National World Heritage Action Planning Workshop
March 20-23, 2006

# PAPUA NEW GUINEA TENTATIVE LIST OF WORLD HERITAGE SITES

*Prepared for:*

The Department of Environment & Conservation
Government of Papua New Guinea

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# TENTATIVE LIST SUBMISSION FORMAT

**STATE PARTY:** Independent State of Papua New Guinea
**DATE OF SUBMISSION:**

**Submission prepared by:** Department of Environment and Conservation, Papua New Guinea

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**NAME OF PROPERTY:** The Kuk Early Agricultural Site

**State, Province or Region:** Western Highlands Province

**Latitude and Longitude, or UTM coordinates**
**Centred on:** (55M) BP $^{93}$60N $^{2}$04E
**Grid Zone Designation:** 55 M
**100 000 metre square identifications:** ZU (North) and BP (East)
**Datum:** Australian Geodetic Datum of 1966

**DESCRIPTION:**

**Cultural Landscape**

The property is a cultural landscape representing successive periods of drainage or manipulation of a wetland for plant food production from c.10,000 years ago to the present. Archaeological and palaeo-ecological research at Kuk Swamp since the 1970s has determined that agriculture was practised on the site by at least 7000-6500 years ago (Denham et al. 2003, 2004), or possibly by 10,000 years ago (Golson 1977, 1991; Golson and Hughes 1980; Hope and Golson 1995). The multi-disciplinary investigations at Kuk have confirmed that New Guinea was one of the few places in the world where early and independent agriculture developed (Neumann 2003).

Kuk Swamp is located in a large inter-montane valley in the interior of New Guinea at 1560 m above means sea level. The Wahgi Valley is one of the largest of the inter-montane valleys that run along the highland spine of New Guinea. The Wahgi Valley has a slightly seasonal lower montane humid climate with a mean annual temperature of 19°C and mean annual rainfall of c.2700 mm.

Kuk Swamp is effectively a side-swamp of the much more extensive North Wahgi wetlands. Wetlands formed in the valley bottoms of the highland valleys during the Pleistocene and Holocene. Today these wetlands are intensively cultivated in several densely populated valleys, e.g., Wahgi Valley and Tari Basin in Papua New Guinea and the Baliem Valley in West Papua, Indonesia.

The archaeological site is located on a former agricultural research station that was drained in the early 1970s. The boundaries of the proposed area accord with that of the former Station comprising Ep Ridge to the north, boundary drains to the east and south, and Guga River to the west. The research station was abandoned in the mid 1990s and since then has been occupied by the traditional land holders, the Kawelka – a group of Meldpa language speakers (Strathern 1972; Strathern and Stewart 2000). The current landscape reflects the ditches, roads, houses, tree planting and other activities associated with the development of the research station, as well as the horticulture, houses and everyday activities of the Kawelka.

Although the whole of the Upper Wahgi Valley and other parts of New Guinea, especially the Highland interior, are products of long-term agricultural practices, Kuk Swamp is proposed for World Heritage listing because:

- it has been investigated in greatest detail,
- it preserves evidence of successive periods of human manipulation for plant food production from the beginning of the Holocene to the present,
- it preserves the oldest evidence of plant food production and agriculture in New Guinea, and
- it is the 'type site' against which similar evidence from other sites in the highlands and lowlands of New Guinea is compared.

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## JUSTIFICATION FOR OUTSTANDING UNIVERSAL VALUE

**Criteria met:**
(Please tick the box corresponding to the proposed criteria and justify the use of each below)

| (i) | (ii) | (iii) √ | (iv) √ | (v) √ | (vi) | (vii) | (viii) | (ix) | (x) |
|---|---|---|---|---|---|---|---|---|---|

*(iii) bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared.*

The archaeological remains at Kuk Swamp bear a unique testimony to the origins and development of New Guinean *and* Pacific agriculture. Kuk Swamp preserves archaeological remains – and associated archaeobotanical and palaeoecological remains – that reflect a long history of agricultural development extending to at least 7000-6500 years ago, and potentially to 10,000 years ago. In contrast to early and independent agriculture in several other parts of the world that was based on the sexual reproduction of cereals and other seed-bearing crops, eg Southeast Asia and Southeast China, agriculture in New Guinea was (and still is) based on the asexual reproduction of plants and was reliant on the vegetative propagation of plant parts (see Diamond 1997). These characteristics of New Guinean agricultural practice became incorporated into agriculture across the Pacific.

Today, most of the traditional staples of New Guinean (and Pacific) agriculture are vegetatively propagated, including bananas (*Musa* spp.), taro (*Colocasia esculenta*), yam (*Dioscorea* spp.), and sugarcane (*Saccharum officinarum*). As well as the archaeological

evidence from Highland New Guinea, recent genetic and phytogeographic evidence suggests that many of these plants originated in the New Guinea region and were domesticated there first (Matthews 1995; De Langhe and de Maret 1999; Lebot 1999). Furthermore, most other types of plants were also vegetatively propagated including herbaceous vegetables and some trees, such as *Pandanus* in the highlands and sago (*Metroxylon sagu*) in the lowlands.

*(iv) be an oustanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history.*

Kuk Swamp is one of the earliest and most intensively studied agricultural sites in the world. Multi-disciplinary lines of evidence from Kuk have grounded interpretations that New Guinea is one of the few places in the world where agriculture developed independently (Denham et al. 2003; Neumann 2003). Specifically, Kuk contains archaeological evidence representing successive technological innovations including:

- the early and independent development of agriculture by at least 7000-6500 years ago and potentially by 10,000 years ago;
- the use of mounds to cultivate plants with different edaphic requirements by 7000-6500 years ago; and,
- the use of wooden spade-like tools to dig ditches to drain wetland margins by 4000 years ago.

However, and in contrast to many other parts of the world where agriculture similarly emerged, societies in New Guinea did not subsequently develop marked socio-political hierarchies or 'civilisations'. Instead, traditional societies in New Guinea were relatively egalitarian and characterised by the unique 'big man' institution, where influence is largely consensual and persuasive. The evidence from Kuk Swamp signifies the potential diversity of societal development following the inception of agriculture and challenges unlinear interpretations of human history.

*(v) be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change.*

The archaeological evidence at Kuk Swamp represents an outstanding example of traditional New Guinean land-use, namely various types of plant exploitation and different types of cultivation, that represent changing human-environment relations over ten millennia. The evidence at Kuk Swamp is outstanding because:

- it preserves evidence of successive periods of plant exploitation and cultivation from 10,000 years ago to the present,
- it preserves the oldest evidence of plant food production and agriculture in New Guinea, and
- it is the 'type site' against which similar evidence from other sites in the highlands and lowlands of New Guinea is compared.

The Kuk site represents an organically evolved landscape which has relic (i.e., archaeological remains of past cultivation and plant exploitation activities) and continuing (i.e., ongoing cultivation) components.

**Statements of authenticity and/or integrity:**

The remains of former agricultural practices are mostly buried and preserved underneath deposits that have accumulated in the wetland from the in-washing of sediments from the catchment, from *in situ* peat accumulation, and from air-fall tephras (associated with volcanic eruptions off the north coast of New Guinea). The remains of some recent (within the last 1000 years) ditches and house sites do form surface earthworks in parts of the swamp,

whereas most recent and all the older archaeological remains associated with former cultivation and plant exploitation are buried underground. Excavations undertaken in 1998 and 1999 have confirmed the on-going preservation of buried archaeological remains following the establishment and operation of the agricultural research station in the early 1970s, and following re-occupation of the area by the traditional land-holders in the mid 1990s. Most forms of traditional cultivation do not lead to deep disturbance of the ground, which would compromise buried archaeological remains. Indeed, the in-filling of modern drainage ditches on the station since it was re-occupied by the Kawelka has raised the water-table, thereby waterlogging, hindering root penetration and aiding the preservation of any buried remains.

**Comparison with other similar properties:**

Kuk Swamp would represent the first site of early and independent agriculture to be internationally recognised on the World Heritage List; no other sites from the other regions of early and independent agricultural development – whether in Africa, the Americas, or Eurasia (see Bellwood 2005) - are currently listed on the World Heritage List. Sites such as the Mount Qingcheng and the Dujiangyan Irrigation System in China, Viñales Valley in Cuba, Joya de Cerén Archaeological Site in El Salvador, and the Rice Terraces of the Phillippine Cordilleras in the Phillippines represent much more recent agricultural practices. Although of greater antiquity, the Ban Chiang Archaeological site in Thailand only dates to 5000 years ago. Consequently, sites of early and independent agricultural development – which mark one of the greatest transitions of human history – are not currently represented on the World Heritage List.

# TENTATIVE LIST SUBMISSION FORMAT

**STATE PARTY:** Independent State of Papua New Guinea
**DATE OF SUBMISSION:**

**Submission prepared by:** Department of Environment and Conservation, Papua New Guinea

Name: Olo Gebia E-mail: ogebia@wwfpacific.org.pg

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Institution: World Wide Fund for Nature Ph: +675 278 6638

| | |
|---|---|
| **NAME OF PROPERTY:** | Kikori River Basin / Great Papuan Plateau |

| | |
|---|---|
| **State, Province or Region:** | Gulf, Western and Southern Highlands Provinces, Papua New Guinea |

**Latitude and Longitude, or UTM coordinates:** approx 144.66° / -7.65° in the east to 142.30° / -5.84° in the west. Boundaries will be delineated in consultation with landholding communities and other stakeholders.

**DESCRIPTION:**

**Mixed Cultural/Natural Property**

The property is a mixed cultural and natural site covering over 6% of the landmass of PNG. The Kikori River Basin / Great Papuan Plateau encompasses over two million hectares. There are few landscapes in Melanesia as dramatic with features including the extinct volcano of Mt Bosavi, cockpit and needle karst of the extensive Darai limestone, remarkable Hegigio Gorge and the spectacular Wassi and Wawoi waterfalls.

The Kikori basin / Great Papuan Plateau contains one of the largest remaining tracts of undisturbed forest in the Southern Hemisphere. The catchment spans across nearly all forest types found in PNG, from alpine and montane forests in the north, to increasingly rare intact lowland forests in the south, to the largest block of mangrove forest in the Pacific. The region has about half the bird species richness of the entire North American continent. Included is a rich assemblage of birds-of-paradise species as well as the world's only underground roosting bird. Many species occur nowhere else in the world.

The region represents three Centres of Plant Diversity, two endemic bird areas, and important segments of the G200 New Guinea Central Range Montane Rainforest and the Southern Lowland Rainforest Ecoregions. Ramsar listed Lake Kutubu – part of the Lakes Kutubu and Sentani ecoregion - is the most unique lacustrine habitat in the New Guinea-Australia region and provides the entire habitat of 12 endemic fish species. Equally Mt Bosavi and the Darai

Limestone Karst are of particular importance with high levels of endemism, unique geological formations and extensive cave development.

Over 60,000 people of the Kikori catchment belong to at least 16 different ethnic groups who depend largely on the natural world for subsistence and livelihoods. The forest has significant economic value for timber, ecotourism and non-timber forest products such as the recent discovered valuable fragrant resin eaglewood (also know as agarwood or aloeswood). Lake Kutubu and Mt. Bosavi are host to a number of cultural significant archaeological sites including important burial caves and cave paintings. The unique longhouse cultures of Mt Bosavi and Lake Kutubu are extensively recorded in anthropological literature. Collectively, these natural and cultural resources put the Kikori Basin on the map as an exceptional global treasure.

The Basin is also the site of PNG's first major oil development. A partnership between the oil consortium and WWF has led to the declaration of over 86,000 ha of protected areas. These include the Lake Kutubu Wildlife Management Area (24,057 ha), Neiru WMA (3,984 ha), Libano WMA (8,250 ha) and Sulamesi WMA (49,800 ha). Further interest has been lodged by communities to establish protected areas within the Kikori River Basin.

Development will commence this year on PNG's largest industrial development, a USD 3.5 billion-gas pipeline from the Southern Highlands to Queensland. Proposed road development will place extreme pressure on the environments of the Basin. Many of these threats can only be addressed through coordination under the context of a catchment management programme now being initiated by WWF with key partners. A partnership of NGOs, government, corporate interests offers a possibility for sustainable finance for effective management of the region.

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## JUSTIFICATION FOR OUTSTANDING UNIVERSAL VALUE

**Criteria met:**
(Please tick the box corresponding to the proposed criteria and justify the use of each below)

(i) . (ii) . (iii) √ (iv) √ (v) √ (vi) (vii) √ (viii) √ (ix) √ . (x) √

**Statements of authenticity and/or integrity:**

Natural systems remain in remarkable good condition with only a few limited areas of human habitation. A World Heritage listing would reinforce efforts for catchment management and conservation of the natural, biological and cultural integrity and human survival through sustainable management of resources.

Presence of culturally significant sites in the Kikori River Basin also gives an added reason for the protection of the area. A World Heritage listing will provide a focus for efforts to conserve biologically important areas and promote sustainable economic opportunities such as tourism and forest product harvest.

**Comparison with other similar properties:**

World Heritage Area protects some species that are shared with this region but there are significant differences in species composition, ecosystems, climate and geology.

# TENTATIVE LIST SUBMISSION FORMAT

**STATE PARTY:** Independent State of Papua New Guinea
**DATE OF SUBMISSION:**

**Submission prepared by:** Department of Environment and Conservation, Papua New Guinea

| | | | |
|---|---|---|---|
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**NAME OF PROPERTY:** Kokoda Track and Owen Stanley Ranges

**State, Province or Region:** Central and Oro Provinces, PNG

**Latitude and Longitude, or UTM coordinates: Approx.** 144.43° / -9.50° in the east to 147.11° / -8.46° in the west. Boundaries will be delineated in consultation with landholding communities and other stakeholders.

**DESCRIPTION:**

**Mixed Cultural/Natural Property**

The property is a mixed cultural and natural site covering a significant proportion of the Owen Stanley Ranges near Port Moresby and potentially including the Kokoda Track, Managalas Plateau and Mount Victoria and Mount Albert Edward region.

The Owen Stanley Ranges, through which the Kokoda Track passes, is one of the most biologically important areas in the Asia Pacific. The 3,800 m high Ranges are a significant element of the globally outstanding (G200) South East Papua Rainforest Ecoregion. Extreme altitudinal and climatic variation have produced a rich variety of vegetation types from savanna to monsoon forest, lowland rainforest and cloud forest. Some of the most extensive and least disturbed subalpine herb and grasslands in New Guinea are found on Mount Albert Edward. The Owen Stanley Mountains Centre of Plant Diversity has one of the richest floras of any mountain range in New Guinea with more that 4000 plant species including many local endemics. This exceeds the floral diversity of the entire World Heritage listed wet tropic rainforests of North Queensland.

The Owen Stanley forests provide habitat for endemic birds of paradise, bowerbirds, finches, wallabies, rats and numerous species of butterflies and aquatic insects including a number of endangered or critically endangered species. The Central Papuan Mountains Endemic Bird Area is one of the richest areas for endemic birds on earth with 510 species (almost two thirds of all New Guinea birds) and 40 endemic or near endemic species.

The Laloki/Brown River wetlands is a particularly important dry season refuge for migrant waterfowl from Australia and a staging area for migratory Palearctic shorebirds. The southern flanks of the Range provide part of the water catchment for Port Moresby.

The Koiari and Orokaiva peoples, the traditional owners of the region, retain a subsistence economy augmented by income from a growing tourism industry. Communities strongly support the protection of the historical and natural values of the Track and proudly demonstrate their culture.

The Kokoda Track is iconic in the history of PNG, Australia and New Zealand as the site of a major World War II battle that turned the fortunes of the Japanese in the Pacific. This is PNG's most significant land-based tourism drawcard offering a combination of historical, cultural and natural features. 2000 trekkers walked the grueling ten day journey in 2005 and further growth is anticipated.

The current Kokoda Track Reserve protects an area only 10 meters wide on either side of the track. A Kokoda Memorial Park is now proposed that will protect the historic, cultural and natural values of the region in much larger reserve. A 300,000 ha protected area is also being established on the Managalas Plateau. The Kokoda Track Authority was established in 2005 to develop a coherent management regime for the Track region and a Sustainable Tourism Strategy will be launched in April 2006.

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## JUSTIFICATION FOR OUTSTANDING UNIVERSAL VALUE

**Criteria met**
(Please tick the box corresponding to the proposed criteria and justify the use of each below)

| (i) | (ii) | (iii) | (iv) | (v) | (vi) √ | (vii) √ | (viii) | (ix) | (x) √ |
|---|---|---|---|---|---|---|---|---|---|

**Statements of authenticity and/or integrity:**

Natural systems remain in remarkable good condition with only a few limited areas of human habitation. A World Heritage listing would assist in addressing threats to the region from logging and mining proposals.

Orokaiva and Koiari cultures have withstood massive changes in the last century and are facing further pressures with the growth of tourism. A World Heritage listing will support efforts to effective manage the region in ways that reflects local culture and ambitions, that support national and international interest in tourism and historic site protection and that promotes pride in cultural traditions.

**Comparison with other similar properties:**

There are no existing properties that represent elements of the biodiversity or culture of the south eastern New Guinea. Lorentz World Heritage Area protects some species that are shared with this region but there are significant differences in species composition, ecosystems, climate and geology.

# TENTATIVE LIST SUBMISSION FORMAT

**STATE PARTY:** Independent State of Papua New Guinea
**DATE OF SUBMISSION:**

**Submission prepared by:** The Department of Environment and Conservation


| | | | |
|---|---|---|---|
| Name: | Michele Bowe | E-mail: | mbowe@wwfpacific.org.pg |
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| Institution: | World Wide Fund for Nature | Ph: | +675 852 1763 |


**NAME OF PROPERTY:** Trans-Fly Complex

**State, Province or Region:** Western Province, PNG

**Latitude and Longitude, or UTM coordinates:**
141.00° - 143.36° E / 8.25° - 8.63° S

**DESCRIPTION:**

**Mixed Cultural/Natural Property**

The property is a mixed cultural and natural site straddling the international border of Papua New Guinea and Indonesia. This low-lying region of savannas, wetlands and monsoon forest habitats covers more than 10 million ha. The area is home to some of the largest and healthiest wetlands in the Asia-Pacific region. Combined with the Kakadu World heritage Site, it represents the only environment of its kind in Australasia. Millions of birds inhabit the floodplains of slow moving rivers, and the surrounding savannas and monsoon forests are unique to the Trans-Fly. The area is home to an endemic marsupial cat, flying possums and birds of paradise. Over 50% of New Guinea's total bird population is found in the ecoregion, including 80 species endemic to New Guinea. A complete range of largely intact vegetation types from coastal mangroves through savannas and tropical dry forests includes all representative types of monsoonal climate vegetation.

It is suggested that this site could potentially be a serial trans-boundary nomination with 1) the existing Kakadu World Heritage Site in Australia's Northern Territory with which shares many similar environmental conditions and 2) the adjacent savannas, wetlands and monsoon forests of the Indonesian side of the border in Papua Province. The cultural links across the border with Papua, Indonesia are significant – many groups share languages and cultural traditions and many sacred sites and ancestor routes are important to groups on both sides of the border. The biological links to Kakadu are also significant, as a large percentage of the biodiversity is shared between these two sites. However, the Trans-Fly includes many New Guinea endemic species not found in Kakadu.

**Protection and Management**

The area comprises parts of three Global 200 ecoregions, an endemic bird area and a centre of plant diversity. Part of the area (590,000 ha) has already been designated as a Ramsar site and a site on the Shorebirds Reserve Network. The area also contains approximately 1,310,000ha of existing or currently being gazetted community managed protected areas. The site contains PNG's largest protected area – the 590,000ha Tonda Wildlife Management Area, which is a community managed protected area. The area is lightly populated, most people still living a traditional lifestyle of hunting, gathering and small scale shifting yam cultivation. In PNG most protected areas are managed by a committee of local landowners who decide upon the rules for management. WWF has worked with the Tonda WMA Committee to develop a set of rules that are based on threats to the reserve and have been conducting research into key ecological processes, key species and management concepts to assist the local people to manage the reserve.

On the northern edge of Tonda, contiguous with it, three new WMAs are being established with local landowning communities. The total area of these is approximately 720,000ha. The Trans-Fly protected areas are greater than all the rest of the protected areas in PNG put together. These new protected areas cover significant expanses of monsoon forests and some key wetlands in the south and middle Fly floodplains.

There is increasing demand for cash income amongst the communities of the Trans-Fly and there is evidence of some unsustainable wildlife harvest of certain species such as Saratoga – a species of fish that is traded over the border with Indonesia. WWF is working with Traffic and local landowners to develop management plans for key species of commercial value.

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**JUSTIFICATION FOR OUTSTANDING UNIVERSAL VALUE**

**Criteria met**
(Please tick the box corresponding to the proposed criteria and justify the use of each below)

| (i) | (ii) | (iii) | (iv) | (v) √ | (vi) √ | (vii) | (viii) | (ix) | (x) √ |
|---|---|---|---|---|---|---|---|---|---|

*(v) to be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;*

Over the entire extent of the Trans-Fly there are over 60 cultural groups, whose lives, customs, languages and knowledge are linked inextricably with the landscapes of the region. In the PNG part here proposed for tentative listing there are about 25 groups that maintain an oral tradition of their ancestor's creation routes across the ecoregion – the routes of which can be followed by reference to natural features in the landscape. These historical beings have informed clan structures, totems and the naming of the landscape and are a vital link between traditional and modern scientific methods of landscape management and conservation. The biodiversity values of the Trans-Fly are largely maintained by a system of anthropogenic burning and therefore the cultural and biodiversity values of the area are inextricably linked. Traditional burning patterns have maintained the open grasslands. Careful burning during the early dry season protects vital pockets of woodland and rainforest patches and sago groves from destructive hot late dry season fires. The patchwork of gardens in monsoon forest maintains a forest "edge" structure that attracts the endemic Greater Bird of Paradise and Bronze Quoll. In some places a relict form of mound agriculture is still visible in the

landscape from a time when crops were planted in raised beds to enable planting during periods of flood.

*(vi) to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria);*

As with most places in Papua New Guinea, cultural traditions are inextricably linked to the environment. Above it is explained how the oral traditions and beliefs represent an important component of the need to conserve the area.

*(x) to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.*

The Trans-Fly is a large expanse of over 1.3 million hectares and includes the full range of southern New Guinea lowland aquatic environments ranging from brackish mangrove lined tidal streams to pure freshwater habitats including rivers, creeks, swamps, ponds and lakes. These variable aquatic habitats are set within an equally rich complex of contrasting terrestrial environments dominated by rich mangrove forests, open savanna and monsoon forests.

The Trans-Fly is considered to be potentially the richest area in New Guinea for freshwater fishes, containing some 111 species belonging to 40 families and 75 genera. It is also the richest area in New Guinea for reptiles with some 97 species being recorded or likely to be found there. This includes 9 species of turtles, 2 species of crocodiles, 48 species of lizards and 38 species of snakes. Six of the 13 species that are endemic to the south coast of New Guinea are thought to be endemic to the Trans-Fly. Seventy-two native terrestrial mammal species are recorded including one monotreme species, 20 marsupial species, 17 rodent species and 34 bat species. This mammal fauna is considered to be relatively species rich, comprising one-quarter of all mammal species recorded from mainland New Guinea. One species is endemic to the Trans-Fly – the marsupial cat called the Bronze Quoll (*Dasyurus spartacus*). Although eleven mammal species that occur in the Trans-Fly are found nowhere else in New Guinea, the range of ten of these extends to northern Australia with which the Trans-Fly contains many similar habitats.

While the species diversity of mammals, fish and reptiles is high, it is the avifauna for which the Trans-Fly is considered outstanding. The region contains approximately 360 species – half of all known bird species from the island of New Guinea, including 90 species that are endemic to the island. It is considered to be a vitally important site regionally for populations of birds that visit the area for at least part of the year. Six species are classified as Range Restricted, four are Globally Threatened, and three are locally endemic species to the Trans-Fly.

The Trans-Fly area contains the whole catchment of two main rivers – the Morehead and the Bensbach. The whole area floods in the wet season, joining the two catchments into one massive floodwater system which is pristine.

**Statements of authenticity and/or integrity:**

Trans-Fly cultures retain land use practices and traditions with an ancient lineage. These are experiencing dramatic change particularly in areas close the border. A World Heritage listing will assist to document, revitalise and promote a pride in these traditions. Natural systems remain in remarkably good condition with only a few limited areas of human habitation and

impacts. The area is remote and rarely visited by outsiders. There are no commercial flights into the area and very few bush tracks. Motorised vehicles are rare. Various studies have recommended that this area receive protection and assistance with management as a result of their findings, but more information is needed to inform management interventions. No major roads cross the region and the human population is sparse.

**Comparison with other similar properties:**

The Trans-Fly can only be compared to similar large tropical wetlands in Africa and South America: the Okavango delta, the Pantanal and the Venezuelan-Colombian Llanos. But the comparison must be weighed carefully, because the Trans-Fly is located in an island, is of very recent origin (Pleistocene), and thus for these reasons alone ecological theory predicts lower diversity. Perhaps the most important aspect of the Trans-Fly is that it represents the only ecosystem of this kind in Australasia.

The Pantanal, a part of which was only recently nominated as World Heritage Site, is also of recent origin (also Pleistocene – previously a desert), but is affected by highly diverse ecosystems, such as the Amazon and Brazilian Atlantic Forests, the Chaco and the foothills of the Andes. Not surprisingly, the diversity of mammals and birds in the Pantanal is higher than in the Trans-Fly (124 and 463 species in Pantanal, respectively, vs. about 70 and 360 in Trans-Fly). However, the comparison is inappropriate. First, while the Trans-Fly encompasses 1.3 million hectares, the Pantanal encompasses 16 million hectares; that is, an area about 12 times bigger than the Trans-Fly. It is important to note that the connectivity of Pantanal to other ecosystems means that it contains fewer endemic species in absolute numbers and in percentages compared to the Trans-Fly.

The Okavango delta in Botswana is also an important wetland, housing millions of migratory species that arrive seasonally in their migrations across the African continent and into Europe and Asia. This ecosystem is much older than the Trans-Fly, and is surrounded by large landmass areas of high diversity. Much like Pantanal, the Okavango delta has fewer endemic species in absolute numbers and percentages than the Trans-Fly.

The Llanos of Venezuela and Colombia are similarly seasonally flooded wetlands and a matrix of habitat types. Their origin is recent, as the Orinoco and Magdalena rivers drifted eastwards with the raise of the Andean cordillera 5 million years ago. These are also an important ecosystem for several migratory species, especially wildfowl, and are adjacent to the region with the highest avian diversity in the world: the Andean foothills. The Llanos are usually not a major stopover site for migratory species from North America. Most species follow the Andes mountain ranges to South America, including the Pantanal and the Argentinean Pampas. Similar to Pantanal, the Llanos house species of wildlife typical of Amazonian forests, such as tapirs and anteaters, spider monkeys and many species of parrots. Endemism is also very low.

The low endemism of the Pantanal, Okavango delta and the Llanos is an important metric of the uniqueness of the Trans-Fly. The endemism stems from two peculiarities of the Trans-Fly: it is found in an island and its geomorphology and origins are unique in Australasia. Regionally, the Trans-Fly is very rich in bird fauna and no other site in the region compares to it, including Kakadu World Heritage Site.

# TENTATIVE LIST SUBMISSION FORMAT

**STATE PARTY:** Independent State of Papua New Guinea
**DATE OF SUBMISSION:**

**Submission prepared by:** Department of Environment & Conservation

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Institution: Conservation International Telephone**:** +675 6410349

**NAME OF PROPERTY:** Milne Bay Seascape (Bramble Heaven, Conflict Group, Lunn Island, Jormard Island and Samarai Island).

**State, Province or Region:** Milne Bay Province- Papua New Guinea

**Latitude and Longitude, or UTM coordinates:**
Conflict Group of Islands and Atolls: Latitude: 10º 45'50.00 S; Longitude 151º 46' 16.32 E
Lunn Island: Latitude: 10º 47'11.76 S: Longitude: 152 007.92 E
Bramble Island: Latitude: 11º 11'09. 24 S; Longitude: 152º 01'40.44 E
Jormard Islands: Latitude: 10º 15'08.64 S Longitude: 152º 08' 11.76 E
Smarai Island: Latitude: 10º 36' 44.51 S; Longitude: 150º 39'45.7 E

**DESCRIPTION:**

**Mixed Cultural/Natural Properties.**

This property is a mixed cultural and natural serial site comprising five (5) sites, largely uninhabited coral atolls and islands with numerous coral reefs system, which are currently earmarked as proposed marine protected areas targeted under the current Community Based Coastal and Marine Conservation Programme undertaken by Conservation International and the PNG Government and Samarai Island a PNG Government declared National Heritage Island.

The property cover range of latitudes depicting low-lying coral atolls and islands with variations in reef system and habitats as well as encompassing as International Shipping Route featuring many ship wreckages in Bramble Haven and Jormard Islands and Navigational Lighthouses to Samarai Island a colonial establish town in Papua.

The Conflict group of islands consists of a total number of 20 coral atolls islands. The 3 large islands include Irai, Panasesa Auriora and Panarakum Island. The Conflict group is an atoll of small coral cays with diversified ecosystems that is interconnected by the continental shelf that runs from Irai to Auriora Island. A 2000 rapid assessment program by Conservation

International and Commonwealth of Scientific and Industrial Research Organisation revealed that the island of Irai was significantly diverse in the number of fish and coral species. The richness in biological diversity and the colonial history that the island has makes it both biologically and historically significant site that deserves recognition under the world heritage list.

The Bramble Haven group of islands consists of a total of 5 coral cay islands namely, Punawan, Dupere Islets, Siva, Panapwa Awanagamwana Islands. These islands are important habitat to marine fauna and flora. These island lies on a reef platform of approximate depth range of 2-25 meters. The southern part of these groups of islands is moderately exposed fringing/lagoon type reefs with gentle slope to deep water with sand and coral bommies in the shallow and coral ridges running horizontally across the slope. These islands house species that have been listed in the IUCN Redlist. Green, hawksbill and loggerhead turtles often utilize these areas for nesting, mating and foraging. This area is commercially exploited at a very low level. Factors that contributes toward this include the location of these islands in relation to the exploited human settlement. Mode of transport by the local communities using motorized boats is also very limited. The (X) islands are significantly important as other sites in Milne Bay in biodiversity distribution. With vast reef area and the extensive Long/Krossman reefs provides for a countless number of other important species such like the Humphead maori Wrasse (*Cheilinus undulatus*) and the whale shark *(Rhincodon typus)*. This area provides to be one of the last frontiers that is extensive and is cross-cultural.

Lunn island is further located east of the main Conflict group of islands. Lunn Island is also records high number of turtle nesting every year. The most eastern side of Lunn is a complex of limestone and calcareous rubble which consists of narrow fringing, irregular reef sloping down to a depth of 15 meters (approx), then abrupt, nearly vertical drop-off to narrow bench at approximately 50-55 metres before dropping steeply into the abyss. The coral cover and species diversity is high due to a wide range of habitats. The shore area is not a nesting area as compared to the other sides of the island. The northwestern end to the Southern part of the island accommodates high nesting of green and hawksbill turtles. A survey by Conservation International revealed that Lunn Island recorded the highest turtle nesting per night compared to the other islands in the Conflict. The biodiversity extends to endangered species such as the Maori Wrasse *(Cheilinus undulatus)*.

**J**omard Island is a small coral cay island constructed on reef platforms, which have reached sea level during the Holocene. The island is fringed by a coral reef of significant size. The morphology of the fringing reef varies from site to site due to the different physical processes that take place on different parts of the island (e.g. wind and wave action). Without the current protection provided by the fringing reef, the physical processes evident will ultimately erode the island away. The fringing reef of Jomard Island also provides a significant habitat for marine species such as fish, crustaceans, corals, bivalves and other marine organisms. The marine life surrounding Jomard Island is extremely diverse in nature and has been identified as a sensitive habitat of environmental significance. The beaches at Jomard Island are made up of fine sands and coral rubble. Ground vegetation lines the upper limits of the beach providing beach stability and protection from eroding process, while the litteral zone (intertidal zone) is home to corals that have adapted to withstand intense ultraviolet radiation, desiccation and high salinities. The reefs surrounding Jomard provides very good shelter for foraging and mating activities for turtles. Furthermore, these diverse reef systems provides a lot to other animal species like fish, clam and sea cucumber who seek food, refuge and thrive in this healthy ecosystem. The beaches of Jomard Island and its fringing reefs accommodate a number of globally endangered species like turtles and others. The terrestrial environment provides very good shelter for birds like pigeons, crows and sea eagles. Jomard Island has

been identified to have the largest turtle-nesting rookery in the southern part of Milne Bay Province.

Samarai Island once known as the 'Pearl of the Pacific' is a historic island in Milne Bay Province. The island, with land area 0.1208 square mile was the first administrative and commercial center for Papua Administration during the height of European expansion and colonialism in the Pacific. The island is relatively smaller but still contains some of the buildings established during the colonial era including the Memorial Hall, District Commissioners resident, Old Steamship and Burns Philips buildings and the Government Wharf. Samarai Island has highly disturbed reef in front of the town jetty, wharf pilings and wreckage providing abundant shelter for variety of fishes, an unusual array of encrusting corals including the second only colony of Acanthastrea minuta ever recorded; mostly rubble bottom contains sparse coral growth; azooxanthellate (non reef) corals, primary Tubastrea, a visual spectacular. The cold up welling areas within Samarai are known habitat in New Guinea for a rare Black velvet angelfish Chaetodontoplus melanosoma quite different from those found in Indonesia, Philippines and Japan. The Milne Bay population differs in having a pale head instead of a pale back as in fishes from other areas, which represent an enigma and may be a separate endemic species to Samarai.

Conflict Group, Bramble Haven, Jormad, and Lunn Islands during the traditional period and up to current period, are used extensively as important traditional pantry areas for nearby islands from Brooker, Panaeaty, Engineer Group, Ware and Misima who have traditional ties with each other due to presence of marine turtles and their eggs, giant clam species, fishes and marine products such as bechedemer and trochus shells.

Conflict group of islands including Lunn Island and possibly Bramble Heaven and Jormard Islands holds the key as some of the marine biodiversity hotspot in the province or within the Coral Triangle together with other sites surveyed in the province, as per the Conservation International Rapid Biodiversity Assessment conducted during 1997. In Conflict and Lunn Islands, where the Rapid Biodiversity Assessment was conducted during 1997, biological the reefs have extensive areas of coral coverage, very high species diversity with an average of 220 species of fish per site compared to the Great Barrier Reef and other species new to science. All of these reefs are in pristine environmental condition with no effect of destructive fishing practices such as dynamite fishing, cyanide as well as coral bleaching within the coral triangle.

The Conflict Group together with Bramble Haven, Lunn Island and Jormard Island are favourable Green, loggerhead and Hawksbill Turtles nesting and breeding sites, habitats for migratory marine and shore birds nesting sites, as well as for all giant clam species.

**Protection and management.**

The Conflict Group of Islands is currently targeted under the Community Based Coastal and Marine Conservation Programme for the province as a Marine Protected Area (MPAs). The recent National Executive Council (NEC) meeting in Alotau declares Samarai Island as a National Heritage Island and the Central Agency Coordination Committee (CACC) visit to the island pledging funding support to renovate the monumental colonial establishment on the island clearly support the cause of Samarai Island to be placed under the Tentative List of the World Heritage Site.

## JUSTIFICATION FOR OUTSTANDING UNIVERSAL VALUE

**Criteria met**
(Please tick the box corresponding to the proposed criteria and justify the use of each below)

| (i) | (ii) | (iii) √ | (iv) | (v) √ | (vi) | (vii) √ | (viii) √ | (ix) √ | (x) √ |
|---|---|---|---|---|---|---|---|---|---|

**Criteria for nomination**

*(iii) bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;*

Samarai Island is one of the important cultural heritage sites of PNG. The island cultural heritage exhibits an important interchange of values during the colonial era of European Administration in Papua New Guinea. It can also be seen as the monument of PNG colonial administration as well as for trade and commerce. The island was an important trade route between Australia and Rabaul by the British Colonial Power at the height of European expansion in the Pacific. It was a site, which was seen as a pride for Milne Bay and has, transformed much of Milne Bay societies from the cannibalism to Christianity and to commercial enterprises. The establishment of trade and commercial centre at Samarai Island during the colonial period resulted in the establishment of many coconut plantations in the province with one being on Panaesea Island in the Conflict Group, which collapse after the economic recession.

*(v) be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change.*

Lunn Island, Jormard and Bramble Haven Islands are located within the path of the International Shipping Route. The islands are sites of the Navigational Light Houses. Jormard and Bramble Heaven contain numerous shipwreck sites and are threat to large-scale oil spill accidents from shipping mishaps. Panaesea Island within the Conflict Group was previously, a colonial run coconut plantation site, during the colonial era, but was abandon due to the economic recession during the 1920s.

All atolls in these series are traditional pantries reserves from people from neighbouring islands. However with the commercialization of many marine resources such as giant clams, black lip pearl and oyster, trocus shell, bechedemer and shark fin, outsiders like illegal foreign fishing vessels and local alike have contributed to severe pressure on the ecosystem thus bringing confrontation between different traditional users in the region.

Listing as World Heritage Site and implementation of the management plan with local resource owners will help preserve a conservation heritage and protect many of the threatened endangered species like green and hawksbill turtles as well as giant clams and other reef fish species with high commercial values.

*(vii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.*

These islands and atolls are classic, iconic manifestation of low-lying coral islands and atolls, characterizes by extraordinary natural beauty, white sandy beaches with waves pounding onto the beaches, beautiful sunsets, deep blue lagoons, azure offshore open shore, beautiful and

pristine coral reef formations teeming with diverse marine life forms and frequently trafficked by International Liners and Ships travelling at an interval.

*(viii) be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.*

This is a series of evolutionary process in gemporphology process rarely represented in the World heritage List, demonstrating the geological process of coral reef formation and in building of coral islet from on going deposition and cementation of coral reef materials from wave action, actively maintaining proximity to sea level rise after million of years ago. Among the relics and deep layers of the coral mineral deposition, a whole geological history can be read including information on world climate and sea level changes, and the evolution of coral and the reefs.

*(ix) be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;*

The coral atolls and islands described in this series have in particular a healthy reef system without any sign of diseases or malfunction and represent examples of marine biodiversity with some of the global endangered keystone species with some species new to science. There is no significant coral reef bleaching experienced within the reef systems due to their exposure to the cooler water temperature and strong ocean currents. In Milne Bay Province and likewise in all of the coral islands and atolls within this list are expose to periodic strong current mostly influenced by the tidal cycle and the occurrences of physical barriers, usually narrow passages between reefs and islands, thus contributing to the richest sites for fish assemblages and healthy reef system.

*(x) contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.*

Based on the CI and SPREP turtle-tagging programme, many of these islands are nesting sites for the Green and Hawksbill turtles, the most frequent sites being, Lunn Island, Conflict Islands, Bramble Haven and Jormard Island Group.

Apart from that, these series of islands also contain and support exceptional population of giant clam species, as well as various other coral reef habitats and species and are often frequent by migratory sea birds colonies ranging from seagulls, terns, frigate birds, herons, ospreys, beach stone curlew, kites, eagle, sand pipers, egrets, black noddys, brown booby, shrub fowls, ground doves, nicobar pigeons, imperial pigeons, white eye, fly catchers, white eye, fan tails and kingfisher.

**Statements of authenticity and/or integrity**

In general, the integrity of these sites are that they are entirely and holistic atolls ecosystem containing all composite features of all low-lying atolls (perimeter reefs, passes, lagoons, patch reefs, beaches and islets) for most parts uninhabited, isolated form each other to some degrees and from large islands surrounded by open ocean. This provides sufficient size for ongoing functioning of the natural system. The marine environment reef system has very high biodiversity especially along the Conflict Group and Lunn Island, showing wide range of

species with average 220 species per site demonstrated the system is intact including migratory species such as turtles and pelagic species.

In the case of Conflict Group, this site is recommended for protection under the Conservation International Rapid Biodiversity Assessment conducted during 1997 due to high rate of marine biodiversity.

The Lunn and Jormard Islands for example which also contain the large nesting sites for green turtles are currently being considered by authorities to be protected to preserve the marine turtle nesting sites.

**Comparison with other similar properties**

Milne Bay Province harbors one of the most environmentally pristine areas of coral reefs remaining in the Coral Triangle, biologically diverse, and Conflict Group, Lunn Island and other sites covered are no exception; contain many of the keystone species. During the 1997 Conservation International Rapid Biodiversity Assessment in Milne Bay rated many of the sites in the province including those in Conflict Group have very high biodiversity in comparison with similar size areas within the Indo-Pacific region.

In Milne Bay province most of the extensive coral reefs system and its biodiversity components are still undocumented which could also increase the number of coral reef species, reef and shore fish faunas and molluscs in the province exceeding other regions within the coral triangle. In Milne Bay Province along, there are possibility that in total, 420 coral species may occur in the region, which is higher than the Australian Great Barrier Reef World Heritage Property, Vanuatu with 296 species and possibly 410 species in Philippines covering Tubataha Reef Marine Park, World Heritage Property.

The islets within Conflict Group, Bramble Haven and Jormard also serve as a nesting sites for green and hawksbill turtles as well as other avifauna as such the Nicobar Pigeon restricted only to certain location within Jormard Islands.

# TENTATIVE LIST SUBMISSION FORMAT

**STATE PARTY:** Independent State of Papua New Guinea
**DATE OF SUBMISSION:**

**Submission prepared by:** Department of Environment and Conservation, Papua New Guinea
Collaborators: David Gill, Jean-Paul Sounier, Andrew Eavis, Julia James, Joe Maeva, Florence Paisparea, Maureen Ewai, Leonardo Salas

Name: Prof. Elery Hamilton-Smith, AM, D. App.Sci. (on behalf of DEC)
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P.O. Box 36, Carlton South, Victoria 3053, Australia.

**NAME OF PROPERTY:** The Sublime Karsts of Papua New Guinea

**State, Province or Region:**
East New Britain Province: Nakanai Range
Southern Highlands Province: Muller Range
Western Province: Hindenburg Range

**Latitude and Longitude, or UTM coordinates**
Nakanai: 150° 40'E – 151° 40' E; 5° 20'S – 5° 55'S
Muller Range: 142° 10 E – 142° 50' E; 5° 30' S – 5° 50'S
Hindenburg: 141° E – 142° E; 5° S – 5° 30' S

**NOTE**
It is intended that the three locations named in this listing will be progressively nominated as adequate information can be assembled on each and as agreement of landholders and other stakeholders are ensured.

**DESCRIPTION:**

## Nakanai

The Nakanai Mountains is an area of outstanding natural beauty on the Island of New Britain, Papua New Guinea. To the north the mountain range is dominated by a group of spectacular volcanoes. It is bounded on the east by the Kol Mountains and to the west the Kapiura – Ania Divide which divides the Nakanai Mountains from the Whiteman Range.

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**JUSTIFICATION FOR OUTSTANDING UNIVERSAL VALUE**

**Criteria met:**
(Please tick the box corresponding to the proposed criteria and justify the use of each below)

| (i) | (ii) | (iii) | (iv) | (v) √ | (vi) | (vii) √ | (viii) √ | (ix) √ | (x) √ |
|---|---|---|---|---|---|---|---|---|---|

*(v) An outstanding example of a traditional human settlement, land use and sea-use which is representative of a culture (or cultures) and human interaction with the environment when it has become vulnerable under the impact of irreversible change.*

The cultural significance of the indigenous clans is a vital and integral part of the Nakanai Mountains. Their traditions and beliefs are as important as the biodiversity and caves of this unique part of the world. As in many parts of Papua New Guinea, traditional culture and life-style remains relatively intact, in spite of persistent modernism. The bond to the traditional lands provides a remarkably stable basis for both community and personal sense of identity. It offers a stable cultural basis from which the people have been able to adapt to and function well within the culture of modernism without abandoning their traditional culture. In the Nakanai, this means that the various villages generally remain true to their cultural traditions, pursing a hunter-gatherer lifestyle integrated with simple agriculture.

*(vii) Contains superlative natural phenomena and areas of exceptional natural beauty and aesthetic importance.*

The geological history covers a period of 43 million years and the mountains exhibit rapid uplifting, some of the highest recorded. The majority of the mountain range lies within the Yalam limestones and is a karst landscape of limestone up to 1.5 kilometres in thickness, deposited over a period of 17 million years. The limestone regions contain numerous white water rivers situated in spectacular one kilometre deep gorges. Large rivers can be seen issuing from caves as beautiful waterfalls from high above river level. There are many massive sinkholes with collapsed dolines up to 400 metres deep and 500 metres in diameter. At the base of the dolines some of the world's largest and most turbulent underground rivers flow, some of them at over 20 tons of water a second in caves of outstanding natural beauty and of immense proportions.

The caves are of international importance and are unique as they are considered to be among the most active and turbulent river caves in the world and are certainly some of the most technically difficult caves in the world to explore. Muruk Cave is 17 kilometres long and 1178 metres deep, the deepest cave in the southern hemisphere and one of the most beautiful 1000 metre deep caves in the world. The entrance pitch of Nare is one of the most impressive known being 250 metres deep with a massive river flowing along the base into one of the largest river passages in the world. Minye Cave possesses one of the biggest known pitch

entrances at 410 metres in depth. At the bottom a river, carrying 15 cubic metres of water per second, roars into the immense cave.

Kavakuna is also a giant doline with its 392 metre deep entrance pitch. One side is not vertical so this cave is suitable for adventure eco-tourism. A further newly discovered cave is more difficult of access, but does provide for a journey of only medium difficulty and great beauty, so may be appropriate for visitors seeking a degree of challenge.

The coastal regions are also of exceptional natural beauty and exhibit raised coral reefs and terraces up to 200 meters above sea level with numerous pure white coral sand beaches fringed with palms.

It must be emphasized that the terrain is such that much of it remains in pristine condition and is totally unexplored. The village people rarely venture more than 2 km. radius from their village.

*(viii) An outstanding example representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of land forms, and significant geomorphic physiographic features*

Although the very real problems of access have constrained research at this stage, and the region is still far from being fully understood, the geomorphology of the karst certainly has a multitude of distinctive features which result from its turbulent history of tectonic movement, volcanism, heavy rainfall, limestone deposition and intense karstification.

*(ix) Outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal and marine ecosystems and communities of plants and animals*

As with so many of the isolated areas of Papua New Guinea, the Nakanai is unique in its geological evolution and its biodiversity. In particular, it demonstrates high levels of localization and endemism, with various adaptations to the remarkable karst environment. Over 20 new species of troblobitic or stygiobitic fauna have been collected from the caves, although few of these have yet been named and described.

The mountains range in altitude from sea level to 2185 meters and are predominantly covered by primary tropical rain forest of lowland and montane types but with relatively few large trees. . Although the vegetation has not yet been adequately studied, it is particularly rich in epiphytic species and is considered of high biological importance. A vast range of both flora and fauna has been identified; many species are endemic to New Britain and are found nowhere else on earth. This is only a small proportion of the estimated total and no doubt there will be thousands more species identified with further research.

There are also a number of ecologically important Mangrove swamp forests. Estuarine Crocodiles and Leather Back Turtles inhabit the coastal waters along with a vast variety of marine species. The pristine and biologically important reefs lie close to shore with a huge diversity of coral forms and marine life.

*(x) The most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.*

Although faunal and floral inventories are only at an early stage, there are at least eight species of endemic or near-endemic mammals, and at least four of these are recognised as endangered. Similarly, there are 22 endemic or near-endemic species of birds, including eight that are recognised as threatened.

**Statement of authenticity or integrity**
The ranges and plateau have only a very sparse human population, with only small villages generally on the lower lands. Various areas of flat or near-flat land are used for cultivation, but then once harvested are left to lie fallow until secondary forest is re-established. Some natural disturbance results from such causes as earthquakes or landslides. Thus, one can say that the natural forest has remained very much in its original but nevertheless, is in a dynamic and constantly changing state.

**Comparison with other similar properties**
As already emphasized, the Papua New Guinea environments must be recognised as distinctive. None of the other major underground rivers share the continuous volume and turbulence of the Nakanai Rivers. The giant Baliem River system in the Lorentz WHA of West Papua (and several other underground rivers) is of similar volume only during short periods of massive flooding which may not even occur every year. Aerial reconnaissance only suggests that a more comparable example may lie in a totally unexplored region of Halmahera in Indonesia.

## Muller Plateau

The surface terrain of the Muller Plateau is extremely inhospitable and difficult to traverse. The area being proposed for inclusion here is in fact virtually uninhabited.

### JUSTIFICATION FOR OUTSTANDING UNIVERSAL VALUE

**Criteria met:**
(Please tick the box corresponding to the proposed criteria and justify the use of each below)

| (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) √ | (viii) √ | (ix) | (x) √ |
|---|---|---|---|---|---|---|---|---|---|

*(vii) Contains superlative natural phenomena and areas of exceptional natural beauty and aesthetic importance.*

The Muller Plateau has, even in comparison with other Papua New Guinea sites, a very complex geological history and structure. The karst occurs in the Cretaceous Ieru formation, the Oligocene-Miocene Darai Limestone and a series of younger marine sedimentary rocks with some volcanic and alluvial deposits of Pleistocene or even Holocene age. Each of these has a diversity of interbedded limestones, siltstones and mudstones.

The whole area has been subject to faulting and folding as a result of continuing tectonic movements. At the same time, joints have often been enlarged by the heavy rainfall of the region and so added to the complex structural arrangements. In turn, the underground

hydrology reflects this complexity with a network of branching distributaries many of which may later coalesce into major drainage channels.

There are a number of immense dolines, measuring between 100m & 300m in diameter, and generally occurring on siltstone which has collapsed into solution cavities in the underlying limestone.

The overall result is a very complex surface landscape with many caves, of which the two major systems are long and deep complex networks. Atea Kanada has been surveyed to 35 km. and Mamo Kanada to 55 km, but with many unexplored areas remaining. These caves are again particularly spectacular and challenging and very adequately demonstrate the sublimity phenomenon upon which this nomination is based.

*(viii) An outstanding example representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of land forms, and significant geomorphic physiographic features*

While parts of these have large high-energy rivers that characterize other areas, there are also high-level tunnels that no longer carry streams and so provide lower energy areas. This has in turn created an environment that has fostered the genesis and evolution of a rich invertebrate fauna. It also provides areas which have yielded palaentological and clastic deposits which again will further our understanding of the karst history.

*(ix)Outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal and marine ecosystems and communities of plants and animals*

The invertebrate fauna of these caves is the richest discovered to date in Papua New Guinea. Many species remain undescribed and un-named, but it is clear that the fauna as a whole will provide an excellent opportunity for evolutionary and ecological research.

There have not been any adequate systematic surveys of the surface biota. We only know that in general, the montane forests of the Central Cordillera (within which the plateau is located) have some of the most diverse biotic communities of the country.

*(x) The most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.*

Again, this criterion is currently data deficient, but further studies will be carried out prior to nomination.

**Statement of authenticity or integrity**
The Plateau remains uninhabited and is undergoing little change other than that which is natural and endemic to the geological instability of the country.

**Comparison with other similar properties**
It is difficult to identify a World Heritage property that is genuinely comparable with this. Probably that which most closely approximates is Gunung Mulu (Malaysia), but the geological structure and hence morphology of the karst is totally different, and hence, so is the biodiversity.

## The Hindenburg Wall

The geological and geomorphic history is probably even more complex than that of the Muller Range. The Darai limestones are extremely variable and interbedded with shales and siltstones. Chert nodules and distinctive "fossil" forms of uncertain origin are common. Then there are a number of faults and anticlines from tectonic change. The giant scarps of the Hindenberg wall and the Bahrman Range give rise to unique patterns of air movement that in turn have sculpted the rock surface. Various phases of tectonic change and of valley glaciation caused major changes in hydrological patterns and cave morphology. Meanwhile the surface was shaped by erosion into towerkarst, then collapse of successive phases of towerkarst. In broad terms, the region is characterised by the mountain scarps on north and south.

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**JUSTIFICATION FOR OUTSTANDING UNIVERSAL VALUE**

**Criteria met:**
(Please tick the box corresponding to the proposed criteria and justify the use of each below)

| (i) | (ii) | (iii) √ | (iv) | (v) | (vi) | (vii) √ | (viii) √ | (ix) √ | (x) √ |
|---|---|---|---|---|---|---|---|---|---|

*(iii) a unique or at least exceptional testimony to a cultural tradition or to a civilization which living or which has disappeared.*

Many small caves or simple rock overhangs have been inhabited over very many years. These may contain various domestic artifacts, bones and other debris from food, and a number have painted markings on the walls. These are painted with mineral pigments, most commonly in white but at times either red or black. Much more importantly, this is the only known site in Papua New Guinea where not only were the cave entrances used by the people as shelter, but they also entered deep into the dark zone of the caves, leaving behind well-preserved evidence of their presence. The caves contain both paintings and carved rock art at least as far as 700 metres from light.

*(vii) Contains superlative natural phenomena and areas of exceptional natural beauty and aesthetic importance.*

This area has a spectacular surface landscape, largely because of the dominating Hindenburg Wall – the northern scarp of the range, rising to a maximum level of some 2000 m. It is rich in both major surface karren and caves, some of an immense size.

*(viii) An outstanding example representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of land forms, and significant geomorphic physiographic features*

As is often the case, the caves contain a record of the very complex past geo-history of the region.

*(ix)Outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal and marine ecosystems and communities of plants and animals*

The most striking and unusual example is the presence of polychaete worms (and perhaps some other species) that are a relict of the last incursion of the sea. They have obviously

evolved from marine ancestors and are now adapted to the freshwater environment. The endemic species of crabs and some other smaller crustaceans are heavily infested with parasites belonging to an obscure group known as Temnocephala. It again symbolizes the complexity of the country's history in that these species occur only in a site so far distant from the current shorelines.

The fauna includes a multitude of other endemic cave-adapted invertebrate species. There is also a rich guanophilic fauna living on the dung of bats, cave swiftlets and cuscus (an otherwise arboreal marsupial) which shelter deep within the caves.

Surface biodiversity is particularly rich with a mixture of high altitude grasslands and wet montane forest with high levels of endemism. However, more detailed analysis is required to distinguish vegetation records from the Star Mountains area of Telefomin, the Muller Plateau and the Central / Eastern Highlands. The vertebrate fauna has been shown to be one of the richest in Papua New Guinea and exhibits affinities with that of West Papua. .

*(x) The most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.*

Again, this criterion is currently data deficient, but further studies are currently in progress. Studies sponsored by the Ok Tedi copper mine revealed the presence of a unique and highly diverse belt of trees of the family Myrtaceae (of the genus *Syzygium* and related genera). Bird diversity is also among the highest in New Guinea, it being a major destination for birdwatchers.

**Statement of authenticity or integrity**
Much of the area is uninhabited; most of the caves have only been entered by a single expedition. It is in a less disturbed state than virtually any other part of the country.

**Comparison with other similar properties**
It is difficult to identify a World Heritage property that is genuinely comparable with this. Probably that which most closely approximates is the Lorentz WHA, situated in West Papua at the other extremity of the Star Mountains. However, there are many differences in the nature of the terrain and certainly in the biodiversity.

# TENTATIVE LIST SUBMISSION FORMAT

**STATE PARTY:** Independent State of Papua New Guinea
**DATE OF SUBMISSION:**

**Submission prepared by:** Department of Environment and Conservation, Papua New Guinea

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Institution: World Wide Fund for Nature Ph: +675 852 1763

**NAME OF PROPERTY:** Upper Sepik River Basin

**State, Province or Region:** East and West Sepik Provinces, Papua New Guinea

**Latitude and Longitude, or UTM coordinates**: approx 143.79° / -5.03° in the east to 141.28° / -3.97° in the west. Boundaries will be delineated in consultation with landholding communities and other stakeholders.

**DESCRIPTION:**

**Mixed Cultural/Natural Property**

The property is a mixed cultural and natural site covering the middle and upper reaches of the Sepik River basin including slopes of the Central Range and potentially the Torricelli and Prince Alexander mountains.

The Sepik River at 1126 km in length and covering an area of 7.7 million hectares is one of the world's greatest river systems. It is the largest unpolluted freshwater system in New Guinea and among the largest and most intact freshwater basins in the Asia Pacific. The diverse habitats of the basin rate as globally significant on a number of biodiversity indices. The area contains two Global 200 eco-regions, three endemic bird areas and three centres of plant diversity. Vegetation types, at altitudes from 0 to 3800 metres asl, include mangrove forest, herb swamps, tall lowland rainforest, cloud forest, and alpine heaths. The Telefomin region is said to contain the greatest marsupial diversity on the planet. Threatened species such as the New Guinea Harpy Eagle, Victoria Crowned Pigeon and the Northern Cassowary remain common and a number of restricted range birds are represented. The Sepik river fish fauna reflects the Great Northern Fish province, sharing many species with the Ramu and Mamberano Rivers. Important waterbird and crocodile populations are supported by the 1500 lakes and other wetlands associated with the basin.

The Sepik River is one of the least developed areas in PNG and home to approximately 430,000 people who depend almost entirely on products from the rivers and forests for their livelihoods. This is perhaps the most linguistically and culturally diverse area in the planet with over 300 languages in an area the size of France. The area is famed for the gabled spirit houses or "haus tambarans", one of the most dramatic examples of indigenous Melanesian

architecture, and a very rich ceremonial carving and music tradition. Sepik peoples maintain their cultural integrity proudly and have influenced styles across the nation.

One protected area is established in the area – the Hunstein Range Wildlife Management Area (220,000 ha). Proposals for two adjacent WMAs totalling approx 48,000 ha have been submitted to the GoPNG in October 2005 and a number of further WMAs are being prepared. Plans exist to include these PAs on the Ramsar list. The Sepik Wetlands Management Initiative is addressing crocodile habitat retention and invasive species removal across the Middle and Upper Sepik River and adjacent lakes. A catchment management programme, led by WWF with a range of stakeholders, aims to establish coherent management of this region.

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## JUSTIFICATION FOR OUTSTANDING UNIVERSAL VALUE

**Criteria met:**
(Please tick the box corresponding to the proposed criteria and justify the use of each below)

| (i) √ | (ii) | (iii) √ | (iv) √ | (v) √ | (vi) | (vii) √ | (viii) √ | (ix) √ | (x) √ |
|---|---|---|---|---|---|---|---|---|---|

**Statements of authenticity and/or integrity:**

The Upper Sepik is the heart of one of the least modified landscapes in the Asia Pacific. A major river runs free without dams, weirs or industrial developments. A band of unbroken rainforest extends for hundreds of kilometres. There are few places left in earth in this condition. A World Heritage listing would reinforce efforts to ensure that these values survive while also encouraging sustainable development for some poor and remote communities whose average income rarely exceed US$10.00 per person per annum. There a few places in Melanesia where cultural heritage is as diverse, dramatically displayed or proudly protected. And yet change is coming rapidly to this region. World Heritage listing linked with an effective catchment management regime can offer a chance to draw tourism, support sustainable development and foster the celebration of the Sepik's rich cultural heritage.

**Comparison with other similar properties:**

No properties represent elements of the biodiversity or culture of the northern catchments of New Guinea. Lorentz World Heritage Area protects some species that are shared with this region but there are significant differences in species composition, ecosystems, climate and geology.

**TENTATIVE LIST SUBMISSION FORMAT**

**STATE PARTY:** Independent State of Papua New Guinea
**DATE OF SUBMISSION:**

**Submission prepared by:** Department of Environment and Conservation, Papua New Guinea
Collaborators: Paul Chatterton, Suzette Stephens, Lisa Dabek, Tim Denham, Toby Ross, Donald Potts, John Chappell, Leonardo Salas

**Name:** Prof. Elery Hamilton-Smith, AM, D. App.Sci. (on behalf of DEC)
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Charles Sturt University, N.S.W.
PO Box 36, Carlton South, Victoria 3053, Australia

**NAME OF PROPERTY:** Huon Terraces - Stairway to the Past

**State, Province or Region:** Morobe Province

**Latitude and Longitude, or UTM coordinates**
146° E to 148° E; 5.50° S to 6.50° S

**DESCRIPTION**

**A Natural Heritage Property embracing both land and marine environment**

This portion of New Guinea has a turbulent geologic history, being located on the junction between the Australian and Pacific crustal plates. The surface geology of this eco-region is a combination of Miocene siltstone, conglomerate, volcanics, and limestone. It has been subject to a long history of volcanism, earthquakes, tsunamis, faulting and other fragmentation. In turn, this has resulted in fragmentation of the biological habitat and hence a high level of localisation and endemism.

The Pacific plate is subducted beneath the Australian, and the land is one of the most rapidly rising areas of the world. The Finisterre and Saruwaged Ranges each consist of a massive ridge of limestone dipping steeply to the ocean. The most significant feature of the region is the remarkable sequence of coastal terraces, particularly well expressed and preserved at Sialum. These are not only spectacular, but have proven to be of immense value as testimony to the geo-climatic history of the Pacific region (and even the world) over the last 300,000 years. These are certainly the finest sequence of such terraces in the world, and have attracted a great deal of attention and continuing research.

Further, as the land has emerged, the surface is generally covered with tephra – a layer of volcanic dist and rock shards, often referred to as volcanic ash. This serves to protect the emerging landscapes and to preserve the landscape history to a remarkable degree. It thus

provides an invaluable resource for understanding of landscape evolution, biological history and human occupation.

The ranges themselves have extensive underground drainage, with springs occurring both on the terraces and at sea level. However, there are freshwater risings in the ocean some 15 km. from the coast, probably based upon groundwater flows through karst conduits. The various nutrients carried with the freshwater apparently provide for a rich marine fauna and hence the rising is a key resource for the fishing industry of the North Coast.

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**JUSTIFICATION FOR OUTSTANDING UNIVERSAL VALUE**

**Criteria met:**
(Please tick the box corresponding to the proposed criteria and justify the use of each below)

| (i) | (ii) | (iii) √ | (iv) | (v) √ | (vi) | (vii) √ | (viii) √ | (ix) √ | (x) √ |
|---|---|---|---|---|---|---|---|---|---|

*(iii) A unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared*

One of the most significant facets of the Huon terraces is that they are mantled with tephras of varying age - thereby preserving buried landscapes of varying age on newly emergent (at the time) surfaces. There is great potential for excavations and palaeoecological work (in associated lagoonal deposits and such like) to understand human-environment interactions at various points in time and through time. Although some work has been undertaken to this end - it is piecemeal, not fully integrated and to date dwarfed by the geo-morphological and geological investigations.

The earliest evidence for human occupation in Melanesia consists of waisted stone axe/adzes embedded in a tephra deposit on a raised coral terrace at Bobongara on the Huon Terraces. Dating of the tephra and the coral terrace indicate that these artefacts are at least 40,000 years old. Waisted stone artefacts have been found at other locations on the terraces, e.g., in the bed of a drainage channel adjacent to that previously documented, and are not restricted to one site. More recent archaeological evidence, dating to the mid and late Holocene, has been documented across the terraces during surveys and excavations. Ethno-archaeological excavations have also been conducted, and these have sought to understand community interpretations of various archaeological remains, as well as the archaeological implications of present-day practices.

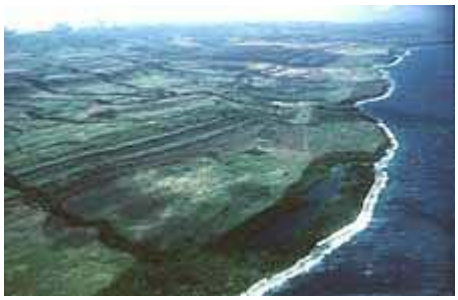
The Huon Ranges have probably the highest linguistic diversity on earth. They support approximately 85 languages largely of the Finisterre-Huon and Austronesian stock in an area of around 20,000 km2 with a population of 221,000 (Census 2000). This is on average one language for every 235 km2 and 2,600 people!

*(v) An outstanding example of a traditional human settlement, land use and sea-use which is representative of a culture (or cultures) and human interaction with the environment when it has become vulnerable under the impact of irreversible change.*

As in many parts of Papua New Guinea, traditional culture and life-style remains relatively intact, in spite of persistent modernism. The bond to the traditional lands provides a remarkably stable basis for both community and personal sense of identity. It offers a stable

cultural basis from which the people have been able to adapt to and function well within the culture of modernism without abandoning their traditional culture. In particular, it has provided for continuity of the traditional reliance upon and high capacity for fishing as a vital component of both the tribal and modern economies.

*(vii) Contains superlative natural phenomena and areas of exceptional natural beauty and aesthetic importance.*



Virtually the whole of the properly is of great natural beauty, but the exceptional and most important phenomena is the series of raised coral reefs forming the coastal terraces of the North Coast. They rise to an elevation of over 600m. Above sea level and exceed a length of over 80km. These are indeed a striking and unusual phenomenon. They provide an iconic landscape for the property, encapsulating and symbolizing its geological and geomorphologic story. Thus we have proposed above that should provide the basis for naming the property.

There are over 20 separate terraces. Some have a broad surface with a low frontal ridge and a depression behind, generally seen as a former reef lagoon. Others, generally at the lower levels, comprise a steeply rising series notched and often cavernous faces.

*(viii) An outstanding example representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of land forms, and significant geomorphic physiographic features*

Research on the history of the terraces commenced with John Chappell's work in 1966. This region is on the most rapidly rising (3mm pa) crustal plate in the world and can be accurately dated from the various coastal terraces. There have been exhaustive studies of the coastal terraces that have yielded an immense understanding of quaternary tectonic movements and sea-levels, the character of coral reef growth, and the climatic changes which have occurred since the end of the tertiary. The higher lands have provided an opportunity for study of the role of landslides in landscape evolution. The details of this research are too complex to document here, but there is an extensive bibliography available and a more detailed statement will be prepared at the appropriate time.

*(ix)Outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal and marine ecosystems and communities of plants and animals*

The Huon Peninsula Montane Rain Forests are made up of the tropical montane moist forests (from 1,000 m to 3,000 m) The vegetation of this eco-region is mostly tropical wet evergreen forest (hill type), with a large percentage of tropical montane evergreen forest and a small amount of limestone forest. Some of the higher peaks also contain ecologically fragile high alpine areas, which are part of the adjoining Central Ranges sub-alpine grassland eco-region. The somewhat low-canopy, closed lowland hill forest contains a more open shrub layer but a denser herbaceous layer than lower-elevation alluvial forest. Palms are fewer in number. The dominant canopy trees include species *of Pometia, Canarium, Anisoptera, Cryptocarya,*

*Terminalia, Syzygium, Ficus, Celtis, Dysoxylum*, *Buchanania. Koompassia, Dillenia, Eucalyptopsis, Vatica*, and *Hopea* are locally abundant. Dense stands of Araucaria, the tallest tropical trees in the world, are present in scattered locations. However, the lowland forests are considered the most threatened forest type in the country.

The Peninsula has been identified as a Centre of Plant Diversity, with probably in excess of 4,000-5,000 species. It is the steepest vegetation gradient in the Asia-Pacific region with a range from 0-4120m. in a distance of less than 20 km.

*(x) The most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.*

The Ranges support many mainland endemic species of warm-blooded vertebrates. This fauna consists of a wide variety of tropical Australasian marsupials, including one locally endemic species of tree kangaroo, with eighty-one mammal species in this eco-region, including five other endemic species. A similar number of species are considered endangered or vulnerable. It is one of the most diverse vertebrate faunas in Papua New Guinea. The spectacular Huon tree-kangaroo (*Dendrolagus matschiei*) is found nowhere else on Earth and is considered endangered. The eco-region also contains the widespread endangered Papuan long-beaked echidna.

Similarly, the avifauna has a clear Australasian flavour, with 18 endemic or near-endemic bird species, including the Emperor Bird of Paradise, *Paradisaea guilielmi,* and the Huon Astrapia, *A. rothschildi*. It also includes the remarkable ground-dwelling *Melampitta gigantea*, apparently adapted to living on karst. Some of these species are considered to be vulnerable. Recent surveys have also revealed a significant number of apparently endemic reptile and amphibian species, a number of which are as yet undescribed. Two preliminary studies of invertebrates revealed a high species richness of moths (over 600 spp.) and weevils. Similar results are likely in any other invertebrate taxa as these examined.

**Statement of authenticity or integrity**

Except for some forest loss along the southern part and the Buweng Timber Rights Purchase (using helicopters), most of the eco-region's natural habitat is intact. The Huon Highlands are a major wilderness area and include probably the largest unlogged *Dacrydium* and other podocarp forests in the Southern hemisphere. This is a superb example of the early Gondwanan conifer forests. A consortium of zoological institutions has given special attention to protection of and research upon the Matschie's Tree-Kangaroo, and a special Conservation Reserve is currently in the process of being established.

**Comparison with other similar properties**

The only comparable World Heritage property is the Cuban Desembarco del Granma National Park with the marine terraces of Cabo Cruz. The two sites are visually similar, but that in Cuba has not had the exhaustive geo-historic and related research and in fact lacks the protective tephra deposits that have provided the protection of historical evidence of the Huon. Conversely, it has more adequate data on surface biodiversity (but that comprises totally different and unrelated biotic communities). We have not been able to identify other comparable sites outside of the World Heritage Registry.

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