere else in the world. Unfortunately, these forests and habitat areas are being depleted at an alarming rate because of destructive economic development activities such as shifting cultivation, unsustainable livelihood activities and population pressure. The USAID Green Annamites project supports Vietnam's transition to climate-smart, low emission, and resilient development that protects the people, landscapes, and biodiversity of central Annamites, with a focus on Quang Nam and Thua Thien Hue provinces. The project aims at achieving three following results:

1. Increased application of low emission land use: USAID Green Annamites supports the provinces of Quang Nam and Thua Thien Hue to conserve and enhance their carbon stocks. The project aims at assisting the region in reducing or stopping carbon emissions from deforestation, forest degradation and unsustainable agricultural practices; and to increase carbon sequestration from restoration of degraded landscapes. A key activity is to improve the livelihoods of forest-dependent local communities through a market-based value chain approach and partnerships with the private sector.
2. Strengthened biodiversity conservation: The project assists the target provinces to mitigate threats against globally significant biodiversity of the region. Such threats include poaching and activities that cause habitat loss, destruction, and fragmentation. The project's key interventions include promoting a landscape approach in biodiversity conservation and creating alternative livelihoods for local communities to reduce negative impacts on biodiversity. Building capacity for key stakeholders, such as authorities in protected area is also critical.
3. Increased resilience for vulnerable communities: This element of the project seeks to ensure that the results of all activities are climate resilient. USAID Green Annamites will build adaptive capacity for GVN stakeholders (like the Department of Natural Resources and Environment (DONRE); the Department of Agriculture and Rural Development (DARD), and key stakeholders from the private sector and civil society.

I.2. PURPOSE OF THE BIODIVERSITY CONSERVATION DESK REVIEW

The main purpose of this activity is to identify the status, challenges and opportunities in Quang Nam and Thua Thien Hue Provinces related to Task 2 of this project – Strengthens Biodiversity Conservation of the USAID Green Annamites Project. This activity includes a review of past and current documents and data available from related biodiversity conservation projects, specifically on the Central Annamites in Quang Nam and Thua Thien Hue provinces (the project areas of the Green Annamites project). This review also yields “lessons learned” culled from related projects and helps this project establish priorities for moving forward.

2. BIODIVERSITY CONSERVATION IN VIETNAM

Vietnam is home to an amazing diversity of plants and animals. Approximately 275 mammal species, 826 bird species, 260 reptile species, 82 amphibian species, 500 freshwater fish species, 2,000 marine fish species and 12,000 plant species have been identified (Dang, 1998; MacKinnon, 1997). Many of those are rare, valuable, endangered and endemic species.

The need for conservation and rehabilitation of the natural environment, however, were not recognized by the Vietnam government until the end of 1970s. The first priority of the Vietnamese government at the time was to provide areas for settlement of war veterans. Chemical detoxification and remediation for human resettlement of areas affected by chemical defoliants were the second priority; and the third was reforestation, establishing protected areas, and conversion of forests into cultivated land (MOF, 1991). The focus on conservation of endangered habitats and species only emerged toward the end of the 1990s. During this time, the concept of ecosystem management was discussed among the very few stakeholders and political leaders and decisions were eventually made to include Vietnam ecosystem in the decision-making process (MOF, 1991).

Currently, the system of terrestrial protected area in Vietnam has 180 protected areas, including 30 national parks, 58 biosphere reserves, 16 species and habitat conservation areas, 56 landscape protection areas, and 20 research and experiment areas, established under the Forest Development and Protection Law (Cuong, 2015). The active establishment of new protected areas in Vietnam was part of the obligations under the UN Convention on Biological Diversity (CBD). Under this agreement, Vietnam committed to increase special use forest areas to 2 million ha in a policy document, titled Renovation Strategies for Forestry Development until the year 2000, aiming at doubling the network of protected areas (PAs) in Vietnam (MOF, 1993).

Although there is an extensive network of PAs in Vietnam (MacKinnon and MacKinnon, 1986; BirdLife and FIPI, 2005), these protected areas were selected in an *ad hoc* manner and are not a comprehensive representation of Vietnam habitats (Wedge *et al.*, 1999). In some protected areas, biodiversity representation is limited, such as semi-evergreen forest. In others, biodiversity representation is over represented, such as the montane forests (BirdLife and FIPI, 2005). According to O'Reilly and Swan, 2004, there have been some successful species-focused conservation interventions, however, the metapopulation dynamics focusing on the integration of species into landscape scale conservation has not been addressed. Nevertheless, a few landscapes and national strategies for biodiversity conservation have been developed with a policy focus; for example, the National Action Plans for Wildlife Trade or Protected Area Strengthening (Long, 2005), Central of Truong Son Initiative (MARD, 2004).

Legislatively, in 2008, the Biodiversity Conservation law was put into operation creating a legal framework for managing biodiversity and protected areas of Vietnam. This is the highest law documented for biodiversity management in the country. Vietnam has also been reinforcing the Biodiversity Law by promulgating many sub law documents, such as: Decision 1250/QĐ-TTg dated 31/7/2013 by the Prime Minister on the Approval of the National Strategy on Biodiversity until 2020, and Orientation until 2030, Decision 218/QĐ-TTg dated 07/02/2014 by the Prime Minister on the Strategy for Management of the Special Use Forest System, Marine Protected Areas, Inland Water Protected Areas until 2020, and Orientation until 2030, decision 1216/QĐ-TTg dated 5/9/2012 by the Prime Minister on the Approval for the National Environmental Protection Strategy until 2020, and Orientation until 2030 and many other related sub-law documents and decrees. However, the implementation of these new laws has been impeded.

Under the current legislative system, some of the wetland areas in the special use forest system fall under the jurisdiction of three laws (Law of Fishery of 2003, Law of Forest Protection and Development of 2003, and Biodiversity Law of 2008). Although inland waters are actually parts of wetland, regulations on the management of inland waters, wetland areas and protected areas of this type of wet land habitat are different from the Law of Fishery, Biodiversity Law, and other related decrees. There has not been a unified form or theory of inland water protection or wetland protection to create coherent policy for these critical areas. The obvious implication is that the establishment of the wetland protected areas faced with conflicting jurisdiction and policy direction resulting in the continued degradation of critical habitat.

There have been overlaps in the biodiversity conservation mandates of Ministry of Natural Resources and Environment (MONRE) and Ministry of Agriculture and Rural Development (MARD). Under the Law on Biodiversity (2008), MONRE is mandated to be responsible for state management of biodiversity, ecosystems, species, and genetic resources, while the Law on Forest Protection and Development (2004) assign MARD to the state management of forest resources and ecosystems. This includes management of biodiversity, species, genetic resources, watersheds, coastal protection, and the economics management of three forest types. At the provincial level, DONRE is responsible for biodiversity conservation but the Forest Protection Department (FPD) is also presumed to be responsible for the protection of biodiversity. The land administration unit of DONRE is responsible for forest land allocation and therefore, plays an important part in community based forest management.

Provincial environmental issues are managed by DONRE. Its' subdivision, the Department of Environmental Protection manages biodiversity generally (Biodiversity Law, 2008). At the central level, biodiversity related issues are managed by the Biodiversity Conservation Agency (BCA), a newly established agency of MONRE. Biodiversity conservation is a new mandate from the ministry and does not yet include any mechanism to guide biodiversity reporting among environmental agencies within the ministry (Nguyen and Bui, 2011). In accordance with the Biodiversity law, MONRE is responsible for the management and monitoring of biodiversity in Vietnam. Currently, however, there is a deficiency in the monitoring of biodiversity by the Environmental Protection, a subdivision of DONRE (Nguyen and Bui, 2011). At the central level, BCA prepares a national environmental report with information about biodiversity issues from information reported by provincial DONREs and other environmental agencies of MONRE. Semiannually, BCA also prepares another national biodiversity report. However, these reports mainly focus on sectoral development with information about forestry, agriculture, fishery, etc. rather than biodiversity conservation (Nguyen and Bui, 2011).

The Land Law of 2004 provides the legal framework for communities to receive land tenure certificates with five rights: to exchange, transfer, lease, inherit and mortgage. This law meets one of the prerequisites for successful community based forest management, comprising ownership of resources. Benefit-sharing guidelines for local community allocation of with forests are specified in decision 178/2001/QD-TTg¹, although the availability of this legal framework and concrete support for the process via government agencies is minimal. Moreover, the awareness of forest edge communities and their rights is low. This leads to a situation where few communities are able to effectively manage their forest or natural resources.

In addition to the discrepancy in legal policy, biodiversity management in Vietnam faces other problems that need to be addressed, such as in PA management. In most of cases, PAs operation depends on insufficient budgets either from the provinces or national government (in the case of national parks). Three funding problems have been identified including: insufficient funding for management of protected

¹ Decision No. 178/2001/QD-TTg of November 12, 2001 on the Benefits and Obligations of Households and Individuals Assigned, Leased or Contracted Forests and Forestry Land.

areas; varying annual budget allocations; and the imbalance in investment priorities for PAs with a tendency to attach special importance to infrastructure development (ICEM, 2003).

The involvement of the local communities in the decision-making process is weak whilst their livelihoods depend significantly on natural resources (Long, 2005). Anderson and Long (2005) pointed out the insufficiency in the capacity of government agencies to facilitate community-based natural resource management. Sage and Nguyen (2001) recommended enhancing integrated conservation, both vertically and horizontally within Vietnam's system. The authors also recommended an adaptation of the legal framework for community based natural resource management, especially with community ownership of natural resources both within the PA network and outside of the network.

In addition to infrastructure development such as roads and hydropower dams, hunting wildlife for trade and subsistence is a significant and direct threat to wildlife (MARD, 2004). The illegal trade in wildlife to supply both national and international markets has increased dramatically in recent years (Donovan, 1998; Tran, 2001; Compton and Le, 1998).

The Vietnam government has recognized that a high proportion of its population is dependence on forest resources. This recognition has to be acknowledged and must be an integrated part of biodiversity conservation. The setting up of protected areas is not the only answer to biodiversity conservation. In recent years, attempting to address poverty alleviation and other national priorities, the government takes a more comprehensive approach by exploring the links between biodiversity conservation, sustainable natural resource use and watershed protection (i.e. Reducing Emissions from Deforestation and Forest Degradation/REDD and Payment for Forest Environmental Services/PFES).

3. BIODIVERSITY IN THE CENTRAL ANNAMITES

3.1. BIOGRAPHIC REGIONS

- In the Green Annamites project area, including Quang Nam and Thua Thien Hue provinces, there are 4 biogeographic regions as follows (Tordoff et al., 2003; Long, 2005):
- **Kon Tum Plateau:** this region can be broadly delineated using 1200 m contours. Two bird species, the golden-winged laughingthrush and the black-crowned barwing, restricted to it; a host of rare and valuable plants and butterflies exist only in this region making it globally unique. Kon Tum Plateau is also the home range of southern crested gibbon species (*Nomascus gabriella*) and Black shanked douc langur (*Pygathrys nigris*) which are endangered species of primates in Vietnam. The region is also very important for NTFPs such as the famous Ngoc Linh ginseng (*Panax vietnamensis*) and Ngoc Linh cinnamon (*Cinnamomum spp.*).
- **Bach Ma - Hai Van Mountains:** the Bach Ma - Hai Van Mountain ridge is one of the wettest areas of Vietnam, receiving up to 8,000mm of precipitation annually. This condition creates a distinctive habitat that harbors endemic species such as the saola (*Pseudoryx nghetinhensis*). These weather conditions are brought about by northeast monsoons. The Bach Ma – Hai Van Mountains absorb the monsoons and create a rain-shadow effect in the south, where the weather gets progressively drier. For this reason, this mountain range creates a transition zone between biogeographic areas, which affects the distribution limits of many species such as saola, red-shanked douc langur, Edward's pheasant, grey peacock pheasant and Annam partridge. This region is the transition front between

southern and central gibbon species. A new primate species *Nomascus annamensis* was identified by Thinh et al. (2010) in this region. The region is also the transition front with grey shanked douc langur and red shanked douc langur distribution area in the South Central Annamites.

- **South Central Truong Son Ridge:** it is the habitats for typical 'Annamitic' species such the grey-shanked douc, Annamite muntjac, large-antlered muntjac, Owston's civet (*Chrotogale owstoni*), crested argus and Indochinese box turtle. This is also the most important area for tiger and elephant conservation in Quang Nam. A small and isolated group of 7 elephants has been sighted in this region.
- **Central Truong Son Lowlands:** a suite of species is restricted to lowland forest such as the timber trees *Paranephelium spirei*, *Celtis philippinensis*, *Barringtonia racemosa*, *Erismanthus sinensis* and *Xylopia vielana*. Although animals are less restricted by altitude, some species favor lowland forest. These include: lesser oriental chevrotain, Siamese fireback, yellow-vented green pigeon and Vietnamese pond turtle. The lowland forest is of special note as it has large expanses of relatively flat, lowland forest under 300m, in contrast to the predominantly hilly or river valley lowland forest in other areas of Quang Nam and Thua Thien Hue. These traits make this region the best location for elephant conservation.

3.2. FOREST HABITATS

Habitat types in Quang Nam and Thua Thien Hue could be delineated according to elevation as follows:

Lowland forest (below 300 m): this is the most threatened terrestrial habitat in the CA. Agriculture, human settlement, and other direct and indirect effects of the Second Indochina War have cleared out large areas of low land forest. Habitat loss, as resulting from agricultural expansion, road development and settlement of migrants threatens the remaining lowland forest below 300 m. This has serious implications for species and vegetation formations restricted to this habitat. Many species such as Edward's pheasants (*Lophura edwardsi*) and Lowe's otter civets (*Cynogale lowei*) which are likely to be restricted to this region (Tordoff et al., 2003).

Lowland hill forest (300-700m): This habitat is characterized by broadleaf evergreen forest formations dominated by members of the *Fabaceae*, *Dipterocarpaceae*, *Lythraceae* and *Gycadaceae*. This habitat is distinguished from lowland forest below 300 m by a greater number of epiphytes and the presence of members of the *Magnoliaceae*, *Lauraceae* and *Fagaceae*. It is a particularly important habitat for *Aquilaria crassna*, *Dialium cochinchinensis*, *Codonopsis javanica* species. The threats in the low land forest also apply to this type of habitat. Similar to lowland hill forest below 300 m, remaining areas of lowland hill forest between 300 and 700 m are important reservoirs of floral diversity (Tordoff et al., 2003). Lowland hill forest is particularly important for saolas, Annamite striped rabbits (*Nesolagus timminsi*), Annam partridges (*Arborophila merlini*), Aloe wood (*Aquilaria crassna*), *Dialium cochinchinensis* and *Codonopsis javanica* (Tordoff et al., 2003). Although not as threatened as lowland forest, this habitat still faces many of the same threats (Long, 2005).

Lower montane forest (700-1,200m): The elevation of this habitat experiences higher mean annual rainfall than lowland areas and has characteristics of evergreen forests. The habitat is characterized by the absence of members of the *Dipterocarpaceae*, and an increasing dominance of members of the *Fagaceae*, *Lauraceae*, *Magnoliaceae* and *Theaceae* (Rundel unpublished). This habitat supports an exceptionally high floral richness representing elements of both the lowland and montane floras. The diverse topology is an additional element which supports a high diversity of polydominant forest formations. Many of the more important formations are mixed broadleaf and coniferous forest formations with extremely restricted distributions (Tordoff et al., 2003). The principle threat to this habitat is forest clearance for upland agriculture. It is less threatened by infrastructure development than lower altitude habitats (Long, 2005).

Medium montane forest (1,200-1,500m): This habitat has similar structure and composition to those of lower montane forest with a similar degree of diversities of plant species and vegetation formations. However, this habitat has an increasing dominance of members of the *Hamamelidaceae*, *Cupressaceae*, *Rhodoleiaceae*, *Mastixiaceae*, *Betulaceae* and *Rosaceae*. This habitat supports a number of polydominant mixed broadleaf and coniferous forest formations of high conservation importance. Examples include forest dominated by *Dacrydium elatum* and forest dominated by *Fokienia hodginsii* (Tordoff et al., 2003). The rate of deforestation is low for this habitat as slopes tend to be steep and unsuitable for agriculture. Natural resources are still harvested from within the forest as in all habitats of Vietnam (Long, 2005).

Upper montane forest (>1,500m): This habitat is dominated by members of the *Ericaceae*, *Magnoliaceae*, *Lauraceae*, *Pinaceae* and *Fagaceae*. A number of species with high conservation value are restricted to this habitat, including the *Quercus platycarya*, *Keteleeria evelyniana*, *Panax vietnamensis* and *Pinus dalatensis* (Tordoff et al., 2003).

Upper montane habitat supports two distinct types of forest formations: forest on summits and ridge crests, and forest on slopes. Slope forest is characterized by a mixture of broadleaf and coniferous species and is dominated by members of the *Fagaceae*, *Lauraceae*, *Magnoliaceae* and *Pinaceae*. The forest formation that is dominated by *Pinus dalatensis* is of high conservation importance. Low temperatures, water and nutrient conditions make the summits and narrow ridges experience edaphic forest formations. This is characterized by stunted growth, xerophytic morphology, and the forest is dominated by members of the *Ericaceae* (principally *Rhododendron spp.*), *Fagaceae* and *Illiciaceae*. Trees in these formations are covered in a thick layer of moss and support a very limited diversity of epiphytic orchids (Tordoff et al., 2003).

The upper montane forest is the least threatened primary habitat in the Central Annamites region. A significant proportion of this is included within existing or proposed protected areas. These high-altitude forests on steep slopes are under the least threat as the topography and is not conducive to agriculture (Tordoff et al., 2003).

3.3. SPECIES DIVERSITY

Data on biodiversity in the two provinces is quite sparse and previous surveys have been of varying quality; often focused on only a single species, and does not cover the whole geographical extent of the provinces. In this section of the review, a brief description of the biodiversity in the two provinces is provided.

For Quang Nam province, information on the biodiversity of the province in this review is summarized from Quang Nam Biodiversity and Natural Resource Law Enforcement Action Plan 2005 – 2010 (Quang Nam PPC, 2005).

A total of 50 species of large mammals have been confirmed with an addition of 11 which are being provisionally recorded through interviews. Twelve (12) confirmed mammals and two provisionally recorded large mammal species are classed as Globally Threatened: Vulnerable. Twenty-two (22) species of bats have also been confirmed.

270 bird species have been confirmed with two species, crested argus (*Rheinardia ocellata*) and golden-winged laughingthrush (*Garrulax ngoclinhensis*) with a Globally Threatened: Vulnerable status.

48 taxa of reptiles of which six turtle species are Globally Threatened: Vulnerable and 35 amphibians of which one frog, the Annam flying frog (*Rhacophorus annamensis*), is Globally Threatened: Vulnerable have been confirmed.

194 species of butterfly have been confirmed to date.

To date 1,129 species of plants in 164 families have been identified. Of these, six are classified as Globally Threatened: Vulnerable by the IUCN (IUCN, 2003) and 47 species are classed as Vulnerable by the 2003 Vietnam Red Data Book.

A list of priority species has been produced to direct conservation efforts and resources. Additionally, flagship species have been identified; the flagship species are used to gain consensus for biodiversity conservation as they are thought to have appeal with the general public.

The information on biodiversity in Thua Thien Hue province has been collected via surveys in Bach Ma NP, Phong Dien Natural Reserve, and other surveys in Thua Thien Hue forests (Dickinson, *et al.*, 2006).

The flora in Thua Thien Hue is diverse due to the convergence of multiple flora sources such as indigenous flora in the North of Vietnam-China, Indo-Malaysian flora, India-Myanmar flora and Himalaya flora. The survey results on the flora species in Thua Thien Hue have identified approximately 2000 plant species (FIPI in the central region, 2008). According to Nguyen and Mai (2003), Bach Ma NP has 371 species classified as endemic flora out of 2000 identified. Historically, French botanists identified new species that were named after Bach Ma such as, *Côm Bạch Mã* (*Elaeocarpus bachmaensis* Gagn) of *Elaeocarpaceae* (François Gagnepain, 1943), *Chia vôi Bạch Mã* (*Cissus bachmaensis* Gagn) of *Nho* (*Vitaceae*) (François Gagnepain, 1947).

Of the 2000 identified species, 38 are listed as endangered at different levels. Specifically, 25 species are listed in the Vietnam redbook (1996), including 03 of EN, 09 of VU, 08 of K and 05 of R (rare); 13 species are included in the world red list (IUCN 2004), including 02 of CR, 02 of EN, 05 of VU, 02 of NT and 02 of DD.

There has not been comprehensive information about reptile and amphibian in Thua Thien Hue. The current information shows that Thua Thien Hue has at least 91 species of amphibia and reptile, while the figure for the whole Annamites region is 210 species (Tordoff *et al.*, 2003). Of the species identified in the three locations mentioned above, 15 of them are included on the Vietnam redlist (2000), 02 are of E, 06 are of V, 5 are of T, 7 are of R and 17 species are of IUCN redlist (1996): 1 is of CR; 4 are of EN, 7 are of VU, 5 are of NT. Especially, *Ophiophagus Hannah*, *Cuora galbinifrons bourreti* are in danger of extinction.

The surveys about butterflies were conducted in Bach Ma (1996), Phong Điền natural reserve (1998, 2004 and 2005) and the Green Corridor project area (2005). The results identified 402 species of 10 families of butterflies in Thua Thien Hue, representing 40% of the total number of butterfly species in Vietnam. Of the high conservation value species, *Troides aeacus* (*Papilionidae*) is listed as an endangered of extinction species under CITES criteria. *Papilio noblei* is in the redlist of IUCN.

The latest surveys in the two special use forest areas and the Green Corridor area reveal 358 bird species of 55 families in Thua Thien Hue. However, these figures do not describe the true diversity of birds in Thua Thien Hue. Of the identified species, 20 are on the Vietnam redlist (2000), of which 10 are in the world redlist (IUCN, 1994) of different levels of endangerment (02 of EN, 05 of VU and 03 of NT), especially significant are the endemic species such as *Arborophila merlini*, *Lophura edwardsi*, *Rheinardia ocellata*, *Jabouilleia danjoui*, *Alcedo Hercules* and *Picus rabieri*.

There has not been a comprehensive study on fish species of Thua Then Hue. The studies focused mainly on fishes in large river such as the Hương river and the lagoon system in this province. In summary, 85 fish species of 17 families of six orders were identified. Of which *Cypriniformes* has three families comprising 17.7% of the families, with 32 species (accounting for 56.1% of the species). This order accounts for the majority of the species. The *Pereiformes* order has 5 families (29.4%) with 13 species (22.8%); the *Siluriformes* order has five families (29.4%) with species (14%). Other orders are *Osteoglossiformes*, *Anguilliformes*, *Synbranchiformes*. Each order has one family (5.9%) and each family has one species (1.8% of the species) (Report No. 7, Green Corridor project). Of the identified species, four are in the redlist of Vietnam (2000). Of which 01 species classified as R, 03 as V. In recent years, seven species have been newly identified (Kottelat, 2001). Twenty-two (22) species were identified as of high economic value for local communities.

Survey results in Thua Thien Hue identified at least 132 mammal species of 10 orders of 28 families (Thua Thien Hue PPC, 2008). The species of mammals identified within special use forests are as follows:

Table 1. Mammals in Thua Thien Hue

Survey location	Order	Family	Species
Bach Ma NP	10	28	132
Phong Dien Natural Reserve	7	20	43
Green Corridor	7	21	54

Source: Technical Report No. 7/2007, Green Corridor Project.

Of the 132 identified species, 32 species are listed on the Vietnam Red list (2000), of which 10 species were identified as E, 18 were identified as V, 4 as R; and 24 species are included on the IUCN 2005 red list (IUCN, 2005), especially *Pygathrix nemaeus*, *Nomascus leucogenys*. Three new ungulates were newly identified, they are saola (*Pseudoryx nghetinhensis*), large muntjac (*Megamuntiacus vunquangensis*) and Truong Son muntjac (*Canimuntiacus truongsongensis*).

4. THREATS TO BIODIVERSITY

The literature review shows multiple activities posing threats to the biodiversity in the two provinces in our project scope. The following are four main threats to the biodiversity and habitats in the Green Annamites landscape of the two provinces.

4.1. HUNTING OF WILDLIFE

In Thua Thien Hue, hunting is one of the main threats to wildlife, including mammals, birds and butterflies. Before 1995-1996, the popularity of using guns for hunting in the region was the main threat to the degradation of wildlife populations, especially to primates and large mammals. However, in 1996-1997, a firearm ban took effect in Vietnam which reduced hunting activities significantly and the threat to the arboreal species such as primates (Thua Thien Hue Provincial PPC, 2008). Currently, the major threat to the wildlife is the popular use of snaring. FPD patrols collected many types of snares. On many occasions, patrols detected hunting camps storing thousands of snare lines. Snaring activities are most frequent during the dry season, from October to February. These activities are market driven because many valuable and rare species are sought after such as bears, monkeys, langurs, gibbons, wild pigs, chamois, etc. (Thua Thien Hue PPC, 2008).

In Quang Nam, the hunting threat is not understood for most species. Hunting is conducted by a multitude of different people. Among the most hunting forms are small snare traps for ground birds, snap traps for rodents, large snares for ungulates, and pit fall traps for turtles, hook lines for otters, log fall traps for civets, the use of dogs and spears, cage traps for bears and spike traps for ungulates. This list is not exhaustive as each ethnic group and each region uses different methods. Furthermore, hunting is not restricted solely to forest-edge communities, as many people from lowland Quang Nam and other provinces travel to the forests to hunt (Long, 2005; Long *et al.*, 2005; Quang Nam PPC, 2005).

Villages that use dogs for hunting are few and most are Kinh villages located in Que Son district (Quang Nam). McCormack and Nguyen (2004); Long and Minh (2005) suggested the relation of the phenomenon to the specialization of turtle collecting.

Long (2005) identified the following wildlife were hunted for trade, subsistence and trade, and for purely subsistence purposes as follows:

Table 2. Motivation for hunting different animals

Taxa hunted primarily for trade	Taxa hunted for subsistence and trade	Taxa hunted purely for subsistence
Pangolins	Wild pigs	Rodents
Hard-shelled turtles	Muntjacs	Squirrels
Soft-shelled turtles	Sambar	Galliformes
Snakes		Chevrotains
Bears		Bats

For forest edge communities, crop protection is the primary reason for hunting. The villagers place traps in and around their fields to reduce crop-raiding by forest animals. Some villages also use fences to protect crops; however, few put effort in maintaining fences (Long, 2005; Long *et al.*, 2005; Quang Nam Provincial People’s Committee, 2005). There are six crop raiding taxa, wild pigs, muntjacs, macaques, porcupines, rats, and sambars. Four are hunted for subsistence use and two, wild pigs and muntjacs, are for trade (Long, 2005; Long *et al.*, 2005; Quang Nam PPC, 2005).

Forest-edge communities mostly conduct their hunting during the wet season, just before harvest when crop protection requirement is at its highest and the crops do not need intensive tending. This does not coincide with the demand peak for bushmeat in the restaurants of Quang Nam, during the dry season between February and September (Robertson *et al.* 2004). This suggests that the wildlife trade in Quang Nam is not driven by poverty. This is quite different from the belief that hunting is directly correlated with poverty.

Most of the illegal wildlife products in Quang Nam is hunted by full time, professional hunters from the lowlands. The scale of illegal trading of wildlife and its related hunting is decreasing the natural capital available to forest-edge communities in Quang Nam (Robertson *et al.* 2004). Hunting can probably only be sustained if trade driven hunting is stopped (Robertson *et al.* 2004).

4.2. ILLEGAL EXTRACTION OF TIMBER AND NON-TIMBER FOREST PRODUCTS (NTFP)

The illegal extraction of timber and NTFP is popular. High demand species of timber being extracted include *Erythrophleum fordii*, *Sindora cochinchinensis*, *Mechelia sp*, *Hopea siamensis* and other species. The most popular extraction activity is rattan collection. Due to unsustainable collection methods of rattan, the forest ecological systems are being negatively impacted. Rattan collectors usually combine their activities with wildlife hunting and fishing using dynamites. Other NTFPs are also collected such as hạt U’oi, honey, palm leaves, leaves for producing broom (*lá đũa*), etc. These activities also degrade habitat quality (Thua Thien Hue PPC, 2008).

Generally, those involved in illegal extraction activities are professionals, especially for the extraction of valuable and rare species with high economic value. According to Thua Thien Hue FPD, from 1998 to

2005, there were 9,869 cases involving the violation of forest protection and development law (such as forest destruction, illegal extraction and transportation of forest resources, etc.). From 2000 to 2006, there were 385 cases involving illegal hunting, trading and transportation of wildlife (Thua Thien Hue PPC, 2008).

In Quang Nam, forest products are collected throughout the forest area of the commune, regardless of the village in which a person lives. For example, to harvest rattan (*Calamus sp.*), a large number of people enter the forest during the year and stay for long periods of time in many areas of Quang Nam forest. These people often fish or hunt during their trips and significantly alter the micro-habitat when they come in high numbers. Harvesting of rattan and *Aquilaria crassna* needs specific management and enforcement action in Quang Nam (Long, 2005; Long *et al.*, 2005; Quang Nam PPC, 2005).

Logging is conducted by both local communities and outsiders in Quang Nam. According to Long *et al.*, 2005, current systems have reasonable control over subsistence logging. However, species population numbers, species ecology or sustainable yield calculations are yet taken into consideration (Long *et al.*, 2005).

The illegal timber trade in Quang Nam is organized, professional and very extensive (Long *et al.*, 2005). Logging is more popular where access is easiest such as the flat lowland areas of western Que Son where road access is easy. For example, road access in Tabhing commune and along the Ho Chi Minh Highway between Thanh My and Prao (Long *et al.*, 2005).

4.3. INFRASTRUCTURE DEVELOPMENT

The development of roads through forest such as on Ho Chi Minh highway has caused major impacts on the hydrology and increased the sediment level in the provinces.

Road No. 74 in Thuong Quang commune, No. 73 in Hong Kim commune and other timber extraction trails that run through natural forests have created the fragmentation of the habitats (Thua Thien Hue PPC, 2008). The hydropower plants in Binh Dien and Aluoi, a water storage lake in Ta Trach are causing the disappearance of large areas of forest. In addition, infrastructure development typically increases illegal hunting and timber logging activities (Thua Thien Hue PPC, 2008).

In Quang Nam, all major tributaries of the Thu Bon river have one or more dams already proposed. Long *et al.* (2005) believed that this will lead to a significant reduction in the natural freshwater biodiversity in Quang Nam and will impact the fisheries and livelihoods of people. The construction of Ho Chi Minh Highway in northern Nam Giang, Dong Giang and Tay Giang (Quang Nam) also removed significant areas of lowland forest (Long *et al.* 2005).

4.4. GOLD MINING

Gold collection activities along Tra Ve river and some other places has created pollution and negative impacts to habitats in Thua Thien Hue. Gold mining is shrinking the habitats of many fishery species and degrading the economic benefits and biodiversity at the same time (Thua Thien Hue PPC, 2008).

Illegal gold mining take place throughout western parts of Quang Nam. The chemicals used in gold extraction are both highly poisonous and have detrimental effects on biodiversity and freshwater resources. Gold mining also caused significant increase in sediment load causing serious effects in river's biodiversity and fish stocks (Long *et al.*, 2005).

Besides threats mentioned above, the following are other dangers to the biodiversity in the Green Annamites landscape (summarized from Quang Nam PPC (2005) and Thua Thien Hue PPC (2008)):

- People living in mountainous areas, especially ethnic minorities rely on extracting natural resources (for wood burning, timber, food, monument trees, medicinal plants, scrap materials,

etc.). There has been a lack of investment for improving the livelihoods of local people in and around special use forest areas, as well as in the mountainous areas in general;

- Old customs (hunting, fishing, shifting cultivation, no birth control, etc.);
- The lack of understanding about conservation and environmental protection among local people;
- The increasing need for materials for infrastructure development (transportation, hydropower, irrigation) and market demand;
- The discrepancies in law enforcement;
- The conflicting and lack of synchronization in policies, laws, regulations, guidelines;
- The lack of the participation of local authorities and communities in natural resources management;
- There is an insufficient capacity of the management boards of the special use forest, protection forest and local authorities of all levels.

5. BIODIVERSITY CONSERVATION EFFORTS IN THE CENTRAL ANNAMITES

5.1. LANDSCAPE APPROACH

The Greater Mekong sub region (GMS) is one of the world's richest biodiversity hotspots with several irreplaceable biomes (ADB, 2011). Between 1997 and 2008, over 1,200 new species were discovered in the GMS. There have been several significant studies to identify and delineate important biodiversity conservation areas in the GMS as: centers for plant diversity by Worldwide Fund for nature (WWF, 1995) and World Conservation union (IUCN); prioritized tiger conservation units by WWF and Wildlife Conservation society (WCS) (1997); important bird area by BirdLife (2002); and ecoregion (Global 200) across the Indo-Pacific region by WWF (2001).

Central Truong Son (or Central Annamites) is situated in central Vietnam and southern Laos PDR. This is an important strategic location for the success of the conservation of Greater Annamite. Central Truong Son (CTS) is characterized as a transition zone between temperate and tropical systems and has a unique biodiversity value both within the Greater Annamites and globally (MARD, 2004).

In spite of the existence of a large number of protected areas, the landscape is still fragmented (ADB, 2011). A long-term approach to address ecosystem fragmentation by securing recognition of biodiversity landscapes is necessary. Although a lot of effort has been made to protect wildlife species, on a landscape scale, a comprehensive approach is lacking.

Central Truong Son Initiative (MARD, 2004), initialized in 2000, aimed at:

- Establishing a legal, policy and institutional framework to strengthen the management, protection and restoration of natural resources.
- Strengthening the capacity for stakeholders to protect, manage and restore the natural ecosystems.

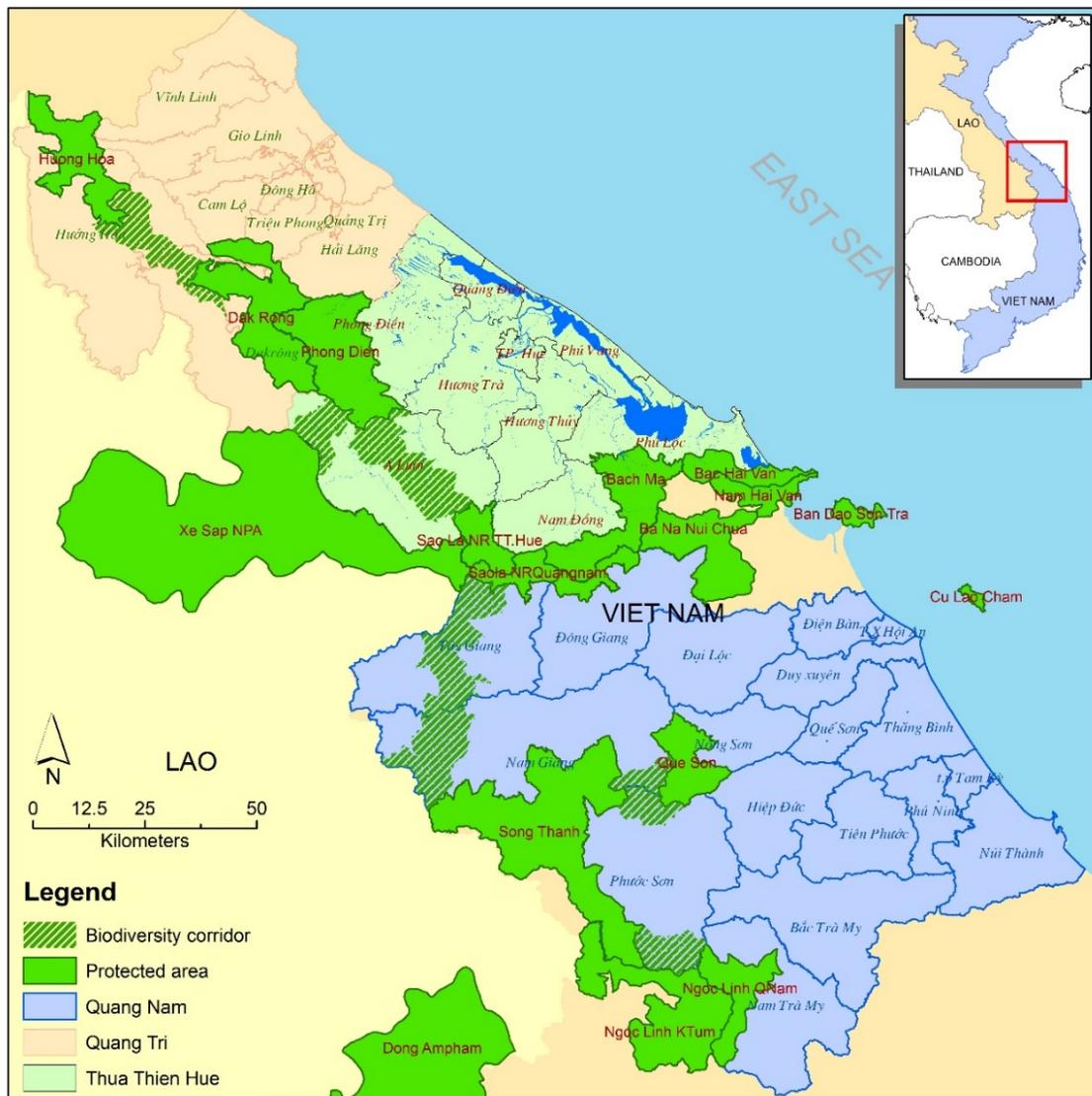
- To sustainably manage forest resources and biodiversity to improve the living standard of local people, contributing to poverty alleviation and hunger eradication, and meet the demands of socio-economic development

Although this was the ever first landscape approach to biodiversity conservation in the Central Truong Son (CTS) landscape, there has not been an assessment on the effectiveness of the initiative thus far.

5.2. BIODIVERSITY CORRIDORS

In recognition of the need for biodiversity conservation and ecosystem service protection, in July 2005, the Core Environment Program and Biodiversity Conservation Corridors Initiative (CEP-BCI) was endorsed by the GMS leaders at the second GMS Summit. BCI is the flagship component (ADB, 2011) with a long-term vision that by 2015, GMS countries would “have established priority biodiversity conservation landscapes and corridors for maintaining the quality of ecosystems, ensuring sustainable use of shared natural resources, and improving the livelihoods of people” (ADB, 2008).

Figure 1. BCI biodiversity corridor



BCC, continuing from BCI, (from 2011 until now) was designed to continue to address the high levels of habitat fragmentation caused by roads construction on the landscape. Vietnam's landscape is fragmented on the East-West economic corridor and on Ho Chi Minh Highway, cutting through the landscape in the north-south direction. Under CEP - BCI, IUCN is providing technical assistance to develop a Decree on Biodiversity Corridors. However, this has yet to be approved by the Vietnamese Government. Technically, a biodiversity conservation corridor has been proposed interlinking the protected areas in the Central Annamites regions of Quang Tri, Thua Thien Hue and Quang Nam.

The biodiversity corridor in the Central Annamites follows two axes: a north-south corridor across the eastern edge of the Annamites mountain ridge along the Lao PDR border- this corridor connects Huong Hoa and Dak Rong Nature Reserves (Quang Tri), Phong Dien Nature Reserve (Thua Thien Hue), Ngoc Linh and Song Thanh Nature Reserves (Quang Nam) to the newly established Saola Reserve in Hue and Dong Amphan (in Lao PDR); and an east-west corridor which connects protected areas in Lao PDR (Xe Sap National Protected Area) and the new Saola Nature Reserves (Thua Thien Hue and Quang Nam) with Bach Ma National Park and the Hai Van Pass forest area on the coast. The corridor in Vietnam spreads over 34 communes, with a total area of 602,521 ha, of which 60% is classified as forested (ADB, 2011).

5.3. PROVINCIAL CONSERVATION EFFORTS IN QUANG NAM AND THUA THIEN HUE

SYSTEMS OF SPECIAL USE FOREST IN QUANG NAM AND THUA THIEN HUE

In the last few years, the provinces continue to develop and reinforce their system of special use forest/protected areas. The following sections present the specific information on each nature reserve (NR) in each province.

System of Special Use Forest in Quang Nam:

- **Song Thanh NR:** this nature reserve was established by Quang Nam PPC via the Decision 3349/2000/QD-UB, dated 31/10/2000, with an area of 93,249 ha, of which 88,879 ha is forest. A feasibility study was approved by MARD, Decision 1860/BNN-KH, dated 02/06/2000. This area contains lowland forests, lowland hills and montane forests. 831 vascular plant species were identified, of which 23 are endemic to Vietnam and 49 are listed either in the IUCN Red List or in the Vietnam Red Data Book. The list of mammals identified in the area includes 53 species, four are endemic to the region: Red-shanked Douc Langur (*Pygathrix nemaeus*), Grey-shanked Douc Langur (*Pygathrix cinerea*), Giant Muntjac (*Megamuntiacus vuquangensis*) and Truong Son muntjac (*Muntiacus truongsoneensis*) (Le *et al.*, 2004).
- **Ngoc Linh NR:** This area occupies about 18,430 ha, mostly upper montane forest. Ngoc Linh NR includes the longest altitudinal gradient of undisturbed natural habitat types remaining in Vietnam (from 150 to 2598 m altitude) (Tordoff *et al.*, 2000). It has high botanical diversity, including several endemic plant species such as *Pinus dalatensis* and *Panax vietnamensis*. Its wildlife includes the Truong Son muntjac (*Muntiacus truongsoneensis*) and the endemic Golden-winged Laughing Thrush (*Garrulax ngoclinhensis*) which is restricted to this region (and on Ngoc Linh mountain on Kontum side) (Tordoff *et al.*, 2000). This area plays an important role in watershed protection for the Tranh River, maintaining the integrity of water flow for downstream irrigation and mitigating the effects of heavy rainfall that has caused devastating flooding in the province (this area of upland Tra My commune has the highest level of precipitation in the province (ICEM, 2008)).
- **Western Que Son Species and Habitat Conservation area (SHCA):** This area holds the largest territory and is the most intact area of lowland forest in Quang Nam. A small group of the highly endangered Asian Elephant (*Elephas maximus*) live in SHCA. There is very strong political will in

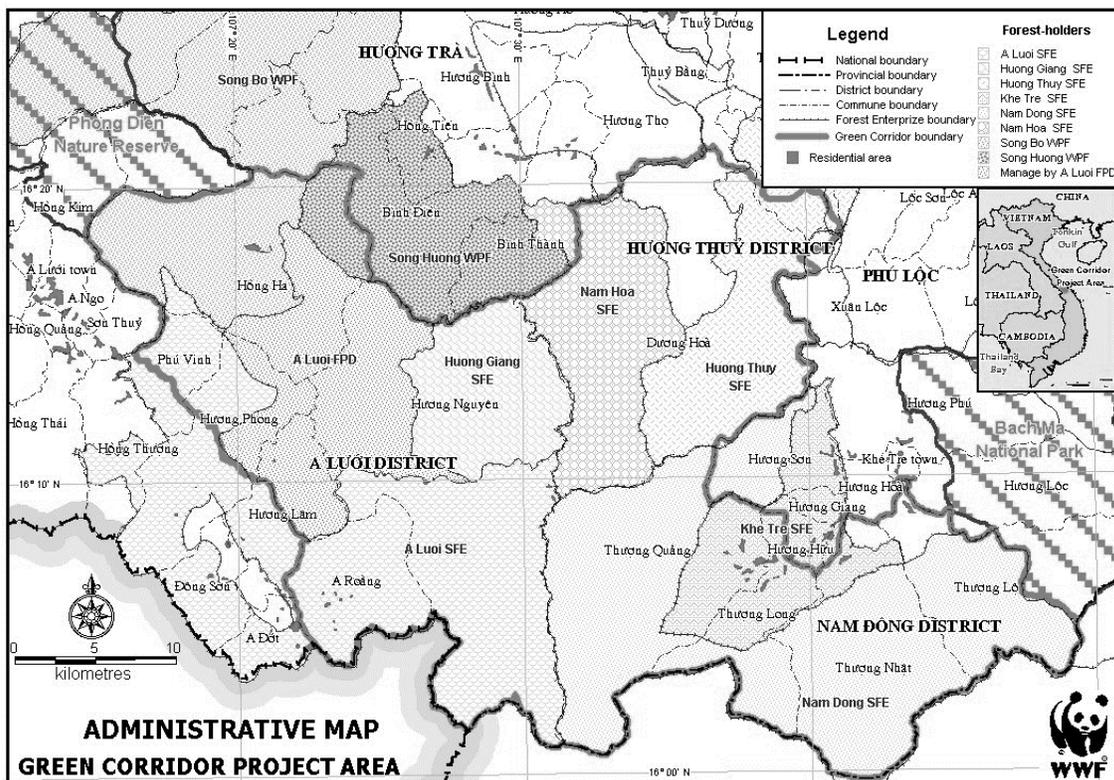
Que Son district to protect the 43,520 ha of forest west of the Thu Bon River in Que Lam, Que Phuoc and Que Ninh Communes (Que Son FPD, 2007). The establishment of the new Elephant Habitat and Species Conservation Area was approved by the PPC on the 1st of August 2007. However, PPC requested that the SHCA be revised to a smaller area and that it should be better integrated with existing development plans for the area (ICEM, 2008).

- Besides the elephants, the area contains seven other globally threatened mammals (including one of the largest remaining extant population of Grey-shanked Douc Langurs (*Pygathrix cinereus*), and at least five other vertebrate species and nine plant species listed that are of conservation concern (ICEM, 2008).
- **Tay Giang Saola SHCA:** This protected area covers the area of communes Bhalêê and Avương (Tây Giang district), communes Tà lu and Sông Kôn (Đông Giang district). The area is adjacent to the Saola SCHA of TT Hue. SHCA was planned to be established in 2010 based on the existing special use forest area (11,635.03 ha), following the 3 types of forest classification statuses as of 2007. This area was expanded to 15,800 ha in 2013. The protected area was established to protect saola populations and their habitats and other valuable genetic resources (Decision 2265/QĐUBND dated 13/7/2012, by Quang Nam PPC).

System of Special Use Forest in TT Hue:

- **Phong Dien NR:** This nature reserve was established according to decision No. 2470/ QĐUB dated 29/8/2003 by the PPC of Thua Thien Hue. The reserve is located in two districts, Phong Điền and A Lưới. The reserve faces Đa Krông nature reserve in Quang Tri province. It has an area of 41,433 ha with a buffer zone area of 43,600 ha (covering 3 communes of Phong Dien district and 6 communes of A Luoi district). The main objectives of the reserve are to protect the natural resources, biodiversity, and communities of valuable and rare, threaten, endemic species in the low mountainous areas in the Central Region. Species such as *Lophura edwardsi*, newly identified saola, large muntjac, and especially tigers and the primate population. The reserve was also designed to maintain the ecological value and headwater protection for Mỹ Chánh, Ô Lâu and Sông Bồ rivers.
- **Saola Protected Area in Thua Thien Hue:** Saola has an area of 12,153 ha, covering Huong Nguyen commune of Aluoi district and Thuong Quang commune of Nam Dong district. The protected area was established to conserve several ungulates, including saola, large muntjac and Truong Son muntjac which were newly identified and also to protect the forest ecological systems of low mountainous areas of the central region of Vietnam (Thua Thien Hue PPC, 2013).
- **WWF-Green Corridor project area in Thua Thien Hue:** Although the project area is not within the special use forest system, existing surveys (2005-2006) have shown that this area is rich in biodiversity (Thua Thien Hue PPC, 2008). The area covers the region between Bach Ma NP and Phong Dien natural reserve, an area of 134,000 ha, of 11 communes and 3 districts: A Lưới, Nam Đông and Hương Thủy of Thua Thien Hue (WWF Indochina Programme, 2003). The area includes large areas of low land forest 300 - 700 meter, west of Ho Chi Minh highway, 700 - 1200 meter from MSL. The majority of the area is 80-100m above MSL where the landscape includes many low-mountainous and hilly areas that are significantly fragmented with many small and steep streams and rivers. The Green Corridor project, implemented by WWF-Vietnam and Thua Thien Hue FPD from 2004 to 2008 was designed to protect the ecological values in the region. This is an important conservation area globally (WWF Indochina Programme, 2003). This region is impacted by illegal extraction of resources and unsustainable development (Thua Thien Hue PPC, 2008).

Figure 2. Green Corridor project area and state forest enterprise



Furthermore, Thua Thien Hue has 6 protected forest areas managed by protected forest management boards in the watersheds of Hương, Bồ, Hương Thủy, Nam Đông, A Lưới and Bắc Hải Vân (Thua Thien Hue PPC, 2008).

Trans-provincial/National Park:

Bach Ma NP: Under the management of the Ministry of Agriculture and Rural Development, Bach Ma NP was established according to Decision 214/CT dated 15/7/1991. Subsequently, according to Decision No. 01/ QĐ-TTg dated 02/01/2008 the area of Bach Ma has extended to 37,487 ha (34,830 ha belongs to Thua Thien Hue province and 3,107 ha belongs to Quang Nam province). The buffer zone of the NP is now 58,676 ha, including 11 communes, Phu Loc and Nam Dong townships and 4 communes of Dong Giang and Nam Giang districts of Quang Nam province. Some of the focal objectives of the NP is to protect natural resources, scientific values and the intermediate ecological system between North and South of Vietnam, to protect some of the endemic, rare and valuable species such as *Lophura edwardsi*, *Crested argus*, Voọc ngũ sắc, tiger, saola, large muntjac, and endemic, valuable and rare plants such as *Elaeocarpus bachmaensis* (Côm Bạch Mã), *Dacrydium elatum* (Tùng Bạch Mã), *Aquilaria crassna* (Trầm Hương), Trắc, *Dalbergia* (Cắm lai), *Hopea* (Kiền Kiền). This NP was also designed to protect the headwater for Truoi, Truồi, Tả trạch (upstream of Hương river), Cu đê, Côn, Vàng rivers.

BIODIVERSITY CONSERVATION STATUS IN QUANG NAM AND THUA THIEN HUE

In the Quang Nam Conservation Assessment by Long et al. 2005, the conservation target components are identified as in Table 3 below.

Table 3. Conservation priorities in Quang Nam

Priority species	Habitats	Flagship species	Processes
Grey-shanked douc	Lowland	Tiger	Critical watershed forest
Saola	Lowland hill	Elephant	100% of forest cover remains
Red-shanked douc	Lower montane	Hornbills	
Gibbon	Medium montane	Crested argus	A minimum of three areas of connected forest over 1,000km ² remain intact
Annam partridge	Upper montane		
Golden-winged laughing thrush	Rivers over 5km from forest edge		
Black-crowned barwing	Forest over 5km from forest edge		
Indochinese box turtle			

The Biodiversity and Natural Resource Law Enforcement Action Plan of Quang Nam 2005 - 2010 has identified 48 Forest Management Units (FMUs, a former forest management unit and later became an established protected forest area management unit) that are critical for forest habitat conservation in Quang Nam. Long et al. (2005) identified geographic patterns of species distribution and showed that four regions of the province exhibit different species compositions. Therefore, in order to conserve a representative sample of Quang Nam's biodiversity, the four priority FMUs, representing one from each biogeographic area must be responsible for protecting their assigned forest areas from forest clearance, hunting, logging and over exploitation of NTFPs (Quang Nam PPC, 2005). The other FMUs should also be managed sustainably to enable ecosystem adaptability and preserve habitat connectivity (Quang Nam PPC, 2005).

Table 4. The biogeographic regions of Quang Nam and their distribution within FMUs

Biogeographic region	Priority FMU	Other priority FMUs
Kon Tum Plateaux	Nam Tra My Main	Phuoc Son Southeast
Truong Son Lowlands	Que Son West	Phuoc Son North; Nam Giang East
South-Central Truong Son Ridge	Nam Giang Main	Phuoc Son West
Bach Ma - Hai Van Mountains	Tay Giang Main	Dong Giang North

Source: Biodiversity and Natural Resource Law Enforcement Action Plan of Quang Nam 2005 – 2010.

Nam Tra My Main, Dong Giang South, Nam Giang Main are of the FMUs highest priority for watershed protection. These are all watersheds of planned large dams so their protection is of high economic and development importance. Therefore, investment in the protection of these FMUs will be cost effective (Quang Nam PPC. 2005).

In Quang Nam, Decision 3603/QĐUBND dated, November 9, 2011, on the approval for the Biodiversity Conservation Action Plan until 2015 with an orientation toward 2020 aims to conserve, develop and sustainably use the biodiversity resources in the province; effectively manage biological resources to protect human health and safety, protect the environment and biodiversity; improve the institutional system, mechanisms, policies and legal system for the management of biodiversity and biological safety in the province; and rehabilitate typical vulnerable natural ecological systems that are degraded. The Decision identified the responsibilities of biodiversity conservation in the forest habitats which include:

- i. Planning for the conservation of biodiversity of forest habitats via updating 3 types of forest planning, implementing of sustainable forest management models; implementing afforestation projects, especially in the degraded headwater areas and vulnerable ecological systems; applying an ecological approach in biodiversity protection; and establishing biodiversity conservation corridors connecting protected areas;
- ii. Developing the in situ, ex situ conservation approaches, especially for endemic, valuable and rare wildlife and plants; conducting surveys of endangered and valuable species in the province, focusing on protected areas and establishing botanic gardens and wildlife security centers for in situ conservation purposes.

In Thua Thien Hue, the remaining primary forest are selectively extracted and fragmented significantly. The majority of the remaining forest is secondary forest, together with bush trees and bamboo areas. Additionally, some of the typical forest areas were damaged by chemicals during the war. This condition makes recovery problematic (Thua Thien Hue PPC, 2008).

In this context, from a policy/legislation perspective, the province issued the Strategy for Managing the System of Protected Areas in the province through 2010, the Strategy for Forestry Development of Thua Thien Hue through 2015; Resolution 7c² about Closing Natural Forest from Extraction and Boosting the Restoration of Bare Lands and Resolution 4e³ on the Sustainable Extraction of Natural Forest and Development of Economic Forest from 2006 through 2010.

In the Action Plan for Biodiversity Conservation through 2010 and Orientation until 2020 (Thua Thien Hue PPC, 2008), Thua Thien Hue province, through 2020, planned to: 1) rehabilitate, develop and sustainably use biodiversity and genetic resources, wildlife species and forest ecological systems of the province; effectively manage biological safeguards, contributing to the commitment of Vietnam to international treaties regarding biodiversity conservation and safety. 2) Complete the systems of institution, policy, legal framework relating to law enforcement concerning biodiversity management and biodiversity safety at the provincial level. 3) Complete the institutional systems for special use forest areas, and to rehabilitate at least 50% of the vulnerable typical natural forest habitats that have been degraded. (Thua Thien Hue PPC, 2008)

The conservation effort by these two provinces is also reflected in the collaboration of the provinces with NGOs in the implementation of a number of conservation projects, such as Biodiversity monitoring in Quang Nam and Thua Thien Hue, Vietnam (2011-2016); USFS Central Annamites Pilot Project (2016); ICRAF Central Annamites Pilot Project (2016); Greater Mekong Sub-Region Biodiversity Corridor Conservation Project (BCC, 2012-2019); Strengthening Voices for Better Choices Project (SVBC, 2005-2009), Livelihoods and Landscapes Restoration Strategy (LLS) Project (2007-2008); Biodiversity Conservation Corridors Initiative (BCI) – Development of a Biodiversity Corridors Decree (2004-2008); Avoidance of deforestation and forest degradation in the border area of southern Laos and central Vietnam for the long-term preservation of carbon sink and biodiversity (CarBi, 2011-2017); Green Corridor project: meeting global conservation targets in a productive landscape (2004-2008) and others.

Table 5 below provides a more comprehensive list of biodiversity conservation related to projects implemented in these two provinces.

² Resolution 7c/NQ-HĐND3, 1997 on the Closing Natural Forest from Extraction and Boosting up the Restoration of Bare Lands and Hills in Thua Thien Hue Province.

³ Resolution 4e/2005/NQ-HĐND on the Sustainable Natural Forest Timber Extraction, Boosting up the Forest Plantation in Thua Thien Hue Province from 2006 until 2010.

5.4. PROJECTS/ PROGRAMS RELATED TO THE GREEN ANNAMITES PROJECT

A number of programs and projects have supported biodiversity conservation and livelihood development in Quang Nam and Thua Thien Hue Provinces and the Central Annamites region. Table 5 lists past and recent projects related to the Green Annamites project.

Table 5. Programs and Projects Related to the Green Annamites Project.

Project	Duration and site	Funding	Implementers/ stakeholder involvement	Relevant Components
CLOSED PROJECTS/PROGRAMS				
The management of strategic areas for integrated conservation (MOSAIC) project	2002 -2006, Quang Nam province	WWF-US, USAID, John D. And Catherine T. MacArthur Foundation, US Fish and Wildlife Service, Ford Foundation	WWF and provincial partners including DARD, FPDs, PAs, local authorities and CBOs.	MOSAIC project worked with both provincial authorities and communities to strengthen their capacity in planning and managing natural resources for promoting biodiversity conservation and sustainable development in Quang Nam province.
Green Corridor project: meeting global conservation targets in a productive landscape	2004-2008, Thua Thien Hue province	World Bank – Global Environmental Facility	WWF and provincial partners including DARD, FPDs, PAs, local authorities and CBOs	This four-year initiative aimed to protect and maintain biodiversity-rich forests of the Green Corridor forest landscape, which were under extreme threats from illegal logging, hunting, and unsustainable development. This project's interventions focused on establishing a replicable model for protection and maintenance of high global conservation values in multiple- use forest landscapes of strategic importance for biodiversity conservation. This included the identification of conservation and forest restoration priorities through a systematic biodiversity value assessment and forest mapping.
Avoidance of deforestation and forest degradation in the border area of southern Laos and central	2011 -2016; Vietnam (Quang Nam and TT Hue)	Germany Federal Ministry for the Environment, Nature Conservation and	World Wildlife Fund (WWF) and partners in 2 province including DARD, FPDs, PAs and local authorities	The project focused on the following activities (i) Biodiversity surveys and monitoring – leeches, camera traps, listening posts; (ii) Forest Guards model (SMART application in patrolling); (iii)

Project	Duration and site	Funding	Implementers/ stakeholder involvement	Relevant Components
Vietnam for the long-term preservation of carbon sink and biodiversity (the WWF - CarBi)		Nuclear Safety (BMU) through KfW and WWF		Community-based forest management.; (iv) Pinpoint 'hotspots' of illegal logging and timber trade; (v) Build capacity and logistics of law enforcement agencies; (vi) Rehabilitation, restoration and protection of forested areas and connecting corridors in Central Annamites; (vii) Developing alternative livelihoods for ethnic minorities in buffer zones,
Sustainable Natural Resource Management Project		Japan International Cooperation Agency (JICA)	JICA and Vietnam Administration of Forestry	Forest restoration and sustainable forest management; will produce data for calculation of carbon reference levels.
Forest Carbon Partnership Facility (FCPF)		World Bank	MARD	Emissions Reduction Program: Sustainable Management of Forests Through Low Emissions Development Planning for Green Growth in The North Central Agro-Ecological Region
Biodiversity Conservation Corridors Initiative (BCI) – Development of a Biodiversity Corridors Decree	2004 – 2008 Quang Tri, Quang Nam and Thua Thien Hue province	Asia Development Bank	MONRE, DONRE relevant provinces	The project aims to support the implementation of the Biodiversity Law. Under CEP - BCI, IUCN is providing technical assistance to develop a Decree on Biodiversity Corridors
Livelihoods and Landscapes Restoration Strategy (LLS) Project	August 2007 - December 2008, Quang Nam and Lam Dong Provinces	Asia Development Bank	MARD and DARD in Quang Nam and Lam Dong Province	Achieve the implementation of national and local policies and program in order to create real and meaningful change in the lives of rural poor.
Strengthening Voices for Better Choices Project (SVBC)	Feb 2005 - Jun 2009 Yen Bai, Ha Tinh, Quang Tri, Thua Thien Hue, Quang Nam, Lam Dong, Dong Nai Binh Phuoc Provinces	The European Commission	MARD and DARD in relevant provinces	Promote forest governance arrangements in accordance with FLEGT

Project	Duration and site	Funding	Implementers/ stakeholder involvement	Relevant Components
ON GOING PROJECTS/PROGRAMS				
Greater Mekong Sub-Region Biodiversity Corridor Conservation Project (BCC)	2012 -2019, Quang Tri, Quang Nam and TT Hue province	Asian Development Bank (ADB) loan to GVN	MONRE, DONRE in relevant provinces including FPDs, PAs and local authorities	Development of corridors to link nature reserves in Central Annamites
ICRAF Central Annamites Pilot Project (2016)	July 2016 – July 2017; Quang Nam and TT Hue province	USAID contract	World Agroforestry Institute (ICRAF)	Agroforestry, hydrologic modeling, carbon stock assessments
USFS Central Annamites Pilot Project (2016)	July 2016 – July 2017; Quang Nam and TT Hue province	US Forest Service-USAID cooperative agreement	US Forest Service International Program	Restoration and forest management capacity building in Quang Nam and Thua Thien Hue
Biodiversity monitoring in Quang Nam and Thua Thien Hue, Vietnam	2016- 2021; Quang Nam and TT Hue province	USAID through MSI	WWF and PAs in 2 provinces (Saola NR in Quang Nam and Hue, Song Thanh and Phong Dien NR)	This on-going project gathers baseline and monitoring biodiversity data from five protected areas in Quang Nam and Thua Thien Hue provinces. Variations in data over time will provide information on the effect of poaching and logging pressures on populations of wild mammals and birds; give a general indication of forest ecosystem health; and assess longer term conservation impact of the on-going enforcement activities.

6. LESSONS LEARNED AND WAY FORWARD

6.1. LESSONS LEARNED

Through reviewing a number of recent projects in the Central Annamites regions, a number of lessons learned can be drawn for future interventions by the Green Annamites Project:

- i. Monitoring of illegal activities including threats and drivers has not been significant. A more comprehensive and integrated law-enforcement program is needed to halt illegal activities in buffer-zone of PAs and corridors.
- ii. Law-enforcement activities has to include training for all stakeholders and awareness raising activities should be not be confined to key players.
- iii. Traditional uses, depending on the natural resource leading demand and huge market for bush meat in Vietnam is the main reason for poaching and has to be curbed across areas including bordering countries.
- iv. Informative and valuable data generated by camera traps and DNA samples ⁴ in the Saola Nature Reserve in Quang Nam and Thua Thien Hue (by WWF) are not sufficient for conclusions on an upward trend (or downward trend) evidence of sampled species.
- v. A comprehensive and practical M&E system where all results, data, reports and events are recorded can increase the scientific value of these findings.
- vi. SMART⁵ is a suitable instrument to monitor and plan law enforcement interventions, promote accountability, and track poaching activities in all areas, especially for PAs.
- vii. Biodiversity conservation measures must be combined with livelihood support to enhance income for forest-dependent communes in and around PAs
- viii. Biodiversity Conservation Agreements between PAs, communities and local authorities are an important instrument to secure the source of livelihood through their own protection efforts.

6.2. THE WAY FORWARD

The sustainability of interventions must always be considered as an essential element of all project activities. The followings are some prioritized interventions for biodiversity conservation for the Green Annamites project:

- (i) Strengthening Capacity for Biodiversity Conservation

⁴ Biodiversity monitoring program under the WWF - CarBi project from 2012-2016 (Table 5.)

⁵ SMART is an information system designed to support enforcement activities. The system was introduced into application at Saola conservation areas in Thua Thien Hue and Quang Nam provinces under the WWF - CarBi project from 2012-2016 (Table 5).

- Improve the capacity of biodiversity conservation for provincial institutions, management boards of the special use forests (PAs), watershed forests (Forest Protection Management Boards) law enforcement, and implement the related mechanisms, policies; and conduct trainings for officials, purchase sufficient equipment, and supplies.
 - Support the adoption of tools such as SMART, METT⁶ and adaptive management systems for PAs/National Park and FPDs/rangers.
 - Conduct field and other tactical/operational and technical training for rangers and PAs staff (biodiversity monitoring, species identification, patrol skills, outreach skills, etc.,).
- (ii) Increase awareness and reduce threats
- Improve the awareness of local people about conservation, environmental protection and encourage local people to abandon old customs that impact conservation negatively;
 - Local communities have to participate in conservation management activities, especially in special use forest areas;
 - For law enforcement, it is crucial to actively involve rangers, the police and army forces, particularly at the commune level.
 - An integrated commune-level law-enforcement strategy will have to be developed.
 - The market for bush meat needs more attention from law-enforcement and must be curbed.
 - Legal credibility should be an integrated part of forest protection enforcement by local villagers who are involved in forest protection.
- (iii) Enhance Management of PAs/National Park and Biodiversity Corridors
- Conduct supplementary inventory surveys to document the biodiversity for the whole province and successfully implement the GIS projects. These are the basics for the implementation of a biodiversity monitoring program, especially in special use forest areas;
 - Update and develop conservation planning as well as management plans for PAs/National Park and BD corridors;
 - Conduct the establishment, extension, and identification of boundaries (demarcation) for special use forest areas, headwater forest areas, transfer this information onto maps (including functional zoning schemes, residential area boundaries), and start conservation efforts in biodiversity corridors and landscape ecological areas;
 - Biological field monitoring and protocols (camera trapping, leeches and Gibbon indicators etc.) should also be implemented to support PAs/National Park and corridors.

⁶ METT is a management effectiveness tracker tool. This tool could be used for the assessment of protected area management effectiveness on an annual or semi-annual basis to monitor the improvement of the management capacity of a protected area. The tool was also used to extensively to measure the management effectiveness improvement by CarBi project for many protected areas in the Central Annamite landscape.

- Application of satellite image analysis in monitoring forest destruction should be extended to natural forests in the buffer zone areas, PAs and biodiversity corridors
 - Support development of PA Management Plans and conservation Planning for provinces.
 - Consider the mobilization of corporate support for conservation in PAs/National Park providing financial mechanisms for conservation of PAs.
 - Improve international cooperation in biodiversity conservation.
- (iv) Improve livelihood for communities around PAs and corridors
- Develop socio-economic condition, improve livelihood for local people in the mountainous areas of this project. The foremost conclusion is that the benefits from conservation activities must be shared with the local communities;
 - Promote research and training to establish climate smart and biodiversity-friendly livelihoods for communities.
 - Take into consideration gender equity in all conservation or community-based conservation activities and conservation planning.

7. REFERENCES

- ADB, 2008. Biodiversity Conservation Corridors Initiative BCI Pilot Site Implementation Status Report 2007
- ADB, 2011. Biodiversity Conservation Corridor Initiative (BCI) Report 2006 – 2011.
- Anderson, K.F. and Long, B. 2005. An assessment of, and lessons learnt from, two pilot community based natural resource management mechanisms in the Truong Son Mountains, Vietnam. WWF Indochina and Danida, Hanoi, Vietnam.
- Anonymous. 1993. Guidelines on the development of socio-economic conditions around Phu Ninh Lake, Tam Ky, Quang Nam – Da Nang. Unpublished report. Institute for Ecology and Biological Resources, Hanoi, Vietnam [in Vietnamese]
- Anonymous. 2002. Quang Nam Statistical Yearbook 2002. Quang Nam Statistical Publishing House. Hanoi, Vietnam.
- BirdLife and FIPI. 2005. Sourcebook of existing and proposed protected areas in Vietnam: second edition. BirdLife Indochina Programme, Hanoi, Vietnam.
- Compton, J. and Le Hai Quang. 1998. Borderline - an assessment of wildlife trade in Vietnam. WWF Indochina Programme, Hanoi, Vietnam
- Cuong Pham, 2015. Biodiversity Status and Prioritized Issues in Biodiversity Management in Vietnam.
- Davis, S.D., V.H. Heywood. A.C. Hamilton. eds. 1995. Centres of plant diversity: a Guide and strategy for their Conservation. Volume 2: Asia, Australasia and the Pacific. Cambridge, U.K.: IUCN.
- Dinerstein, E., E. Wikramanayake, J. Robinson, U. Karanth, A. Rabinowitz, D. Olsen, T. Mathew, P. Hedao and M. Conner. 1997. Part I: a Framework for identifying High-priority areas for Conservation of Free-ranging tigers (*panthera tigris*), in: a Framework for identifying High-priority areas and actions for the Conservation of tigers in the Wild. WWF/WCS report submitted to the national Fish and Wildlife Foundation.
- Dirzo R. and Garcia M.C. 1992. Rates of deforestation in Los Tuxtlas, a Neotropical area in southeast Mexico. *Conservation Biology* 6: 84-90.
- Donovan, D.G. (Ed). 1998. Policy issues of transboundary trade in forest products in Northern Vietnam, Laos PDR, and Yunnan PRC. Volume II: The country reports. Program on Environment. East-West Centre, Honolulu, Hawaii
- FIPI. 2003. Brief report on the project of planning three forest categories and use of bare lands in Quang Nam province Unpublished report to a provincial meeting in August 2003. [In Vietnamese].
- François Gagnepain, *Bulletin de la Société Botanique de France* 93(7–8): 231–232. 1947
- François Gagnepain, *Notul. Syst. (Paris)* 11: 1 1943
- ICEM, 2003. Vietnam national report on protected areas and development. review of protected areas and development in the lower Mekong river region. Indooroopilly, Queensland, Australia.
- ICEM, 2008, Strategic Environmental Assessment of the Quang Nam Province Hydropower Plan for the Vu Gia-Thu Bon River Basin, Prepared for the ADB, MONRE, MOITT & EVN, Hanoi, Viet Nam.

Law Enforcement Action Plan 2005 - 2010. Quang Nam Forest Protection Department and WWF Vietnam. Tam Ky, Quang Nam, Vietnam

Law No. 20/2008/QH12 on Biodiversity.

Law No. 29/2004/QH11 on Forest Protection and Development.

Linkie, M., Smith, R.J. and Leader-Williams, N. 2004. Mapping and predicting deforestation patterns in the lowlands of Sumatra. *Biodiversity and Conservation* 13: 1809-1818.

Long, Barney, 2005. Identification of Priority Areas for Integrated Conservation Management in Quang Nam Province, Vietnam. Thesis submitted for the degree of Doctor of Philosophy in Biodiversity Management Durrell Institute of Conservation and Ecology, University of Kent.

Long, B, Minh Hoang and Thai Truyen. 2005. A Conservation Assessment of Quang Nam Province, Central Vietnam. WWF Indochina and Quang Nam Forest Protection Department, Tam Ky, Vietnam.

Long, B. and Minh Hoang. 2005. A conservation assessment of Western Que Son district with a feasibility for the establishment of a landscape conservation area for elephants in Quang Nam. WWF Vietnam. Tam Ky, Vietnam.

MacKinnon, J. 1997. Protected areas systems review of the Indo-Malayan Realm. Asian Bureau for Conservation and World Conservation Monitoring Centre, Canterbury, UK.

MacKinnon, J. and MacKinnon, K. 1986. Review of the protected areas system of the Indo-Malayan Realm, IUCN, Gland, Switzerland.

MARD, 2004. The Central Truong Son Biodiversity Conservation Initiative.

McCormack, T. and Nguyen Le Ai Vinh. 2004. The search for the Vietnamese pond turtle (*Mauremys annamensis*) in Que Son district of Quang Nam province, central Vietnam. Unpublished report. Asian Turtle Conservation Network. Hanoi, Vietnam.

Ministry of Forestry, 1993. Renovation of Strategies for Forestry Development until the Year 2000

MOF, 1991. Vietnam Forest Sector Review, Tropical Forest Action Programme, Hanoi.

Murphy, D. 2004. The status and conservation of Javan rhinoceros, Siamese crocodile, Phasianidae and gaur in Cat Tien national park, Vietnam: 2004. Technical Report No.50. Cat Tien Conservation Project, WWF Vietnam, Hanoi, Vietnam.

Nguyen Manh Ha, Bui Xuan Truong, 2011. Review of and proposed improvements to the information system for PA management and biodiversity conservation

Novaro, A.J., Redford, K.H. and Bodmer, R.E. 2000. Effects of hunting in source-sink systems in the Neotropics. *Conservation Biology* 14(3): 713-721.

O'Reilly, S.M.G. and Swan, S.R. 2004. Report of the strategic review of the 'pilot community patrol group' in Mu Cang Chai Species habitat conservation area. Fauna & Flora International, Hanoi, Vietnam.

Quang Nam People's Committee. 2005. Quang Nam Biodiversity and Natural Resource Law Enforcement Action Plan 2005 - 2010. Quang Nam Forest Protection Department and WWF Vietnam. Tam Ky, Quang Nam, Vietnam.

Quangnam Provincial People Committee, 2014. Report No. 194/BC-UBND on the socio-economic status of 2014 and objectives for 2015.

Quangnam statistical office, 2015. Quangnam statistical year book. Statistical Publishing House

Robertson, S., Huyen Van Thuong, Nguyen Ngoc Nguyen, Ho Loi, Le Hoang Son, Nguyen Quyen, Vu Ngoc Anh, Le Van Di, Hoang Xuan Thuy, Vu Ngoc Thanh and Long, B. 2004. The illegal wildlife trade in Quang Nam province; covert investigations by specially trained forest rangers. Unpublished report. WWF Indochina and Quang Nam Forest Protection Department, Tam Ky, Vietnam.

Sage, N. and Nguyen Cu. 2001. Analysis of constraints and enabling factors of ICDPs in Vietnam. CARE, SNV and WWF, Hanoi, Vietnam.

Technical report No. 7/2007. Biodiversity Assessment for the Green Corridor Landscape of Thua Thien Hue. Green Corridor Project

Thua Thien Hue People's Committee, 2008. Action Plan for Forest Biodiversity Conservation in Thua Thien Hue until 2010 and orientation until 2020

Thua Thien Hue Provincial People's Committee, 2013. Decision No 2020/QĐ-UBND on the Establishment of Saola Conservation Area.

Tordoff, A., R. Timmins, R. Smith, and Mai Ky Vinh. 2003. A Biological Assessment of the Central Truong Son Landscape. Central Truong Son Initiative Report No. 1. WWF Indochina, Hanoi, Vietnam.

Tordoff, a.W. ed. 2002. Directory of Important Bird Areas in Vietnam: Key Sites for Conservation. Hanoi: Birdlife international in indochina and the institute of ecology and Biological resources

Tordoff, A.W., Timmins, R.J., Smith R.J. and Mai Ky Vinh. 2003. A biological assessment of the central Truong Son landscape. Central Truong Son Initiative Report No. 1. WWF Indochina, Hanoi, Vietnam.

Tran Quoc Bao. 2001. The wildlife trade and economy. Nature Conservation Unit (National Forest Protection Department) and Vietnam CITES office, Hanoi, Vietnam.

TTH PPC, 2008. Action Plan for Biodiversity Conservation of Thua Thien Hue Province until 2010, Orientation until 2020

Wedge, D.C., Long, A.J., Mai Ky Vinh, Vu Van Dung and Eames, J.C. 1999. Expanding the protected areas network in Vietnam for the 21st century: an analysis of the current system with recommendations for equitable expansion. BirdLife International Vietnam Programme, Hanoi, Vietnam.

Wikramanayake, e.d., E. Dinerstein, C. Loucks, D. Olsen, J. Morrison, J. Lamoreux, M. McKnight, and P. Hedao. 2001. Terrestrial Ecoregions of the Info-Pacific: A Conservation Assessment. Island Press: Washington, D.C

WWF Indochina Programme, 2003. The Green Corridor Project, Meeting Global Conservation Target in a Productive Landscape

USAID Vietnam
15/F, Tung Shing Building, 2 Ngo Quyen
Hanoi
Vietnam
Phone +84 (4) 3935-1260
Fax +84 (4) 3935-1265
Email: USAIDVietnam@usaid.gov