

TABLE 15: Review of Wetlands Sites in Vietnam

Name	Province	Type	Area(ha)	Location	Special features	Reserve	Threat	Bio	Survey	Recommendations
Ba Be Lake	Cao Bang	FL	450	22°45'N, 105°37'E	Only large montane lake in N Vietnam	NP	P	A	L	Strengthen protection of N.R.
Cam Son Reservoir	Ha Bac	R	2,620	21°32'N, 106°34'E	Local fish and some wintering birds	NR	PH	C	L	Maintain as nature reserve
Nui Coc Reservoir	Thai Nguyen	R	2,580	21°35'N, 105°42'E	10 spp of fish and wintering birds	NR	PH	C	M	Extend to include catchment forest
Thac Ba Reservoir	Yen Bai	R	23,400	21°42'-22°05'N, 104°45'-105°03'E	Waterfowl in winter	NR	PH	B	M	Reforest islets and surrounding hills
Chu Lake	Vinh Phu	FL	300	21°36'N, 104°54'E	Freshwater vegetation and waterfowl	-	RH	B	H	Survey to assess protection needs
Hoa Binh Reservoir	Hoa Binh, Son La	R	72,800	20°48'-21°45'N, 104°05'-105°15'E	Long deep lake in valley, fish	-	PC	B	H	Survey to assess protection needs
Chinh Cong	Vinh Phu	FL	400	21°31'N, 105°05'E	Fish, waterfowl and freshwater vegetation	-	RH	B	H	Should be given local protection
Tam Dao Ponds	Vinh Phu	FL	2	22°25'N, 105°35'E	Several small ponds with endemic newt	NP	D	C	L	Apply better protection to ponds
Vac Swamp	Vinh Phu	FS	250	21°18'N, 105°36'E	Swamp vegetation	-	R	C	H	Give local protection
Suoi Hai Lake	Ha Tay	R	700	21°10'N, 105°25'E	Reservoir lotus beds	-	DH	C	H	Survey for assessment
Dong Mo Lake	Ha Tay	R	700	21°03'N, 105°50'E	Reservoir with birds	-	DH	C	H	Survey for assessment
West Lake	Hanoi	FL	413	21°03'N, 105°50'E	Reservoir fish and migrant waterfowl	-	R D H P	A	L	Clean up pollution, ban reclamation
Quang Ha Sands	Quang Ninh	S	4,000	21°20'N, 107°52'E	Coastal sandflats	-	DH	C	M	Survey to assess needs

Name	Province	Type	Area (tha)	Location	Special features	Reserve	Threat	Bio	Survey	Recommendations
Cai Bau Mangroves	Quang Ninh	M	500	21°10'N, 107°25'E	Best example of northern mangroves	-	CH	B	M	Protect as example of provincial reserve
Yen Lap Lake	Quang Ninh	R	600	21°05'N, 106°50'E	Brackish reservoir	-	H	C	H	Survey & ban hunting
Haiphong/Cat Ba	Haiphong	M	2,300	20°50'N, 106°52'E	Mangroves and mudflats	-	HC	C	L	Try to protect example
Cat Ba Lake	Haiphong	FL	2	20°45'N, 107°00'E	Small lake and fauna	NP	D	C	L	Protect fragile site
Xuan Thuy Delta	Ha Nam Ninh	SM	4,000	20°10'N, 106°35'E	Mangrove, mudflats, wintering birds	PR	HC	A	L	Protect fragile site
Cua Day Flats	Ha Nam Ninh	S	1,000	19°55'N, 106°05'E	Coastal mud and sand	-	H	A	L	Combine into RAM-SAR site
Hoa Lu Swamp	Ninh Binh	FS	1,000	20°18'N, 105°55'E	Swamp vegetation in limestone area	-	FD	B	H	Should be given local protection
Bai Thuang Swamp	Thanh Hoa	FS	200	19°59'N, 105°28'E	Freshwater swamp vegetation	-	R	C	H	Survey to assess protection needs
Song Muc Lake (Ben En)	Thanh Hoa	R	700	19°42'N, 105°33'E	Original lake enlarged as reservoir	NP	FP	B	M	Control destructive fishing methods
Yen My Reservoir	Thanh Hoa	R	300	19°30'N, 105°41'E	Reservoir with fish and birds	-	D	C	H	Survey to assess protection needs
Ke Go Reservoir	Nghe An	R	2,500	18°13'N, 105°55'E	Fish and waterfowl (White-winged Duck)	-	H	B	L	Include reservoir in nature reserve
Pha Tam Giang Lagoon	Thua Thien-Hue	L	8,000	16°35'N, 107°30'E	Large coastal lagoon fish and migrant birds	-	HF	B	H	Manage with Dam Cau Hai
Dam Cau Hai Lagoon	Thua Thien-Hue	L	12,000	16°20'N, 107°50'E	Largest coastal lagoon fish and migrant birds	-	HF	B	H	Protect part as reserve and apply no-hunting
Son Tra	Quang Nam-Danang	Ro	200	16°05'N, 106°15'E	Reserve has marine sector with rocky coast	NR	DH	C	M	Stricter protection of coastline needed
Cu Lao Cham	QN-Danang	Ro	50	15°57'N, 106°30'E	Rocky shoreline	NR	H	C	L	Ban hunting
Phu Ninh Lake	QN-Danang	R	1,000	15°26'N, 108°30'E	Reservoir and water-fowl	-	H	C	M	Assess protection needs

Name	Province	Type	Area(ha)	Location	Special features	Reserve	Threat	Bio	Survey	Recommendations
Dam Tra O	Binh Dinh	L	2,000	14°20'N, 109°07'E	Brackish lagoon, birds	-	H F	C	M	Assess protection needs
Vinh Nuoc Ngoi	Binh Dinh	L	2,000	14°10'N, 109°10'E	Brackish lagoon, birds	-	H F	C	M	Assess protection needs
Ya Li Reservoir	Kon Tum	R	1,000	13°59'N, 107°35'E	Reservoir in Mekong drainage	-	H F	C	M	Survey to assess importance
Bien Lake	Gia Lai	VL	600	14°03'N, 108°01'E	Volcanic lake, 3 endemic spp of fish	-	F	A	M	Should be nature reserve
Nui Mot Reservoir	Binh Dinh	R	1,500	13°45'N, 10°59'E	Smaller Reservoir	-	F	C	M	Survey to assess importance
Quy Nhon Lagoon	Binh Dinh	L	5,000	13°52'N, 109°15'E	Brackish water tidal lagoon fish, bird	-	F H	B	H	Survey to assess protection needs
Cu Mong Lagoon	Phu Yen	L	3,000	13°34'N, 109°15'E	Brackish water fowl lagoon	-	F	?	H	Survey to assess protection needs
Xuan Dai Lagoon	Phu Yen	L	2,000	13°35'N, 109°15'E	Saltwater lagoon	-	H	C	M	Assess importance for protection
O Loan Lagoon	Phu Yen	L	1,500	13°17'N, 109°17'E	Small lagoon, migrating waterfowl	-	H	B	H	Survey to assess importance
Ba River Estuary	Phu Yen	E	1,000	13°05'N, 100°20'E	Most important estuary on eastern seaboard	-	H F P	B	M	Establish small provincial reservoir
Tay Son	Phu Yen	FL	80	13°03'N, 108°41'E	Oxbow lake with crocodile and waterfowl	Pr	F	C	H	Improve reserve management
Buon Me Thuot	Dac Lac	FL	100	12°40'N, 108°01'E	Small lake with crocodile and waterfowl	NR	H	E C	M	Make no hunting area on small lake
Ninh Hoa	Ninh Thuan	S	1,000	11°37'N, 101°02'E	Salt pans + lagoon used by waders	-	H	C	M	Seasonal ban on hunting
Lah Lake	Dac Lac	FL	500	12°25'N, 108°11'E	Scenic lake with fish, birds and crocodiles	NR	F	A	M	Redesign Reserve to South 1/3 of lake

Name	Province	Type	Area(ha)	Location	Special features	Reserve	Threat	Bio	Survey	Recommendations
Nam Ka	Dac Lac	FL	1,000	12°20'N, 107°58'E	Lakes and swamps with valuable fauna and flora	-	FH	A	H	Add these lakes to save management unit
Dan Kia Lake	Lam Dong	R	200	12°00'N, 108°22'E	Scenic lake in pine forest	-	D	C	L	Preserve as scenic area
Don Duong Lake	Lam Dong	R	1,000	11°50'N, 108°35'E	Scenic lake in pine forest	-	D	C	L	Preserve as scenic area
Cam Ranh Bay	Khanh Hoa	L	3,000	11°50'N, 109°10'E	Extensive brackish lagoon, waterfowl	-	H	C	H	Make no hunting area on small lake
Dam Ninh Bay	Ninh Thuan	L	2,000	11°30'N, 109°02'E	Small brackish lagoon, salt flats, waterfowl	-	H	C	M	Seasonal no hunting area on lagoon
Cat Tien	Dong Nai	FS	2,500	11°30'N, 107°20'E	Fresh water swamps and lakes, white wing duck and waterfowl	NP	H	A	M	Routine monitoring
Dau Tieng Reservoir	Tay Ninh	R	5,000	11°15'-11°32'N, 106°10'E-106°30'E	Large reservoir close to Cambodian wetland	-	H F	C	H	Survey to assess importance for waterfowl
Bien Lac Swamp	Binh Thuan	FS	2,000	11°10'N, 107°40'E	Lake and seasonal swamp forest	NR	C B	B	L	Improve protection of reserve
Mui Ne/Mui Gia	Binh Thuan	S	1,000	11°00'N, 108°25'E	Sandy shore line/waders	-	H D	B	M	Seasonal no hunting area
Phan Thiet	Binh Thuan	Sa		11°00'N, 108°25'E	Sandy shore line/waders	-	H	C	M	Seasonal no hunting area
Tri An	Dong Nai	R	10,000	11°10'N, 107°10'E	Large reservoir, fish, some waterfowl	-	P F	B	L	Control fishing levels
Duyen Hai	Ho Chi Minh	M	2,000	10°20'N, 106°55'E	Dong Nai Estuary and mangroves	-	S C	B	H	Create reserve on seaward edge
Tram Chim	Dong Thap	FS	300,000	10°35'-11°00'N, 105°20'-106°00'E	Peaty Swamp, Plain of Reeds, rare birds	Pr	D R	A	L	Limit replanting, avoid draining, ban hunting maintain protection
Mekong Estuary	Ben Tre + Tra Vinh	E	20,000	9°25'-10°30'N, 106°25'-106°30'E	Nipa palm estuary water birds	-	H C	B	M	Seasonal no hunting area

Name	Province	Type	Area (ha)	Location	Special features	Reserve	Threat	Bio	Survey	Recommendations
U Minh	Minh Hai	PS	4,000	9°15'N, 104°55'E	Peaty swamp best malaleuca in Vietnam	Pr	B	A	L	Maintain fire protection rigorously
Bird Sanctuary	Minh Hai	F	180	11°15'-11°32'N, 106°10'-106°30'E	Waterfowl colony in Phoenix mangrove	NR	D H	B	H	Routine maintenance & protection
Ca Mau	Minh Hai	M	4,000	8°35'N, 104°41'E	Best Mangrove in Viet Nam	NR	C	A	H	Find new location for representative reserve
Con Dao	Ba Ria/Vung Tau	RS	100	8°40'N, 106°38'E	Sea bird breeding colonies	NP	D	B	H	Routine maintenance & protection

Bio = Biodiversity rating

A = very important

B = important

C = minor value

Reserve: NP = National Park

NR = Nature Reserve

Prov = Provincial Reserve

Threat: P = pollution or poisoning of fish

H = hunting

R = land reclamation

C = cutting

D = disturbance of wildlife

S = shrimp ponds

F = overfishing

Survey: H = high

M = medium

L = low

Type:

FL = freshwater lake

FS = freshwater swamp

R = reservoir

M = mangroves

L = lagoon

Ro = rocky coast

VL = volcanic lake

Sa = salt pans

The protection and wise use of wetlands will be part of a wetland conservation programme (section 3.5).

Marine Protected Areas

The only protected areas in the seas off Vietnam are 12 fisheries control zones with defined permissible fisheries landings and Cat Ba National Park, which covers 5400 ha (36%) of coastline.

Since 1992, three coral reefs; Hon Mun (Khanh Hoa), Cat Ba (Haiphong) and Hon Cau (Binh Thuan) have been surveyed in detail, producing detailed accounts on the biodiversity, resource utilisation and conservation potential of these sites. Several other sites have also been studied and four more are to be surveyed before the end of 1994 (*Figure 39* on the next page).

A questionnaire aimed at ranking the values, threats and conservation potential of 12 coral reef sites was distributed to local marine scientists and the results are illustrated in *Figure 39*.

While biodiversity, ecological and economic values form the basis for the ranking of site importance, the level or severity of threats determines the urgency of protective actions. Except for Hon Mun and Hon Cau, which have been proposed for gazettment into a marine park and marine reserve respectively, all other potential sites such as Bach Long Vi, Con Dao, Phu Quy and the Spratly archipelagos require investigations for assessment and project development (project M18).

Pristine coral reefs with little human pressure may be set aside as strict reserves, sites already utilised may be gazetted as fisheries' regulated zones or multiple-use areas managed in ways that minimise conflicts while allowing effective conservation. The incorporation of local people in protected area management (guard force) and activities (mariculture, tourism) has been identified as a key to success.

One of the issues which will need to be resolved is which Government agency will be responsible for the management of marine protected areas, and this is part of an Integrated Coastal Zone Management Plan.

Finally it will be necessary to develop a comprehensive training programme for scientists and planners on marine conservation issues (M32).

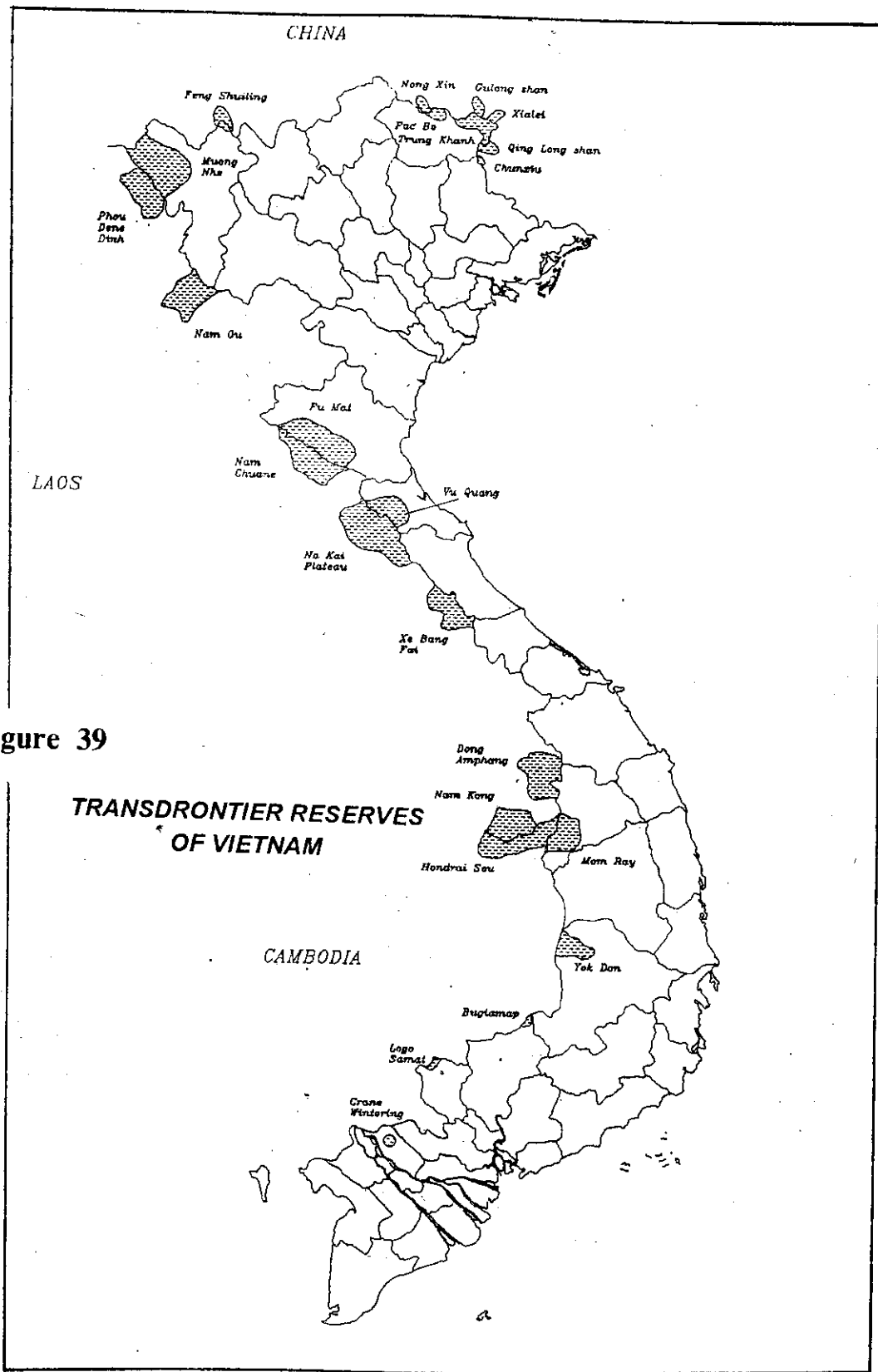


Figure 39

**TRANSDRONTIER RESERVES
OF VIETNAM**

3.3 Strengthening the Management of Protected Areas

New Management Approaches

Increased staff training This is largely being tackled within the context of an ongoing GEF project. BAP is proposing complementary activities under project M26 and M27.

Improved management plans Many of the existing reserves still lack management plans, others are out of date or lacking in detail and clarity. Model management plans will be developed for key reserves and then other reserves will be required to prepare realistic plans before funding is provided beyond basic protection. This is covered in projects M1 to M20.

Increased involvement of local people in reserve management, staffing, forest protection and development and use of community buffer zones. This approach is critical to the success of nature reserves in areas of high population.

Integrating Conservation and Development: the Need for Integrated Approaches

Buffer zones are areas adjacent to protected areas, on which land-use is partially restricted. Community buffer zones should not conflict with the objective of the protected area.

There are two main functions of community buffer zones:

1. They can extend the area of preserved or protected natural habitat into a larger management area. This permits animals and plants to survive outside the reserve; for example in selectively logged forests and hunting areas. This is known as extension buffering.
2. They provide products of value to local people, and allow harvesting and use of these resources. This is the socio-buffer function.

In both cases an important objective of community buffer zones should be to manage human activities that affect the nearby reserve. For buffer zones to be effective, it is vital that the interests and aspirations of communities dependent on these areas and the agencies responsible for the administration, management and development of these areas, are considered and consulted at all stages of buffer zone development. This requires a high level of inter-sectoral planning and co-operation.

When the boundaries of protected areas are delineated on maps in management plans in Vietnam, buffer zones are routinely added. Little consideration is given to land-use inside the proposed buffer zone and consultation among local communities and administration is often non-existent. That is why protected areas in Vietnam do not have functional buffer zones.

Because of human pressure on the remaining natural environment, most protected areas in Vietnam already support people, making the protected areas themselves buffer zones and the core reserve areas are tiny and in some instances do not exist.

MacKinnon (1986) outlined the restrictions required when planning buffer zones. These are rarely adhered to in Vietnam for various reasons including lack of consultation, lack of understanding of the need of buffer zones and poor implementation of the law and lack of resources. For example, a new economic zone has been established adjacent to Bach Ma National Park and thousands of settlers are now living in the buffer zone. This has also happened at Cat Tien National Park along the park's southern boundary and the opportunity to create an extension buffer zone in the Lag Na Forest Enterprise has been lost.

The approach to setting up buffer zones in Vietnam must be reconsidered, and it is recommended that new approaches, included modified landscape ecology, be followed in the future:

- Select the best leading agency for planning and implementation. There are many types of buffer zones depending on the context of the protected area. In some cases agriculture may be more important than forestry. So for each particular case, the most important agency must lead the buffer zone development with help of other agencies. MOSTE should decide on the lead agency.
- Procedures and mechanisms are established to ensure that at every stage of buffer zone planning, district and provincial governments are consulted and involved.
- Procedures and mechanisms are established to help consultation and co-operation with the Ministry of Finance and ministries and agencies responsible for resettlement, agriculture, hydrology, mining and other industries. This will guarantee full inter-sectoral planning.
- The wishes and aspirations of local communities living on lands in or adjacent to proposed protected areas and buffer zones are incorporated in the management plans.

- NGOs operating in Vietnam are invited and directed to focus their programmes, whenever possible, to assist with buffer zone development.

Because the concept of buffer zones is still relatively new, and as there are no tested management guidelines for buffer zones, project M23 will help develop and test new approaches in the management of buffer zones around protected areas. Projects M27 and M22 deal with the establishment of buffer zones around Cuc Phuong National Park and Yok Don National Park.

3.4 Marine and Coastal Conservation Programme

Although the need for marine and coastal conservation has been identified repeatedly with several national documents such as the Vietnam National Conservation Strategy (1985), Report on the Review of the Nature Conservation System, National Parks and Protected Areas (1990) and the National Plan for Environment and Sustainable Development 1991-2000 (1991), there is not yet a marine and coastal conservation programme in Vietnam.

One of the main obstacles is the lack of a recognised authority. The first task of the government (MOSTE) is therefore to identify a responsible authority, and to organise training for the staff in this authority (project M32).

The marine conservation programme should consist of three components:

- a) Marine protected area system (see discussion above in section 3.2.3).
- b) Fisheries control and sustainable development, including environmental considerations (this is largely the responsibility of the Ministry of Fisheries, but BAP proposes a project on the promotion of non-damaging fishing methods (M28) and an investigation on the status of off-shore fisheries resources (M31).
- c) Integrated Coastal Zone Management (see M21).

Integrated Coastal Zone Management (ICZM)

The main cause of habitat destruction and loss of biodiversity in various coastal and marine ecosystems is the lack of an integrated approach to planning and management. In many cases, typically tidal marsh, there is not even recognition of the existence or values of the environment concerned. It is the role of scientists to identify such neglected and under-valued areas and to inform such findings to government planners and developers. An Integrated Coastal Zone Management (ICZM) strategy should be designed and implemented to enable development and sustainable utilisation of the

coastal zone and resources while maintaining the integrity of the natural environment and biodiversity. This is described in project M21.

3.5 Wetlands Conservation Programme

Wetlands in Vietnam suffer because they have not been placed under an agency's responsibility. The Ministry of Forestry manages several wetland sites that fall into forest estates including important mangrove areas and a few lakes and rivers that pass through nature reserves. The Ministry of Fisheries is responsible for production fishing in other lakes, rivers and marine areas but has no programme. By their dynamic and inter-related nature, wetlands are also particularly prone to pollution, changes in water flow and water table and levels of sedimentation, salinisation etc. Rivers in particular are also important transport routes used by people.

The first task of the government (MOSTE) is therefore to identify a responsible authority for the programme.

Some of Vietnam's most precious species and many of Vietnam's endangered species are wetland dwellers, so serious attention must be paid to conserving these areas. The IUCN report: "A Directory of Asian Wetlands", (Scott, 1989) describes 25 wetland sites in Vietnam identified as significant. There are several other important wetlands that were not included in that review. All these sites are listed in Table 15 (pages 112-116) and mapped (*Figure 40* on the next two pages). Table 15 assesses the relative importance of these various sites and lists recommendations for action.

Eleven sites are rated as category "A". Of these, five are not protected. An immediate priority would therefore be to accord some level of protection to these sites.

Vietnam has become a party of the RAMSAR convention and has nominated one site, Xuan Thuy in the Red River delta, as a RAMSAR site for protection under this convention. Project M10 aim at strengthening and expanding the conservation and management of wetlands in the Red River Delta.

A detailed wetland conservation and management strategy needs to be developed on this basis to help take the actions needed to safeguard these wetlands, which is described in project M29. This would include multiple use of selected protected areas along the coast, as described in project M19.

Figure 40

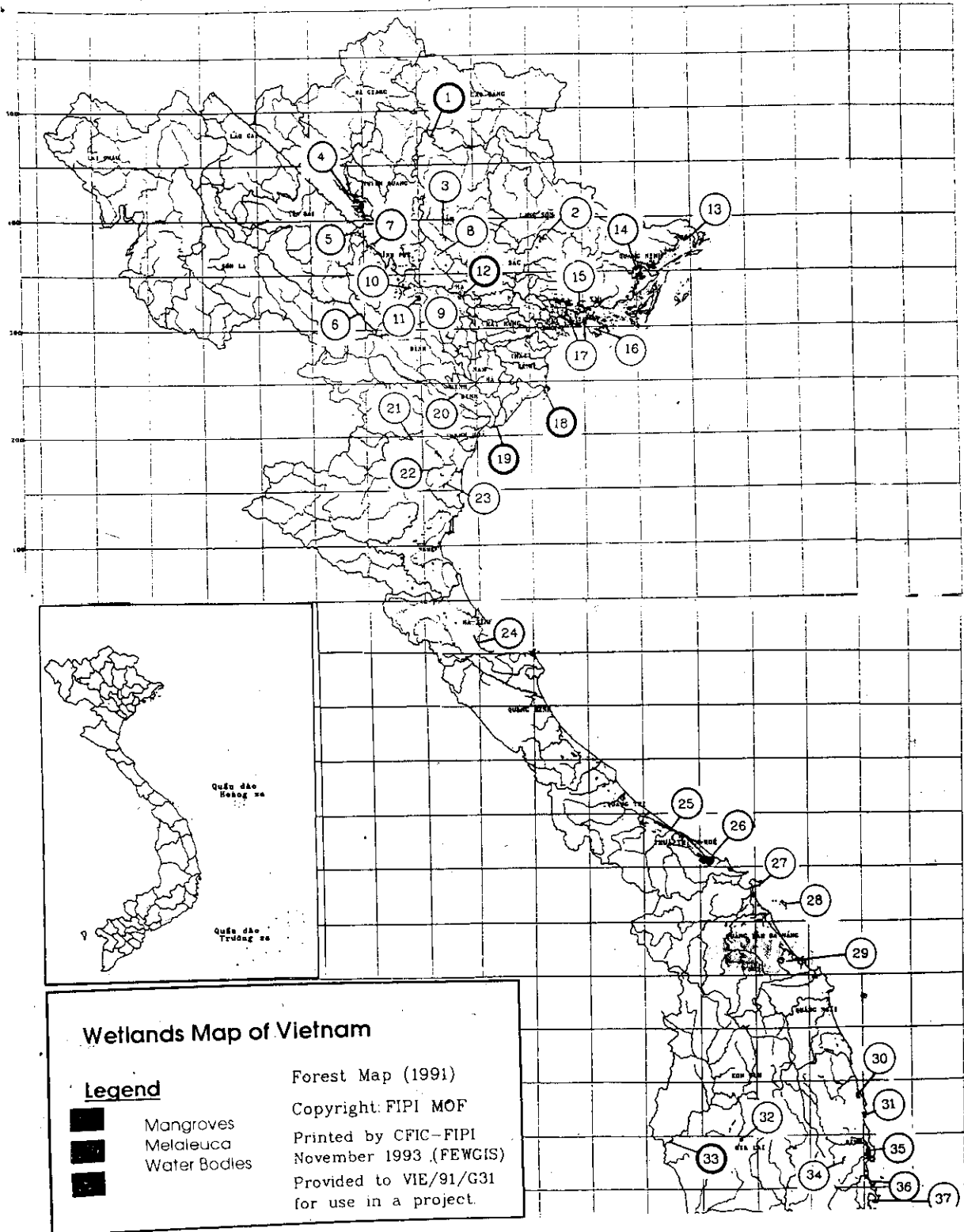
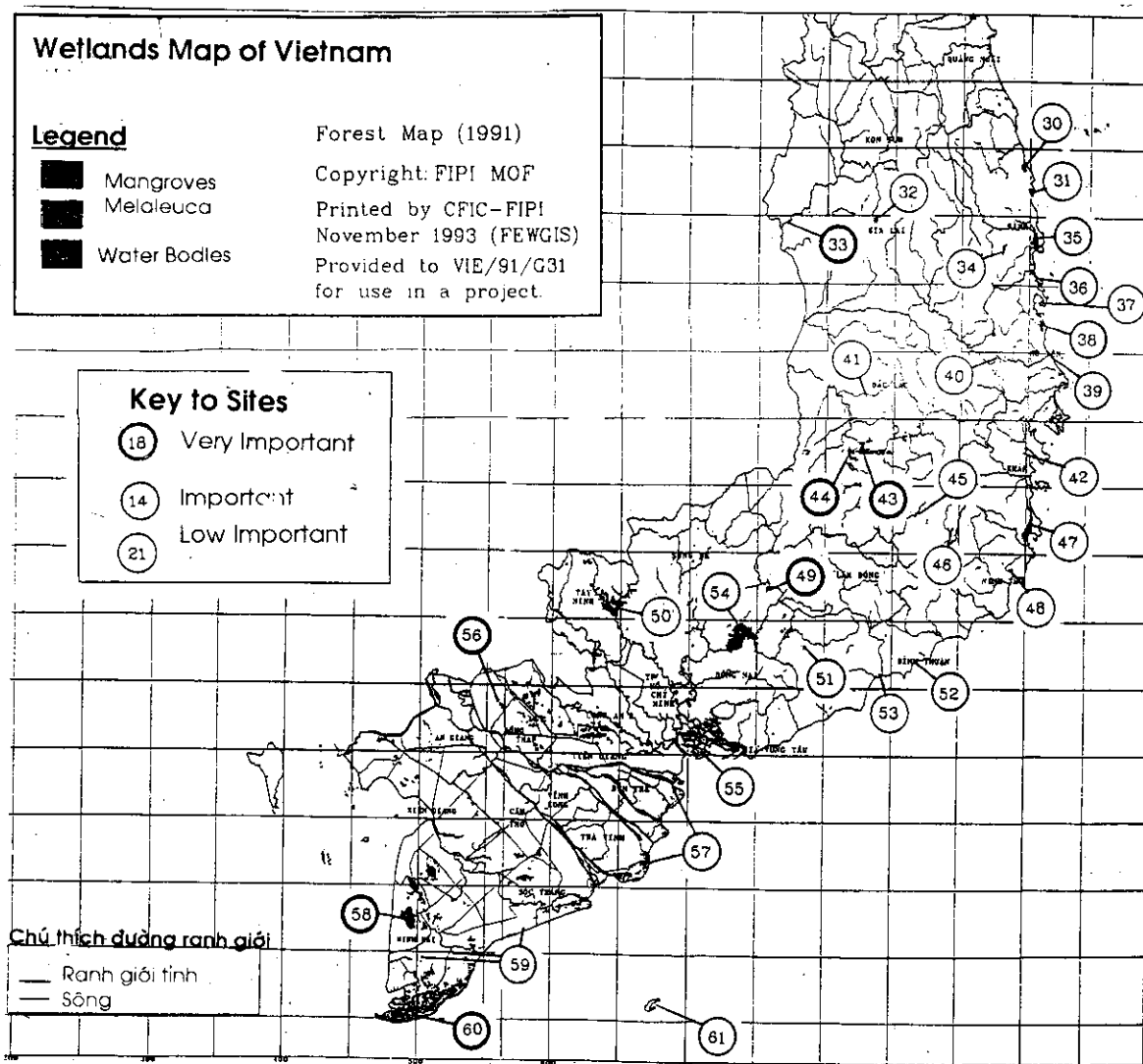


Figure 41



4. COMPLEMENTARY ACTIONS FOR BIODIVERSITY CONSERVATION

4.1 Establishment of National Genebanks

Technology is now available to preserve plant seeds, tissue cultures, animal sperm, ova and embryos in sub-zero temperatures for many years or in some cases indefinitely. It would be a wise precaution to add a third string to the conservation bow and lay down banks of rare native species.

There is a need for national authorities to be identified to take the lead in this area, develop a national genebank conservation strategy, cost a programme of action and encourage and supervise the implementation of such a strategy. This activity is described in project C1. The programme should be co-ordinated with efforts to breed rare species, and should not divert resources from in-situ conservation efforts. MOSTE already has a co-ordination body for phylogenetic resources protection. A similar body is needed for animal resources.

4.2 Conservation of Agricultural Biodiversity

Livestock, fruits, vegetables and cash crops have been developed over hundreds of years in different parts of Vietnam. Each variety has its own special character and advantages. Some are adapted to life in cold, dry, high, swampy or other conditions. Some are very hardy, others reproduce quickly or grow quickly, some are resistant to particular local pests or diseases and some are selected to meet particular tastes. These varieties are the pool of selected experience of 3,000 years of domestication in Vietnam. They are the elements of biodiversity which are most useful to the people of Vietnam. They are crucial to the survival of humankind both by their direct contribution as foods, clothing and fuel as well as indirect contribution to sustainable agriculture by producing fertilisers, draught power, grazing control and assisting in soil conditioning. However, many of these varieties are in danger of being lost. The famous Vietnamese pot-bellied pig is now more likely to be found in a zoo in England or California than in the farmers homestead in Vietnam.

The need to conserve traditional domestic varieties, is recognised in Vietnam. Activities are aimed at maintaining existing breeds until their contribution to domestic animal diversity can be assessed. A national policy is being developed and this will result in an action plan for this section of biodiversity. Implementation will involve other parties concerned in the overall co-ordination of the Biodiversity Action Plan.

Domestication has brought with it the isolation of different genetic combinations selected to best suit human needs in a particular environment and this itself requires different approaches and policies when considering the maintenance of genetic

diversity. A Global Databank for animal genetic resources already exists at FAO in Rome and Vietnam continues to provide data to this.

Since 1973, Vietnam has established a genetic inventory system for domestic animals and crops throughout the country. This system was financed and co-ordinated by MOSTE with the participation of many research institutions in the country and some local NGOs.

The objective has been the collection and safe keeping of all varieties of rare and precious varieties; high economical varieties and dominant varieties. The techniques used are short-term propagation in fields and medium-term freezing of some seeds. Root stock is preserved as tissue samples. The technology is not advanced and the security of the collections not yet adequate.

The government programme to establish and maintain viable populations of traditional domesticated varieties of both plants and animals must be extended and strengthened (projects C1 and C8). The programme should establish special stations on agricultural research farms and develop subsidies to encourage minority and local farmers to continue growing their own traditional varieties (project P6). Both must be linked urgently with buffer zone development and protected area management plans. Project C2 aims to develop cultures of selected marine species and to promote farming of these species by coastal communities.

4.3 Control of Trade in Endangered Species

The government became a CITES member in 1994 and has introduced national legislation by which it can meet the obligations of CITES membership. The Ministry of Forestry is the management authority for CITES, and MOSTE has appointed two scientific authorities, IEBR and CRES, to set export quotas and apply regulations to control such trade in endangered species. One of Vietnam's first acts as a CITES member was to request that the saola (*Pseudoryx nghetinhensis*) and the giant muntjac (*Megamuntiacus vuquangensis*) be listed as Appendix I protected species in the November 1994 international CITES meeting.

A great deal will depend on increasing the awareness of the public to the wildlife protection laws and regulations (project C14) and improving the capacity of police and customs officials to implement those regulations. Special training courses are planned to train customs officials in identifying protected species and clear identification posters and booklets will be published (this is covered in projects P2 and P10).

Key areas where trade must be controlled are the ports of Ho Chi Minh City, Nha Trang and Haiphong, international airports, markets in Ho Chi Minh City, Ban Ma Thuot

and Hanoi, border crossings in Lang Son, Cao Bang, Lao Cai and the Lao and Cambodian borders (project P10).

4.4 Control of Forest Fire

The following actions are being taken to control forest fire:

- Issuing forest protection laws and regulations.
- Launching public awareness campaigns and extension programmes.
- Sedentarisation programmes to reduce shifting cultivation (only following intensive socio-cultural studies).
- Establishing provincial, district and village level committees to prevent forest fire including public brigades for fire-fighting and patrolling.
- Fire forecasting, planting green belts and fire ditches, establishing water reservoirs and building fire watchtowers.
- Undertaking various fire-prevention measures such as removing inflammable material from fire-prone forests, clearing or early burning of fire belts.
- Special regulations and applied training in fire-fighting techniques.

The programme has been successful and the area of forest burned in the last few years is much less than previously. There is no need for BAP to propose additional projects.

Each province should develop its own fire-protection plan in accordance with its own conditions and resources. Protection of human life and safety of fire-fighting brigades must remain a priority and plans must include contingencies for prompt treatment of anyone injured.

4.5 Restoring Natural Habitats

In areas where habitats which are important for biodiversity conservation have been lost, or where habitat links should be restored, a programme of restoring natural habitats should be applied. The following actions should be taken:

i) Identifying areas:

This should be determined by cross-referencing biogeographical considerations with demographic variables such as population density, ethnic areas or administrative boundaries. The character of vegetation and fauna and the proximity to areas of primary biological importance including protected areas should also be considered.

It is recommended that a minimum patch size of 500 hectares be considered as smaller patches require greater management inputs. However this limit may be changed according to local conditions of accessibility.

To designate future land-use, decisions must be made according to the following criteria:

- a) Condition of vegetation
- b) Soil condition: To be characterised as good or poor according to whether the degradation to which they have been subjected renders them infertile.
- c) Accessibility of the area: The degree to which the areas are accessible to population centres.
- d) Degree of concentration of bare, degraded and forest fallow areas: If the patches cover more than 60 percent of the total area then it will be economical to apply intensive management.

ii) For each management area appropriate actions need to be determined by:

- a) Characterisation of land-systems and identification of potential land-uses
- b) Selection of most suitable land uses from potential options on the basis of social, institutional and economic factors and constraints.

Productive land uses envisaged are:

- Managed forest
- Tree crop or permanent forest plantation
- Agroforestry compound
- Managed fallows leading to the development of a natural or semi-natural primary forest
- Untreated areas may also be productive in some senses, eg grazing lands.

Following the designation of appropriate land use, a development plan and proposal should be prepared for implementation.

iii) The principle management options available are:

- No treatment
- Increased productivity through treatment which shortens the unproductive phase of the fallow
- Increased productivity through promotion and utilisation of non timber products
- Conversion to plantation and agroforestry.

iv) Basic intervention involves techniques concerning:

- Recovering fallow lands through silvicultural interventions and other means
- Promotion of useful plants in bare and degraded lands through enrichment planting and selective harvesting.

Research should be carried out to select species which will promote the development of a useful or productive vegetation (projects C7 and M25). It is likely that the approach to be adopted is one which resembles a "natural" succession. So consideration should be given to the selection of the appropriate species to be promoted before considering identifying particular species. Once selected species are identified, local species can be selected according to the utilitarian or other values assigned upon them by local inhabitants.

The implementation of rehabilitation activities needs to:

- Involve and benefit local people
- Intergrade obligations to improve land with their tenurial rights to exploited these and other lands in regulated manner.
- Make provision of material inputs and other investments in accordance with the best way to facilitate the designated land-use.

4.6 Biodiversity Monitoring Programme

A monitoring programme is needed to determine whether application of improved management and regulations is having a positive effect on biodiversity conservation. The monitoring programme will consist of the following seven main elements:

Monitoring of Habitats

The Forest Inventory and Planning Institute (FIPI) will continue to monitor the annual changes in forest cover and forest density throughout the country by remote sensing. This is backed up by the inspection of over 5000 monitoring quadrants set in a grid covering the country. This inspection work is carried out annually by forestry brigades at provincial level. For this work to be successful, FIPI needs to co-ordinate and co-operate with various ministries and survey agencies of other sectors. Project C9 provides the resources for this.

Monitoring of Ground Conditions

Each major protected area will develop its own monitoring programme following national guidelines. A programme for monitoring forest from over 5,000 sample grid sites is already underway and should be continued. This type of monitoring is therefore part of the individual protected area projects described in the BAP under section 3.2.

Monitoring Indicator Species

Species surveys will continue to be made on the status and distribution of key and critical species. Such surveys will be co-ordinated through the MOF and FIPI, but will be carried out by scientists. A list of monitoring variables should be developed.

Data Monitoring

The programme should draw together the various types of information and analyse results to give an insight into the trends and management implications of the monitoring data. It is therefore planned to develop a biodiversity data centre (Project C10) which will maintain an integrated species, habitat and locality database linked to a mapping and GIS capability. A special component could be a marine biodiversity data base as described in Project C11. This centre will consist of a network linking existing facilities in FIPI, Ministry of Finance, IEBR and a new co-ordination office to be established in MOSTE.

Three international projects will help to develop this network: GIS training is being provided by the GEF project (VIE/91/G31), assistance delivered through the World Bank supported project to review the Protected Area System of the Indo-Malayan Realm; and the UNDP regional project RAS/93/102 with a transfrontier data-sharing component.

Monitoring of Management

There needs to be a more rigorous monitoring and evaluation of management effectiveness. Each management plan must include an appropriate programme for such monitoring and a review process whereby management procedures are periodically evaluated and revised if necessary.

In most cases the strongest form of monitoring should be designed around the routine patrol and reporting function of the guardforce. Guards must make regular inspection patrols and reports should be designed to record three types of information - about the condition of the habitat, about the abundance and location of wildlife and about levels of human activity.

Monitoring of Fisheries Stocks

While the Fisheries Resource Protection Department keeps track on overall fisheries production at provincial levels, it would be more effective if scientists were also involved in fisheries monitoring, focusing on certain heavily exploited or declining species and in sensitive areas where fisheries are prone the impacts from overexploitation or environmental degradation. This should be linked to the Marine Biodiversity Database which is proposed to be established in project C11.

Monitoring of Physical Parameters

The National Environment Agency (NEA) in MOSTE will co-ordinate a nationwide programme to monitor the physical features of the environment. Such a programme should involve:

- Climate monitoring including global warming, CO₂ levels, greenhouse gases, acid rain.

- Air pollution - particles and gases.

- Water sediment loads in rivers and coastal waters.

- Water pollutants - metals, toxins, batteries.

- Water flow and ground water table levels.

Different departments and institutes will be involved in sampling and recording this data but such information should be brought together for analysis in the planned central environmental data centre at MOSTE. This programme is not part of BAP, but marine pollution control is covered in project P9.

4.7 Biodiversity Research Programme

There has been some progress in research on biodiversity and its conservation by the State Committee for Science and Technology (now MOSTE). From 1980, two five-year plans have given priority to a number of biodiversity topics within MoF, MAFI, MSP, MPH due to their demand on biological resources and also by MOE.

Important ecosystems have been studied:- mangrove ecosystem (Minh Hai), forest ecosystem (Khop-Central highlands), vegetation cover classification, recovery of some forest formations, eco-features of some fish varieties. Since 1987, a group of scientific research institutes have participated in general protection and monitoring of ecosystems throughout the country. One natural system which has not been studied in detail is the karst landscape of Vietnam. Project C12 focuses on the karst of Ke Bang in Quang Binh Province.

Since 1991, marine sciences and resource utilisation has been researched by the two Oceanographic Institutes in Haiphong (HIO) and Nha Trang (IOOC). There are also smaller projects at provincial level on topics like production and utilisation of certain species. Marine protected area projects are beginning to emerge at local levels.

This research has been financed by the government and some international organisations, but there have been gaps in the research because results are not focused in some integrated management agencies for general application. The results of such research are scattered and often unavailable to the biodiversity managers who need them.

It is inevitable that *ad hoc* research will continue but in addition MOSTE together with MOF, MAFI, MSP, MPH and various scientific institutes and universities should draw up a well-planned research programme of topics and projects that are felt to be of the highest priority. During the preparation of the BAP, the research priorities were found to be:

- Inland and water ecosystems
- Biological features of marine and forest animals
- Genetic resources conservation
- Selected research and domestic use of some highly economic wildlife species
- Ethnic minorities
- Success rate of awareness campaigns
- Social issues
- Success of Vietnamese micro projects at a technical and social level

This research must include as far as possible local communities. It will create employment and give more than simply scientific information. The activities within this proposed biodiversity research programme are covered by projects C1 to C8.

4.8 *Ex-situ* Conservation

The primary conservation value of maintaining a species in captivity is if the aim of the *ex-situ* breeding programme leads to the reintroduction of captive-bred stock to the species' natural habitat as a means of stabilising the wild population.

Therefore, *ex-situ* conservation should only form part of a co-ordinated species survival strategy, where captive propagation is linked with conservation of the natural habitat. It is only in the wild that a species can continue to evolve naturally, fulfil its natural ecological role and maintain its genetic fitness.

The 1992 National Research Council review said that given the number of species threatened with extinction due to habitat destruction and the lack of understanding of their basic biology, as well as the expense (in terms of money, energy and constant human attention) involved in maintaining species outside their habitats, *in-situ* conservation is the most practical, cost-effective and dependable for the vast majority of organisms. Ex-situ programmes should therefore only be promoted as "final options".

While accepting that *ex-situ* conservation is useful for crisis management, the question arises as to how to identify those species for which it could be considered in Vietnam? A starting point could be to consider taxa which are known to meet three criteria:

That the taxa be a restricted range endemic with a global range of less than 50,000 km² (as defined by Terborgh and Winter, 1983)

That the taxa be critically threatened as defined by Mace *et al.* (1993)

That *in situ* conservation is failing to stem population decline.

Breeding Programmes

It is important to develop stud books of individuals of rare species in captivity so that the most suitable breeding partnerships can be achieved. This should be backed up by DNA studies to monitor the genetic diversity within captive populations.

The following principles should be applied to all captive breeding programmes:

Strict limits must be placed on removing breeding stock from the wild

Breeding should be carried out as part of overall species survival plan

The long-term objective should always be to build up population levels for return to the wild

Studbooks should be maintained and breeding partners chosen in ways to maximise genetic diversity of the captive population

Regulations and controls should be imposed to divorce conservation from commercial motives.

National Strategy for Zoological Gardens

Standards in Vietnam's zoos are generally poor. There is also a lack of protection of displayed animals from a poorly educated public who often come to tease animals, poking them with sticks, throwing objects at them or feeding them dangerous objects.

Mortality levels in Vietnam's two main zoos are high and reproductive success for most species is low. This means that the zoos must look for new animals, which is carried out through poaching and selling wildlife. Both Hanoi and Saigon zoos, as well as some smaller collections, are therefore a drain on the national resources of precious species and a great threat to conservation.

A national strategy is urgently needed to make zoos a positive rather than negative force in conservation. This strategy should have a priority aim of assisting zoos to achieve numerical self-sufficiency in their animal stocks. This will involve improving their housing and breeding and standards of animal care and welfare. Zoos must also be encouraged to educate the public to realise that wild animals are precious, interesting and in need of conserving, rather than being presented as creatures of fun and ridicule.

The development and management strategy for zoological gardens in Vietnam is described in project C3.

National Strategy for Botanical Gardens

The main object of a strategy for botanical gardens should be to try to ensure that secure ex-situ populations of all endangered species in Vietnam are established. The recently prepared Red List of Plants gives descriptions of these species and their distribution. For safety, such populations should be split so that a fire or typhoon in one garden will not destroy the entire stock of a species.

Also there must be objectives to develop better methods of propagating rare species such as tissue culture, cloning etc, better ways to store and transport seed and protocols must be developed by which national and international botanic gardens can more easily exchange genetic materials.

The strategy for botanical gardens is included as project C4.

Regulation of Wildlife Farming

Some wildlife species are farmed commercially on a large scale in Vietnam. These include monkeys for biomedical research, Sika deer for medicinal antlers, civets for scent glands used in medicines and scents, pythons and crocodiles for their skins, soft-shelled turtles and frogs for food.

A few species are being threatened by breeding farms and regulations are needed to control and monitor this. Breeding farms often act as screens for selling bought-in captive animals labelled as captive-bred.

Guiding principles should be adopted to include:

No wild animals should be taken into breeding farms except with permission from the local forestry and veterinary departments. Permits shall not be granted unless the species in question is known to be "out of danger" in the wild and the wild population is being monitored.

Permits should only be granted to *bona fide* units or individuals who have a proven record of successful breeding and who maintain facilities that are open to inspection by staff of the local Forestry and Veterinary departments and meet standards to be developed by the MOSTE.

Permits will be revoked for any unit or individual found to be breaking the law by mis-labelling stock (by species or by claiming captive bred for wild-caught animals), buying or selling stock without a permit, dealing in prohibited species.

Care must also be taken to ensure reasonable standards of animal welfare and eradication of unnecessary cruelty to animals. Project C5 provides guidance for wildlife farming projects.

4.9 Education and Awareness Programme

Courses have been prepared for primary and secondary grade school use and as parts of university degrees and diplomas but these are not yet mandatory or widely used across the country. The Ministry of Education has made the decision to do this. It is recommended that a review is made of the impact and success of the current courses; they are revised on the basis of this review and with incorporation of new material taken from similar courses developed in other Asian countries (India etc.) and that they are finally made mandatory at all schools and learning institutes in the country. It is

recommended to have formal biodiversity education in the environmental education programme.

Public Awareness Campaigns

Improving public awareness about biodiversity conservation and environmental issues in general is clearly a high priority. A large environmental awareness project (VIE/93/030 - Promotion of Environmental Awareness) financed by UNDP and implemented by MOSTE and the Youth Union is currently ongoing to build national capacities to design and implement integrated mass media campaigns for environmental awareness. The first campaign was launched at the beginning of 1995.

Awareness campaigns to improve the awareness of people at all levels of environmental and biodiversity issues could utilise various methods to reach the people: newspaper and magazine articles, public notices, radio and television and special staged events and promotions. Such a campaign could also link up with other national extension services such as forestry extension and health (population or maternal and child health) extension programmes.

BAP could work together with VIE/93/030 - Promotion of Environmental Awareness in developing a national programme to raise awareness specifically about biodiversity (project C14). One special area which could be covered is awareness about marine biodiversity, and this could be a separate project (project C13). In addition, it is proposed to establish three awareness centres as the locations to educate decision makers and government staff about biodiversity (project C15).

4.10 Socio-economic Aspects of a Biodiversity Programme.

All forms of development have far-reaching socio-economic effects. It is important to examine what effects the Biodiversity Programme will have on socio-economic conditions in the country and take measures to counter any adverse effects that might be expected and to promote positive outcomes.

In essence, the Biodiversity Programme is designed to bring long-term benefits and a sustainability of benefits to the people of Vietnam but it does not necessarily guarantee a fair distribution of benefits and may involve losses of income or potential income for some group of people, especially in the short term.

As the programme's success will hinge upon its acceptance and support by rural populations living close to natural habitat, it is important to ensure that these groups of people feel benefits rather than losses. It becomes the responsibility of government

to tax those sectors of the economy that are flourishing under new development to pay for the costs of safeguarding environmental quality and long-term national interests, however unpopular such taxes may be.

Local Rural communities around conservation project areas will derive many valuable long-term benefits:

- Equitable climate and attractive surroundings
- Forests to gather wood and other products
- Clean, safe water sources
- Healthy fish populations to exploit
- Employment opportunities
- Secondary industries (tour guiding, accommodation, food sales, souvenir industry etc.)
- Ability to preserve favoured traditions

But they may also resent restrictions that will be placed on them in the form of hunting controls, limits to clearing new land, loss of timber exploitation opportunities etc.

It is important to use public awareness to make the resource users realise and appreciate the benefits and understand the need for the losses. Moreover, the government should mobilise assistance in the form of buffer zone development projects to outweigh any short-term income losses that rural communities may experience. Such buffer zone aid should be clearly packaged as part of the biodiversity protection programme and should contain general social services such as improved schools, clinics, roads, irrigation systems, storm shelters and ports for fishing boats, wells, electricity, seed and stock, veterinary services, help in protecting crops against wild animals and agroforestry investments.

The attitude of some ministries' reluctance to invest in development inside "forestry lands" must be overcome. Much forestry land is heavily populated and must be open to social sector support and economic investment, not merely left as a forestry problem.

In order to help villagers understand the concept of biodiversity and to assist them in developing appropriate conservation action, BAP proposes to organise village biodiversity committees which will take the lead in this initiative. Project C6 aims to establish such committees in eight pilot villages.

Illegal migration into core and buffer areas for socio-economic reasons is a major threat to conservation. Measures to mitigate this should concentrate on linking education, awareness and law enforcement. The BAP proposes to develop these techniques through implementing a model project in Dac Lac province (M30).

4.11 Increased International Co-operation

Vietnam has suffered from a long period of international isolation and levels of international support and co-operation have been low. However, with the lifting of most embargoes on trade and credit Vietnam is attracting much higher levels of foreign aid, co-operation and investment. It is vital that this increasing level of international co-operation extends into the environmental sector if the environmental safeguards that can be put in place can keep pace with the increased levels of development.

Vietnam will continue to participate in and implement the international conventions and agreements on biodiversity; develop national parks (terrestrial and marine); strengthening the monitoring and conservation across border areas; and establish a forum for regional co-operation on biodiversity issues (project P11).

It is also important that this increasing level of international co-operation is properly co-ordinated, and the government should liaise with UNDP to develop regular and focused discussions with the donors which are operating in the environment sector.

Almost all the major credit facilities such as World Bank, Asian Development Bank as well as multilateral agencies such as UNDP and bilateral aid programmes are now taking environmental protection far more seriously. Their programmes are obliged to pay greater respect to environmental concerns and a higher proportion of environmental protection projects in their portfolios. Vietnam can utilise this trend to secure greater international Co-operation for implementing many aspects of the Biodiversity Action Plan.

It is also wise for Vietnam to align its own Biodiversity Action Plan closely with the various programmes being developed under the UN Convention on Biological Diversity and other UNCED programmes.

5. PRIORITY PROJECT PROFILES

During the course of the preparation of the Biodiversity Action Plan, 59 project profiles were prepared covering all aspects of the plan. These are listed on the following pages. Although many project ideas were proposed and considered, only profiles of those projects rated as having importance to the overall conservation of biodiversity and which have not yet been initiated are provided in full in the document.

The project profile section begins with a table showing the relationships and phasing of all projects prepared. This is followed by a brief description with a scale for funding. For ease of comparison, projects are listed as large, medium or small scale:

Large scale project	More than US\$ 5 million
Medium scale project	US\$ 1 million to US\$ 5 million
Small scale project	Up to US\$ 1 million

Project Categories

Projects are arranged by Policy Programmes (P), Management and Conservation Field Programmes (M) and Complementary Actions (C). This arrangement follows the presentation in sections 2 through 4 of the BAP text.

Policy Programmes are presented, as shown in Table 16 on the following pages, by broad category approaches:

Policy Tools Strengthening biodiversity conservation through governmental organisations and regulations.

Participation and Expanded Players Enlarging the pool of agencies and people involved in biodiversity conservation.

Traditional Approaches Utilising the skills and traditional knowledge base of Viet Nam's culture and society.

Marine Issues Expanding the scope of biodiversity conservation beyond terrestrial issues.

Regional Biodiversity Linking national biodiversity issues to the conservation programmes of neighbouring countries and the region.

Management and Conservation Projects, the backbone of biodiversity conservation, are presented in five inter-related categories:

Conservation and Management Improving the implementation of protected areas as the key method for maintaining biodiversity.

Protected Area Establishment Filling in the "gaps" and expanding the areas and ecosystems protected by establishing new protected areas.

Buffer Zones and Community Projects Engaging rural communities to become directly involved in biodiversity conservation through participatory approaches to protected area management and sustainable resource use.

Rehabilitation Fostering the natural regeneration of important habitats.

Human Approaches Developing the capacity of conservation professionals, decision makers and the general population through training, awareness and baseline research.

Complementary actions are also proposed, fulfilling the broader biodiversity conservation agenda proposed in the BAP. Projects are presented in four categories:

***Ex-situ* and Scientific Methods** Long viewed as an important method for preserving species and biodiversity through technology.

Traditional Approaches Exploring and testing traditional approaches to the maintenance and preservation of economically important biodiversity.

Databases and Habitat Monitoring An essential tool for evaluating the progress of the national biodiversity status.

Public Awareness Assisting biodiversity conservation through an educated and environmentally conscious population.

Project Phasing

The Biodiversity Action Plan is to be implemented in three phases as illustrated in Table 16. Not all projects proposed in the Biodiversity Action Plan can or should be implemented immediately. Many of the first phase projects focus on planning, establishing institutional arrangements and training the staff. The others target the protection of threatened biodiversity. This should be done during the first two or three

years. Phase II is a consolidation phase, which should last for an additional two to three years. Phase III will cover those early Phase projects which require follow-up implementation and evaluation. It also covers the management of biodiversity which at the time of drafting the Plan is not greatly threatened. During this Phase, lessons learned in the first two Phases would be passed onto new projects.