

Site Nomination for Peat Site Profiles in Southeast Asia	
Category:	Protected Area
Name of Site:	U Minh Ha National Park
Country:	Vietnam
GPS Point:	Latitude: From 9°12'30? to 9°17'41? North Longitude: From 104°54'11? to 104°59'16? East
Location & Access:	<p>U Minh Ha peatlands region located in two districts (U Minh and Tran Van Thoi) of Ca Mau province, Vietnam. A large area of peatland was established as a national park, and the remains are located in surrounding area.</p> <p>U Minh Ha National Park, 25 km from Ca Mau city, near the coast of the West Sea, was established on November 20th, 2006, merging Vo Doi Nature Reserve and a part U Minh III and Tran Van Thoi State Forestry Enterprises and has a total area of 8,527 hectares, of which 3,600 hectares of the previous Vo Doi Nature Reserve is strictly protected and the remaining area is a Restoration Zone.</p> <p>In addition, buffer zone of the U Minh Ha National Park has more than 25,000 hectares of the U Minh forest-fishery 1 and 3, and forestry-fishery Tran Van Thoi, Cai Tau K1 prison and Minh Hai Center for Applied Mangrove Research.</p>
Total Area:	8286.00 hectare(s)
Background of Site:	<p>Imagery interpretation shows that the U Minh Ha National Park has 6,360.89 hectares of peat land of 0.4 to 1.2 meter thickness. The soil underneath the peat layer is potential acidic.</p> <p>Topography; UMHNP has a maximum elevation of 2.5 m above mean sea level and is seasonally flooded to a depth of 0.5 to 1.0 m during the monsoon period from May to November. The water is fresh, with a pH of less than 5.0 owing to the widespread presence of acid sulphate soils in the area around the park and to the exposure of the underlying acid sulphate soils in areas within the park where peat has been burnt away by fire.</p> <p>The history of the vegetation in the area since human settlement is not well known. Much of the original vegetation was probably destroyed prior to 1975 by the widespread spraying of defoliants during wartime. For this reason most of the present peat forest vegetation in UMHNP is a secondary growth forest resulting from replanting or natural regrowth after the cessation of hostilities in 1975.</p> <p>Hydrology; the protected core zone enclosed within dikes is flooded during the wet season. The depth of flooding depends on rainfall and the water level in the canals outside the protected area, the average depth usually being about 30 - 50 cm towards the end of the wet season. The water gates are closed for most of the dry season to maintain a high water level in the core protected zone, thereby reducing the risk of fire. Water levels throughout the dry season are therefore much higher than they were prior to the construction of the dike around the core protected zone.</p> <p>Most of the area of the core zone is covered with natural, semi-natural, and some planted Melaleuca forest. The core zone has about 30 hectares of open area, which was created by forest fires that took place some years ago.</p> <p>The park is surrounded by a "de jure" buffer zone of 25,085 hectares, encompassing 05 communes in 02 districts of U Minh and Tran Van Thoi, with a total of 4,077 households and 18,823 people as of 2007, most of whom are impoverished farmers relying on agriculture for income.</p> <p>Between 1998-2005, Ca Mau province allocated land and forest to households to move into and settle in the buffer zone of the park. First comers received 10 hectares of land while those who came later were allocated 7, 5, or 3 hectares of land. The households are granted "green books" or temporary forestry land use certificates valid for 20 years, which are renewable. As part of the deal, 50% of the allocated land is devoted to Melaleuca plantations and the remaining 50% can be used for household agriculture.</p> <p>As part of the deal, farmers need to obtain permission before harvesting trees on the "50%" Melaleuca plantation. They are subject to technical guidelines from the authorities managing the land in the buffer zone, including U Minh III State Forestry Enterprise, the Cai Tau</p>

	Detention Camp, and the commune People's Committees; 95% of the revenue is to be enjoyed by the households while 5% goes to the government entities as a management fee.
Significant Value of Site:	<ul style="list-style-type: none"> - Biodiversity - Hydrology - Soil/Carbon <p>Notes:</p> <p>Biodiversity</p> <p>U Minh Ha National Park is an area of typical flora and fauna of wetlands on peat layer of dead plant material accumulated by the long form.</p> <p>The three major vegetation types at Vo Doi Nature Reserve are 'semi-natural' (originally planted but no longer tended) Melaleuca forest, Melaleuca plantation and seasonally inundated grassland. Semi-natural Melaleuca forest covers a large area in the west of the site. The tree flora is dominated by Melaleuca cajuputi, although other tree species are also present, including Ilex cymosa and Alstonia spathulata. Melaleuca plantations of varying ages are distributed in the east of the nature reserve. In the centre of the nature reserve, there are areas of grassland with scattered, young, naturally regenerating Melaleuca trees. The most widespread grassland community is one dominated by Eleocharis dulcis, with Cyperus halpan, Cyperus polystachyos, Fuirena umbellata, Philydrum lanuginosum and Phragmites vallatoria also present. On slightly higher ground, a grassland community dominated by Phragmites vallatoria is found (Buckton et al. 1999).</p> <p>A surveys report (Guong, 2006) showed a total of 33 species of vascular plants were found in the park. The species diversity was higher on intact peatland (28 species) compared with that of the burned area with exposed acid sulphate soils (14 species). Of the eight tree species found on intact peatland, only one (Melaleuca cajuputi) was also present on the exposed acid sulphate soils of the burned area. Similarly, of the six climbers common on intact peatland, only one (Cyperus trifolia) was found in much smaller numbers on exposed acid sulphate soils in the burned area. Shrub and herb species were also poorly represented in the burned area with exposed acid sulphate material. Plant biodiversity in UMHNP, however, appears to significantly lower than that of other pristine tropical peatlands. There are a number of explanations for the low plant biodiversity in UMH. One is the fact that the vegetation in UMH is only semi-natural, since most of the area is a secondary growth of mainly planted Melaleuca cajuputi (post 1975), with limited natural regeneration of other tree species, climbers and ground flora. Guong (2009) stated that high planting densities of Melaleuca and its aggressive canopy dominance of other species may limit opportunities for other species to become established (Guong, et al, 2009).</p> <p>UMHNP and buffer zone support high bird species richness. In particular, the area supports a high abundance and species richness of water birds, including small bitterns (Ixobrychus and Dupetor), Bronze-winged Jacana (Metopidius indicus) and Purple Swamphen, (Porphyrio porphyrio). There are recent records of adjutants, probably Lesser Adjutant, Leptoptilos javanicus. Buckton et al, 1999) stated that this species had been believed to breed at the nature reserve in the past but appears to no longer do so. However, the species may still occur outside of the nature reserve to the north. In addition, Woolly-necked Stork (Ciconia episcopus) has been reported to occur in the area to the north of the nature reserve, where it might breed. The reasons for the apparent absence of the larger water birds from the nature reserve itself are not clear but may include disturbance and habitat deterioration in the past, partly due to forest fires.</p> <p>There are a plenty species of fish were found UMHNP, some species dominantly such as Ophiocephalus striatus, Anabas testudineus, Clarias macrocephalus, Notopterus notopterus, Trichogaster trichopterus and T. pectoralis. Of these, N. notopterus and T. pectoralis were apparently absent from the area with exposed acid sulphate soils. Truong and Tran (1993) recorded 173 freshwater fish species in the Mekong Delta, but only a few of these are found commonly in areas with low water pH.</p> <p>With species of birds, many important species of animals have been found in UMHNP such as hairy-nosed otter (Lutra sumatrana), pangolin (Manis linnaeus), deer, long-tailed macaques (Macaca fascicularis), wild boars, turtles, and species of reptiles: snakes, pythons. This is one of two national parks in Ca Mau province, Vietnam. On May 26, 2009, Cape Ca Mau National Park and the U Minh Ha are included in the UNESCO list of biosphere reserves in the world.</p>
Designated use (status/legal classification):	<ul style="list-style-type: none"> - National Park/State Park

Notes:

A large area of peatlands here is considered as protected forest area and established as U Minh Ha. Most of peatlands have been covered dominantly by Melaleuca forest; however, there have been both fires and changes in land use since that survey and it is very likely that there has been a consequent reduction in the extent of peatland in both areas, particularly outside core protected zones. Although the area of peatland in Vietnam is small by comparison with that in some other countries in SE Asia, it is nevertheless very important for its contribution to biodiversity and its role as habitat for a number of rare or endangered bird species (Safford et al., 1998; Buckton & Safford, 2004).

The protection of remaining peat area in U Minh Ha National Park, Ca Mau Province has brought about practical benefits for the area such as preventing the acidification of soil for agricultural production and provision of water for domestic use in the rainy season. The peat layer is like a piece of sponge absorbing and retaining water so that it is capable of regulating water regime, keeping moisture for the forest in the dry season to prevent fire and provide habitat for plants and animals.

Major Issues:

Hydrology Management:

Suitable management of hydrology in peatlands forest has been an important issue of Park manager. Oxidation and subsidence of peatlands from lowering of the water level in the dry season, particularly forest fires. However, keeping high water level in peatlands leads to problems for Melaleuca forest growth, ecosystems and biodiversity.

Since forest fires in peatlands, in order to reduce the risk of further fires, a dike and canal system has been built around the peat area to maintain unnaturally high water levels. Consequently, the peat area was flooded for most of the year. In particular, the higher water levels that now exist in the core peatland area of U Minh Ha region limit the establishment, survival and growth of many peat forest tree species, climbers and dicotyledonous ground flora, most of which are tolerant of ephemeral flooding, but relatively intolerant of flooding for extended periods. Plant diversity may also be limited by the unavailability or poor dispersal of seeds, particularly for those species that are relatively uncommon in the peat forest.

Forest Fire:

Forest fire is one of the major threats that UMH peatlands is faced with every year. Forest fire is the main cause of the loss of the peat layer, a valuable resource that takes thousands of years to form. Melaleuca trees are fire tolerant and regenerate strongly after fire. However, large fires and frequent fires would cause the loss of biodiversity and loss of the endemic species of this natural peat area. The major fire happened in 2011 and 2002 destroyed the top half of the peat layer and completely destroyed hundreds of hectares of peat.

Peat in U Minh Ha region is of the same status, constantly under threat of forest fire. Forest on peat can easily catch fire in the dry season and fire fighting is extremely difficult. There are three types of fire in peat forest including 'canopy fire' or fire that burns on the tree tops, 'surface fire' or fire that burns on the ground, and 'underground fire' or fire that burns the peat underneath the ground. To fight fire in peat area, it is important to stop the fire from spreading on the surface and then use tractors to dig firebreaks in the peat.

In the recent years, especially in the dry season of 2001-2002, with the global climate change, the rain season ended early, the hot and dry season prolonged resulting in decline in water table, the vegetation mat under the forest canopy became dry and served as a great source of fuel. Further more, the forest area that can catch fire is large so that once fire happens it spreads at great speed and is difficult to put out.

Although warned of fire threats during the dry season, the forest managers lack measures for fire monitoring and prevention and for eliminating fire causes.

As discussed, the fire risk of the peat layer in the core zone comes also in part from the poaching activities resulting from the acute poverty situation of the population in the buffer zone; to reduce fire risk, the livelihood issues in the buffer zone needs to be addressed.

Peat oxidation:

Even in the absence of the peat extraction project, the peat layer's destruction is threatened through severe fire risk and a slower but sure process of oxidation. The fire risk and oxidation issues are rooted in the hydrology management dilemma not only of the park but in peatlands of buffer zone.

The park was founded to conserve the unique biodiversity and habitats of the U Minh

peatlands. The original hydrologic regime that shaped and supported the ecosystem and associated biodiversity was a seasonally inundated system with a wet season from May to October and a dry season November to April next year. In addition, the construction of dikes and canals, together with land use practices in the surrounding In the original system, there would be standing water in the wet season; in the dry season capillary action would keep the top of the peat layer moist. This original hydrologic rhythm supported the ecosystem and its biodiversity while preventing peat from decomposing. The area has changed the natural hydrology of the peatland area.

After a severe forest fire in the dry season of 2001-2002, a system of periphery dykes and a dense checker-board network of canals were created for fire control purposes. Water was artificially stocked and the park was submerged until 2007. This resulted in a massive die-off of up to 1/3 of the Melaleuca trees in the park and severely effected biodiversity. Recognizing that permanent inundation was killing the park, managers changed tactics in 2007. Water has been released from the core zone to enable the recovery of the park's seasonally inundated ecosystem and its biodiversity. However, under the new management practice, the peat layer in the park has been excessively dry in the dry season for 6 months. When water is released from the park, the dense checker-board network of canals accelerates water loss by increasing surface evaporation and lowering the water table within the peat layer.

The resulting excessive dryness has radically increased fire risk. Peat is extremely inflammable under dry conditions. Peat fire is also extremely hard to suppress as it can burn deep down under the ground. Fire in these excessively dry conditions could potentially burn off the entire peat layer in the core zone of the park with a single ignition. Non-tree vegetation also becomes dry and dies in the dry season adding to the fuel load and forming "fire ladders" that would act to spread the fire more rapidly upon ignition.

In addition to the fire risk, under these excessively dry conditions, a gradual process of peat oxidation is taking place, which is slowly but surely destroying the peat layer in the long term. The current challenge posed to the park is to avoid prolonged inundation and retain enough moisture in the dry season to prevent peat oxidation (and maintain plant life).

This challenge is further exacerbated by a difference of 1.1 meters in elevation between the top of the peat dome and its edges (the edges have sunk as a result of increased subsidence along canals). Thus, if the water level is now maintained to ensure moist conditions for the higher part of the peat dome, the lower part would be submerged year round—the condition under which trees and wetland vegetation dies and biodiversity dwindles. Alternatively, if the water level is maintained at a lower level to allow the lower part to experience the seasonal hydrology rhythm, the higher part of the dome would dry out and be subject to oxidation and increased fire risk.

The difference in elevation of the peat dome creates horizontal underground flows within the peat layer from the higher parts of the peat dome to the lower edges. The horizontal flows accelerate peat loss significantly through washing peat into the canals and oxidizing peat with dissolved oxygen.

Fire risk at the park is increased through poaching activities from people in the buffer zone. The park is rich in resources such as bee honey and wildlife (deer, wild boar, python, and so on) and most of the people in the buffer zone live in acute poverty.

As a result of being unable to solve the dilemma, the park is forced to apply a strict fire control system and spends 1 billion VND or \$55,000 each year on fire control. Tall watch towers, 25 meters in height, have been installed around the park with fire watch personnel on duty around the clock. Households in the buffer zone are members of community fire fighting groups. In the dry season, households are made to provide labour (free of charge) to the park for fire prevention work (creating fire breaks). When a fire happens, these community fire fighting groups are mobilized to fight the fire. When a member of the fire control group travels out of the village, they must notify the park of their absence from the village. The involvement in the fire control group is part of the land allocation deal. These fire fighting duties are a burden on the villagers and their livelihoods. Also, traditional bee keeping in the buffer zone—a potential significant source of income of farmers—is totally banned.

Compounding the situation is the low capacity of the park staff to adequately address the issue. Currently, the park has no hydrology monitoring system and none of the park staff is trained in hydrology management.

In summary, there are 5 issues concerning peat management at U Minh Ha National Park:

- 1) Excessive dryness causing fire risk and oxidation;
- 2) The difference in elevation between the higher part (the dome) and the lower edges, hence the challenge in keeping the entire peat layer moist throughout the year, but not permanently submerged;
- (3) The horizontal flows within peat, as a consequence of the difference in elevation, causing "peat burn in water" through oxidation by dissolved oxygen;
- (4) the low capacity of park staff in monitoring and managing the hydrology of the park; and
- (5) Poverty, livelihoods, poaching activities that cause fire risk.

Peatlands forest conversion:

More than 20,000 hectares of Melaleuca forest in buffer zone has contributed to the forest system playing an important role in balancing the entire ecosystem environment in the Mekong Delta. In addition, Melaleuca forest in peatlands and non-peatlands play an important role of carbon storage in regional climate change.

However, as demand of land for the production of local communities, there has been a conversion of peatland Melaleuca forest to agriculture and other uses in buffer zone has resulted in declining of forest area and then peat degradation in U Minh Ha region.

Based on surveys in 2010, the consultation with the management of U Minh Ha Forestry Enterprise reveals that the Enterprise is planning to convert 17,500 ha to Acacia plantations. As reported by the enterprise, of the 17,500 ha of forestry land, 12,000 ha are "mature" melaleuca with a stock of 350,000 m³/ha (including only the trunk), 6,000 ha are young forest, and 3,000 ha are non-forested. In 2010, the company will proceed with planting the first 200 hectares of Acacia and eventually over the course of 10 years, all existing melaleuca will be cut down to be replaced by Acacia.

Acacia tree is not suitable in peat swamp and flood plain, therefore method of "raised bed" will be applied in these areas resulting in the rate of used land will also has to be reduced to about 60 – 70 % of land. In addition, the methods of raised bed will accelerate oxidation of peat materials as well as oxidation of pyritic materials in sulfidic horizon of acid sulphate soils causing problems to agricultural production and fish resources in buffer zone.

As above mentioned, conversion of peatland and on-peatlands forest for agriculture and Acacia plantation will impact to natural resources of peatlands in U Minh Ha region. In addition, given the environmental, biodiversity, and livelihood costs, the value of the net carbon sequestration of the planned conversion is questionable. Environmental safeguards should be applied to such cases as this one to ensure that net carbon sequestration does not come with significant and irreversible environmental, biodiversity, and livelihood damages.

Peat extraction project

Peatlands forest areas with thick peat layer are not suitable for crop production, therefore thick layers will be taken away to make them thinner. In addition, much peat materials have been exploited to supply for fertilizer processing, which has resulted in loss of peatlands forest in the U Minh Ha region.

In recently, the Peat Extraction Project proposed by Ca Mau Department of Natural Resources and Environment in 2009, proposes to harvest 0.5 meter in depth on a 200 ha area in the core zone of the park in order to create a pond for tourism purposes. The harvestable stock was estimated at 600,000 tons out of a total stock of 1,000,000 tons of peat. Although the plan of peat extraction has been faced by environmentists, but the suggested plan has still mentioned from industrial development of Ca Mau Province.

Site Jurisdiction & Administration:	U Minh Ha National Park is managed by Management Board belongs to Ca mau Provincial People Committe.
Peatland Type:	Lowland
Management activities:	<p>a) Past</p> <p>U Minh Ha was a decreed nature reserve covering 2,000 ha, managed by the provincial FPD. However, the whole site covered some 3,724 ha, and there was no distinction on the ground between the nature reserve area and the rest of the site. Nevertheless, the whole site was effectively given full protection by nature reserve staff. The proposed extension areas of Tran Van Thoi and U Minh III were officially Production Forest, though were not commercially exploited to any great extent.</p>

b) Current
 Currently, U Minh Ha National Park were set up for conserving what remains of the unique ecosystem of the original U Minh region. It is these conservation areas that retain most of the remaining peatlands.
 Major manabgement activities folowings:
 - Conservation and rehabilitation of ecosystems and biodiversity in peatlands of the park.
 - Water and fire forest management in peatlands
 - Ustainable use of peatlands in buffer zone.

c) Potential
 As described, one of the largest areas of peatlands in Vietnam occurs in U Minh Ha which has been established as a nature reserve. There has been so much concern about protecting the Melaleuca natural forest in the coastal zone in Mekong Delta, but less importance has been placed on understanding the values and functions of peatlands. For example, there was great concern that the fire incidence in UMHNP had damaged a large area of Melaleuca forest, but not as much concern about degradation of peatlands and the loss of biodiversity. An action plan for the UMHNP was designed when it was recommended as a National Park. Some components of the action plan have been implemented since 2002, but some shortcomings remain and have resulted in many problems for the rehabilitation and sustainable use of peatlands in and around the national park.

Existing capacity for site management is limited throughout the range of project sites. Staffs of UMHNP lack the skills for modern conservation management techniques, in particular in relation to community co-management, conflict resolution and integrated wetland and watershed management.

There is a lack of formalized stakeholder participation in site management, hampering effective integrated management. Owing to this lack of opportunity for participation combined with low conservation awareness levels, local communities rarely have a good understanding of the conservation objectives of nature reserves and how they can contribute. This often alienates conservation management authorities from local communities and can result in high levels of encroachment and illegal activities. While conditions at the project sites vary enormously, some are subject to intense human utilization for agriculture, grazing, fishing and other uses. It is necessary to recommend UMHNP as a pilot site for the Project on Rehabilitation and Sustainable Use of Peatlands in Vietnam.

Facilities & Activities Available on Site:

At present there are no projects that relate directly to peatlands alone. Because peatland management is addressed as part of several projects on nature conservation, forest and agricultural production, socio-economic development for communities living in and around peatland areas.

There is a national project for forest rehabilitation which aims to restore forest in bare land, including in the peatland areas of Mekong Delta. This project is being funded by MARD and is being implemented throughout the whole country.

A national project for community livelihood development and for poverty-alleviation in rural areas has been funded by MARD and the Ministry of Labor, War Invalids and Social Welfare (MLWISW). The communities living in and around the peatland areas have been included and have benefited from this project. Project goals are to alleviate poverty through sustainable resource use and management.

A five year action plan for natural parks focusing on biodiversity conservation and community livelihood development was initiated in UMHNP and its buffer zone. The UMHNP action plan has received funds from related government agencies to implement components of the action plan that related to it.

Institution Responsible for the Site:

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