

The Nature Society (Singapore)

Conservation Committee

**Feedback for the Inter-Ministerial Committee Project
on Sustainable Singapore: Lively and Liveable City**

March 2009

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Feedback for the Inter-Ministerial Committee Project on Sustainable Singapore: A Lively and Liveable City

(This report is drafted by the Conservation Committee of the Nature Society (Singapore) and is endorsed by the Society's Council.

Summary

This report is intended as a feedback to the Inter-ministerial Committee working on the Sustainable Singapore Project. It attempts to clarify the concept of Sustainability and explicate on the main causes of habitat degradation and loss in Singapore. To achieve a greener and sustainable Singapore, it advocates that the fragmentation in our forest Nature Reserves should be urgently addressed with specific remedial recommendations provided. Then it moves on to the issue of the remaining green areas which now constitute about almost 50% of the total land area in Singapore. Specific recommendations are given on these areas, which include restoring the delisted Nature Areas back into the Green Plan and roping others as new Nature Areas in their own right or in combination with other designations such as Public Parks, Outdoor Recreational Parks and even Areas of Scenic Beauty, which is proposed here as a new designation for some of these green areas. Finally, the values of these green areas are outlined with an argument for these areas to be left as they are to serve as carbon sinks while exploring the possibility of gaining carbon credits.

I. Introduction

We refer to the message on the Sustainable Singapore website put up last year by the Inter-Ministerial Committee on Sustainable Development. There was a nationwide call by the Committee for ideas from the people to achieve "sustainability". We, the Nature Society, appreciate very much the government's going full tilt to forge a greener Singapore. The high seriousness and grand scope of this 10-year Sustainable Singapore programme is underscored by four Ministers sitting in the Committee. We are very appreciative of this and would like to put forward some ideas and proposals for the consideration of the Committee with the objective of forging towards what we consider to be a comprehensive coverage of the project.

We have read the information given on the website and also the feedback that have been collected so far. As far as we can see, the programme outlined in the website is rather pale on the side of nature conservation. The priority areas are focussed on brown issues --- air & water pollution, energy efficiency, resource management, education for environmentally clean and non-wasteful habits & practices, etc. The feedback voices so far are also slanted in this direction. Whilst these are all important issues, there is an urgent need to bring the green issues --- fragmentation of our Nature Reserves, endangered species protection, biodiversity and natural habitat conservation, etc. ---- into the forefront as priority issues as well and not let them be put on the back shelves.

II. Definitions of Sustainability

We are actually not very clear as to the concept of sustainability invoked by the Inter-Ministerial Committee. However, there are basically three well-known definitions that are currently invoked by environmentalists:

Definition 1: “ ‘Sustainability’ ... implies something about maintaining the level of human well-being so that it might improve but at least never decline (or, not more than temporarily anyway.)” (David Pearce, 1993)

Definition 2 : “Sustainable development is development that meets the needs of the present without compromising the ability of the future generations to meet their own needs”. (Brundtland Report, World Commission on Environment and Development, 1987)

Definition 3: “Sustainability of a population is delivering quality of life for all within the means of nature” (N. Chambers et al)

We consider that Definition 1 is far too focused on just human well-being without any recognition or acknowledgement that such human well-being is ultimately dependent on the well-being of nature as well, or any consideration of the well-being of other species in their own right. Moreover, it does not make a fundamental distinction between natural and man-made assets. That certain natural assets like our life-support processes/systems (e.g. ozone layer, photosynthesis, carbon sinks) are not substitutable by human-made capitals is hardly emphasized.

Definition 2 is currently popular among governments and is endorsed by the UN. We are not rejecting this definition completely. We find that it can be rather inadequate in that it does not like the first, specifically spell out the dependence of human well-being on nature. It does not clearly refer to the well-being of other species, nor to the fact that we cannot survive without air, water and food which are sourced from nature. The inescapable reality is, as long as we want to live on Earth, we cannot be outside nature, transcending it. As Earthlings, we are embedded in it. What we do affects nature but what happens in nature likewise affects us --- whether we like it or not.

Thus, we are more inclined towards Definition 3, as it embraces delivering quality of life for “all” (meaning all denizens of the Earth inclusive of humans.) The other emphasis in this definition is “within the means of nature”, meaning that the ecological framework of nature that has led to the well-being and the flowering of the Earth’s biodiversity should not be transgressed to the point of causing impoverishment or endangerment of life of all types on Earth. A case of this impoverishment of life on Earth, to ourselves and other species, is the current rising level of CO₂ emission on the global arena or the CFC emission that have been more or less controlled to a less harmful level.

III. Main Causes of Wildlife Habitat Degradation & Loss in Singapore

One of the major causes of wildlife habitat degradation and loss in Singapore is the modernization development since Independence, when the nation embarked on the creation of big industrial complexes and satellite towns. Other major causes that we would like to highlight here, since they are less well-known, are:

A) Land Reclamation

This involved reclamation of waterbodies, tidal shorelines, and marshy areas for land. Land reclamation along the islands and coasts have wiped out mangrove & intertidal life (e.g. at Sg. Mandai Kechil, St. John Island, at Pulau Semakau on the eastern fringe, Pulau Sakeng) The siltation caused by this reclamation has led to siltation and turbidity in the sea-water in the Southern Islands affecting the coral life drastically. Many low-lying and water-logged areas (e.g. at Tampines, Simpang) were also being reclaimed, wiping out freshwater ponds, streams & marshes, home of wetland & aquatic wildlife (e.g. bitterns, egrets, crakes, wild ducks, amphibians & fishlife).

B) Creation & Expansion of Reservoirs

This has been going on for decades because of the necessity of being self-sufficient in our water-supply. But this is nevertheless a major cause of wildlife habitat loss & destruction. In the Central Catchment Forest, the expansion of the Upper Seletar Reservoir, the Peirce Reservoir which is divided into two as well as the MacRitchie Reservoir had caused the further fragmentation and the shrinking of the Central Catchment Nature Reserve/Forest. The damming up of our major rivers to create reservoirs was likewise destructive of riverine and mangrove habitat as at Sg. Kranji, Sg Seletar, Sg. Punggol, Sg Serangoon. The reservoirs thus created become freshwater lakes and have their own kind of wildlife but this will never replace the loss of the mangrove and the tidal riverine wildlife. There are now only a few rivers left that are undammed as yet and still flowing more or less naturally in their course to the sea. Good examples of these are : Sg Simpang, Sg Khatib Bongsu (in its lower course), Sg. Melayu (flowing near the Sarimbun Scout Camp.) These are comparatively small and should be preserved unchanged for the sake of the wildlife in their waters and banks.

C) Canalisation of Rivers & Streams

There is a penchant for the relevant authorities to tidy up rivers and streams by embanking them with concrete, converting them into ugly canals and monsoon drains, which are impoverished of the wildlife that lived originally along the flowing waters and banks. These canals and monsoon drains are a blight on our landscape, which has a charm of its own, more so if these canals and streams are de-concretised. The official rationale for this is to reduce flooding by allowing the water to flow to the sea faster but the consequence is that water is not retained on the land above or below ground. The PUB's project to de-concretise the banks of parts of the Kallang River is a good move. Such an ecologically sensitive project should be applied to other rivers and streams. A good place to carry out an ecologically sensitive revamp of the canals and monsoon drains/streams is around the Kranji Reservoir where the presence of many marshes at the shoreline of the reservoir could be the sources for various species

of flora and fauna to re-colonise them and where flooding if it arises would not be a problem as the area is sparsely settled.

D) The Proliferation of Roads & Expressways

In recent decades, the proliferation of roads and expressways have caused the fragmentation of our countryside and the forested areas of central Singapore, which is mostly within the boundary of the Central Nature Reserve. The Bukit Timah Expressway is one glaring example of this fragmentation dividing up the Bukit Timah from the Central Catchment Nature Reserve. Most of these roads only save the motorists 5-10 minutes of driving time (e.g. the recently constructed Buangkok East Drive), but the impact on our wildlife can be dire, causing isolation and road-kills, e.g. Leopard Cats, Pangolins, snakes, etc.

A good example of such bad construction is the planned Admiralty Road East, which is projected to cut across Khatib Bongsu mangrove and woodland, an area rich in biodiversity --- to link up with Admiralty Road West. As well as affecting the rich habitats generally, one nest site of the Changeable Hawk Eagle will be lost if this project is implemented. The Changeable Hawk Eagle is listed as Endangered in **The Singapore Red Data Book** (2008). We urge that this be not carried out, as Yishun Avenue 6 is already available for the link-up here from west to east.

Another such example is the plan to extend the Punggol Central road to Lorong Halus on the eastern side of Sg. Serangoon, which will affect adversely the breeding site (two ponds) of the Little Grebe, a bird species listed in **The Singapore Red Data Book** (2008) as Critically Endangered.

One widespread destruction of wildlife habitats --- whether in suburbia or the countryside --- is the impact on hedges. Examples in the suburbia are old hedges along River Valley Road, Grange Road and St Thomas Walk --- which have been destroyed to make way for new plantings of the new condos. Those old hedges had developed over time into natural green belts of vegetation. They harboured many species of plants which are now rare and listed in the **Singapore Red Data Book** as Critically Endangered like the *Cissus repens*, *Cissus nodosa*, *Ficus virens*. And also cultivated plants which were common in the last century but nowadays rather rare or uncommon. Examples of these that grow wild in some hedges are *Lepisanthes ferruginea*, *Artocarpus altilis*, *Artocarpus elasticus*, *Areca catecu* (Areca Palm), *Ixora finlaysonia*, *Antigonon leptopus* (Honolulu Flower), etc. One interesting natural hedge disappearing is on the slope along Fort Canning opposite Wesley Church. Others are at Nassim Road and the Tanglin-Ridout-Chatsworth area and around the black-and-white houses in various parts of Singapore (in particular around the Istana.) Old hedges deserve protection. Apart from its screening function and aesthetic value, they serve as green corridors as well habitats for wildlife.

Recently there was announced (**TODAY** 16 February 2009) a plan to use the Changi open land near the Singapore Airshow Exhibition area to create a permanent racing circuit covering about 40 ha. of land and 3.5 km of racing track. Although this is reclaimed land, it has over the years become an extensive grassland and scrubland, home to many grassland and scrubland bird species --- resident and migrant. Vast flocks of Munias, Bee-eaters, Oriental Pratincoles, Black-winged Kites as well as migratory Marsh Harriers abound in the area. There is a cove at the area too where many migratory shorebirds gather and this site should not be developed at all. The

shorebirds like the Sanderling, Kentish Plover, Grey Plover, etc., unlike those at Sg Buloh Wetland Reserve prefer the sandy coast rather than the tidal mudflat. Of great interest to birdwatchers and ornithologists all over the world, it is the well-known haunt of the so-called 'White-faced Plover', a migratory shorebird, which was recently discovered and considered by some ornithologists to be possibly a new species. 14 of this 'White-faced Plover' were counted there in 2008.

We are not against the use of this area for the racing circuit, (although motor racing may become less suitable in a world striving to avert climate change), but would propose that there be an eco-study of the site so that the design of the circuit could take into account the wildlife sensitive areas. A Sustainable Singapore must not be developed completely for the convenience of our motorists who are contributing in a major way to the output of CO2 emission from their vehicles. We suggest that, should the project be implemented, the Ministry of Transport should be ecologically sensitive to this issue of cutting and dividing up into fragments our remaining forests, woodlands, grasslands and the countryside in general.

E) Central Forest Fragmentation

We are concerned about the serious state of our fragmented forest Nature Reserve in general and wish to highlight actions to prevent further fragmentation and degradation. These actions include the gazetting of additional Nature Reserve areas that will connect fragments and help increase biodiversity in the areas now connected, as well as the utilization of buffer nature areas that are not gazetted. In particular we would strongly suggest, as in next section below, the prevention of the further fragmentation that will come from the Singapore Tourism Board (STB) Mandai Project, which we argue should be re-sited, whilst the original area should instead be gazetted as part of the Central Catchment Nature Reserve.

Our concern does not stem from merely on-site study of the ecological situation but also from a study of the wider ecological framework, covering the situation of the Central Catchment Reserve as a whole. This is to take a long-term view of the ecological health and viability of the Nature Reserve given the foreseeable impacts of the STB's project.

IV. Fragmentation in the Nature Reserves (Central Catchment & Bukit Timah Nature Reserves)

Please refer to Google Map 1 attached.

A) Forest Fragmentation

The central forest is seriously in bad ecological shape due to severe fragmentation over the course of many decades going back to pre-independence times caused by the creation of golf courses, roads, pipelines, expansion of the existing reservoirs, etc. In fact, the whole of the forest Nature Reserve are now fragmented into roughly 7 patches, each standing in isolation from the rest through gaps in the forest cover. What we have now is what ecologists call 'habitat islands' rather than one homogeneous, integrated and compact forest. Fragmentation brings about population isolation among the various species as well as the well-studied phenomenon of the edge-effects. These 7 patches are:

- 1) Bukit Timah Forest ---- to the west of the BKE;
- 2) Lornie Forest --- bordering Lornie Road;
- 3) MacRitchie Forest ---- between Upper/Lower Peirce Reservoir and Macritchie Reservoir;
- 4) Seletar Forest --- between Upper/Lower Peirce Reservoir and Upper Seletar Reservoir;
- 5) Mandai Forest --- south of Mandai Road to Upper Seletar Reservoir;
- 6) Asrama Forest --- strip parallel to and north of Mandai Road.
- 7) Mandai Zoo & Night Safari --- a degraded area within the Reserve and separated from the rest of the Reserve's forest by the Mandai Lake Road and the Night Safari's fence.

Edge-effects involve loss of humidity, loss of interior cooler habitat, invasion and predation by alien and non-forest species, introduction of diseases from urban zones to the forest wildlife, which have no immunity or resistance to them, etc. (A standard accessible text on this subject is **Essentials of Conservation Biology**, in particular Part 3 , Ch. 9; by Richard B. Primack)

B) Forest Degradation

Apart from the overall fragmentation, we have further degradation within these forest patches themselves caused by inappropriate uses, which involves clearance of the forest cover within the boundary of the Central Catchment Reserve to a greater or lesser extent. Some prominent examples are:

- 1) The Zoo and the Night Safari, which degraded about 89 ha of compact forest;
- 2) The huge covered service reservoir at Upper Peirce, which cleared completely about 11 ha of forest;

3) The Nee Soon Firing Range, which cleared 20 ha of forest that was a part of the remaining rare swamp-forest in Singapore harbouring many rare and nationally endangered wildlife;

C) General Conclusions Drawn: Fragmentation & Degradation.

Given this overall situation, it is indeed a very alarming prospect for the future survival of our forest wildlife, especially when proposed projects like the STB Mandai Project are operating to increase fragmentation. If we are sensitive to the ecological dimension of the situation, we are inevitably led to the conclusion that:

1) There is an **urgent need to fill in the gaps and to provide officially-designated buffer areas for the forest Nature Reserves** that are not subjected to future developments. So far the setting up of the Hindhede Park (9.5 ha.) and the Dairy Farm Park (63 ha) by National Parks, both as integrated buffers to the Bukit Timah Nature Reserve, is a move in the right direction. The situation is now **more urgent on the northern flank of the Central Catchment Reserve, where the STB sites are located, as the gaps there are extremely severe;**

2) There should be **compensation for the development use of the Nature Reserve land**, which for the prominent cases cited above comes to about 120 ha. The creation of Hindhede Park and Dairy Farm Park, both amounting to about 72.5 ha., compensates to some extent.

3) There is an **urgent need to stop any more development within and at off-boundary contiguous areas.**

4) There is also an **urgent need to incorporate officially, as integrated buffers of the Central Catchment Nature Reserve, all undeveloped areas between its boundary and the surrounding roads --- Upper Thomson, Mandai, the BKE, and the PIE.** The forest Nature Reserves comes to only about 2000 ha. minus the waterbodies and this is relatively small and fragile compared to other such reserves in the region. Because of fragmentation, the width of many portions of the forest at the Reserve boundary are extremely thin and lacking in interior habitat. The use of these buffers should be identical to what has been conceptualized and implemented at Hindhede and Dairy Farm where no built structures are allowed apart from a visitor centres, hides and rain-shelters, and where activities such as cycling, which are prohibited within the Reserves, can be allowed along designated routes.

D) Fragmentation Caused by STB Mandai Project

Our discussion here is formulated based on information provided by STB to us in two meetings on an eco-tourism project south of the Mandai Road area and on both sides of the Mandai Lake Road. In these meetings we gather that STB is looking at two parcels of land contiguous to the Central Catchment Reserve and these are:

1) **Mandai Road Patch:** An wedge-shape patch of about 15 ha, bounded by Mandai Road, Mandai Lake Road and the boundary of the Western Catchment Reserve; and

2) **Mandai Track-15 Patch:** An elongated patch of about 18 ha, between Mandai Track 15 and the Western Catchment Reserve up to the military firing range.

The total comes to about 33 ha., all of which are contiguous to but outside the boundary of the Central Catchment Nature Reserve.

STB has not provided any detailed plans for the use of these areas except that they will be used for nature-related tourism and that the project will take into account and be sensitive to the biodiversity and ecology of these areas.

STB has carried out a biodiversity survey of these areas and we have been given a summary of the results. The results are very impressive in terms of the biodiversity of these areas, which are acting as corridors between adjacent parts of the Nature Reserve. From the STB biodiversity survey and together with our own field and map study of the area, we are extremely perturbed with the proposed development project. We have arrived at the following conclusions and proposals, which will be spelled out below.

1) Summary of STB's Wildlife Survey (February 2007)

This is given in the Executive Summary of the STB's survey report, which states: "Of the selected faunal groups, 252 species of animals have been recorded within the survey zone so far. This involves 18 mammals, 114 birds, 24 reptiles, 15 amphibians, 21 fish, 37 butterflies and 23 odonates (damselflies/dragonflies). A total of 55 Locally Threatened animal species were recorded and this included the Globally Threatened Sunda Pangolin, Grey-headed Fish-Eagle, Red-crowned Barbet and the Straw-headed Bulbul. Of the animal species recorded, 43 may be considered Forest Specialists"

"The Seletar Zone, despite its relative small area, is an important part of the Central Catchment Nature Reserve. More than 20% of the animals recorded are considered Locally Threatened." The "Seletar Zone" mentioned in this report covers the two plots of land projected for the STB development.

We accept the results of this STB biodiversity survey report and we also agree totally with its conservation recommendation, which states that "it is best to leave this area untouched."

2) Nature Society's Proposal

We would, in fact, go further than this and suggest that, since the two areas projected for the STB development are effectively acting as corridors for wildlife between adjacent Nature Reserve areas, it would be best designated as official buffer areas, to remain undeveloped, or, even better, to be gazetted as a part of the Central Catchment Nature Reserve. It seems to us tragic that at a time when Singapore is focusing on sustainable environmental issues, it should actually be acting to develop on natural areas that are corridors and buffers between Nature Reserve areas. It would also seem counter productive, since inevitably the proposed nature-related tourism project will become known as a project development on, and degrading, a rich biodiversity area.

V) Areas outside the Nature Reserves

A) More Green Areas Now

Recently, **The Straits Times** (25 June 2008) reported that Singapore is “getting greener”. The basis for this is that “the area of the island covered by greenery has gone up from 36 % in 1986 to 47 % last year (2007), despite the country’s population shooting up from 2.7M to 4.6M during this period 10 % of the land here is set aside for nature reserves & parks, allowing for biodiversity in habitats including lowland rainforests, freshwater swamp forests, & coastal forests to be conserved. “ This report is derived from the findings of the Centre for Remote Imaging, Sensing & Processing (CRISP), NUS & National Parks Board (Nparks.) We have requested for a copy of this report from a relevant authority but only an outline of the report with a very brief summary of the conclusion was released to us.

The more important issue here is how much of the areas that make up the 10% are Nature Areas put into **The Singapore Green Plan (SGP)**. Parks are not necessarily Nature Areas, which are directly allocated for the conservation of our biodiversity. The original SGP (1993) states that 5 % of the total land area (inclusive of the reclaimed lands) are set aside as either Nature Reserves or Nature Areas. Is there an increase or decrease since 1993? The revised **SGP** (2012) itself is lacking in information on this issue, lacking in any statement about the size of individual areas as well as the total land area. This is not acceptable.

If there exist such a list in URA or National Parks , the list should be made easily accessible as public information. It is here proposed that a publicity brochure or booklet be produced by the relevant authorities in collaboration with the major green NGOs --- where the key information on all the Nature Reserves and Nature Areas of the Green Plan can be obtained in one concise source. Key information are : a) its designation in the Green Plan; b) the location & boundary with a sketch map; c) area size; d) important flora & fauna; e) threats to its viability; f) other attractions, etc. This whole product should also be put on a website. The production of such a convenient source would create a greater awareness of our Green Plan for the conservation of our biodiversity to the general public and hence will evoke more public support for it.

The 11 % of the increased green areas that have sprung up from the 80s to the 21st century are mostly undeveloped areas in our remaining countryside. Yes, we do have a countryside. Contrary to what most Singaporeans would presume, Singapore is not all a concrete jungle since almost 50 % of the total land area are green. This countryside consists of existing farmlands and phased-out agricultural areas, orchards, rubber plantations, etc., which are all reverting to a wild state with patches of marshland, grassland, scrubland and woodland here and there. These green areas have become a refuge for the remaining wildlife of Singapore, including many species that are thought by experts to be supposedly extinct or rare, as well as serving as harbours for migratory species coming down from the temperate zones. Given this scenario, the possibility of increasing our Nature Areas in **The Singapore Green Plan** should not be automatically ruled out in the name of land scarcity.

B) Importance of these Green Areas for Wildlife

From what we can gather, many of these green areas have become refuges for wildlife that are supposed to be rare or at one time extinct in Singapore --- such as the Leopard Cat (e.g. Jln. Bahar, Mandai Road), Pangolin (e.g. Jln. Bahar), Malayan Porcupine (e.g. Tekong), Red Jungle Fowl (e.g. Ubin, Western Catchment), Wild Pig (e.g. Western Catchment, Punggol, Kranji), Oriental Pied Hornbill (e.g. Woodleigh, Ubin), Straw-headed Bulbul (e.g. Springleaf, Sg Melayu), Spotted Wood Owl (e.g. Zehnder Road, Seletar Airbase), Smooth/Small-clawed Otter (Khatib Bongsu, Sg Serangoon), the Greater Mouse-deer (Ubin), Barred Eagle Owl (Ubin), etc.

They are also becoming extended foraging and even nesting/breeding grounds for many species of wildlife in our forest Nature Reserves, some of which are rare or endangered, such as the Grey-headed Fish Eagle (e.g. Khatib Bongsu, Sg Seletar, Lg. Halus), Changeable Hawk Eagle (e.g. Sg Ulu Pandan, Jln. Bahar, Khatib Kongsu), White-bellied Woodpecker (e.g. Bt. Brown), Buffy Fish Owl (e.g. Clementi, Sentosa), etc.

Apart from providing relatively new habitat areas for the general run of the common and uncommon resident species, they are also playing a very important role as havens for the host of migratory birds (raptors, warblers, flycatchers, etc.) coming down south during the winter in the temperate zones.

Apart from the conspicuous animals, the importance of many of these areas as habitats for other forms of wildlife (butterflies, dragonflies, reptiles, etc.) must also be emphasized. Given the promising discovery of such rare species as the Banded Krait at Khatib Bongsu, the Twin-barred Tree Snake at Springleaf Woodland, the *Pandita sinope* & *Hypolimnas anomala anomala* (butterflies) at Kranji, the *Indothemis limbata* (dragonfly) at Marina South and Marina East, *Mortonagrion falcatum* (dragonfly) at Semakau and the Tuas marshes,.

There are also recent rediscoveries of the dragonfly species *Paragomphus capricornis* near the Dairy Farm Field Centre, the species being last recorded about 80 years ago, and *Brachygonia oculata* at the Western Catchment area, the species not being recorded for more than 100 years ago. There are also three recent discoveries of nationally unrecorded dragonfly species in the buffer zones surrounding the Central Catchment Nature Reserve, and these are: *Leptogomphus risi* (Durian Loop near Rifles range Road, 2004); *Prodasineura humeralis* (Lorong Asrama, Mandai Track 15, 2006); *Heliaeschna uninervulata* (Venus Drive Trail, 2007). And one in the Western Catchment area : *Copera vittata* (2006).

Given that 10% of these green areas are already set aside as nature reserves and parks, we have then at least 37 % that are still left that are left subjected to future developments. This includes areas that were once designated as Nature Areas in the **Singapore Green Plan** --- Pulau Semakau, Mandai Estuary, Sungei Khatib Bongsu --- but now delisted from that category. Given that there is a lot of biodiversity-rich green areas that are still extant, we should be less restrictive in forging a wider and more comprehensive Green Plan for the conservation of our biodiversity. Apart from designating the better biodiversity areas as Nature Areas in the Green Plan, some of these areas can be designated as green corridors and stepping stones for wildlife, public parks with a nature component and even as **Areas of Scenic Value** (landscapes of woodlands, marshes, grasslands, etc.), which is a non-existent

designation which we would like to propose be introduced for some of the remaining green areas in Singapore..

C) Specific Proposals for these Green Areas

1) Restore Delisted Nature Areas into The Singapore Green Plan (SGP):

Put back & re-designate the following Nature Areas into the Singapore Green Plan 2012 (2002) from which it was delisted in the URA Master Plan (2003.) These areas are still intact as natural habitats. There was no proper open consultation among relevant stakeholders (inclusive of the public) as to the decision to delist these Nature Areas. They were in the SGP in the first original formulation (1993).

i) Sg. Khatib Bongsu

The area is bordered by Sg. Khatib Bongsu, Sg. Seletar Estuary, the Johore Straits and Yishun Avenue 6. The general area is highly scenic and beautiful. The whole area should be made an outdoor recreational park cum Nature Area. The outdoor recreational park can cater to camping, fishing along the coast, hiking, mounain-biking, etc. We propose that the mangrove area along the river and the shoreline to Sg Seletar Estuary together with the adjacent belt of woodlands bordering the mangrove be designated a Nature Area.

There are 14 mangrove tree species at Sg. Khatib Bongsu, among which is *Lumnitzera racemosa*, an Endangered species listed in **The Singapore Red Data Book** (2008). Growing by the edge and on the mangrove is the *Hoya diversifolia*, which is Critically Endangered. Although the species richness is not comparable to that at Mandai or Tekong, on the whole the mangrove is extensive and healthy, with thicker stretches along Sg Khatib Bongsu and the estuary of Sg Seletar. The mangrove along the river and around the ponds was actually designated for conservation in the Simpang Development Guide Plan (1993).

A total of 180 species of birds, residents and migrants (winter visitor & passage migrant), have been recorded at the Khatib Bongsu area. This comes to 49 % of the total number of bird species in Singapore – almost comparable to that at Sungei Buloh Wetland Reserve. This is impressive given that Khatib is a less frequented and less-researched area. 13 bird species found here are listed in **The Singapore Red Data Book (2008)** and among these are: Rusty-breasted Cuckoo (Vulnerable), Red-legged Crake (Vulnerable), Black-crowned Night Heron (Critically Endangered), Straw-headed Bulbul (Endangered & Globally Endangered), Ruddy Kingfisher (Critically Endangered), Grey-headed Fish Eagle (Critically Endangered & Globally Vulnerable), Changeable Hawk Eagle (Endangered), White-chested Babbler (Critically Endangered), etc. The Grey-headed Fish Eagle and the Changeable Hawk eagle are nesting in the Albizia woodlands in this area.

40 species of other vertebrates (fishes, amphibians, reptiles and mammals) are recorded at the Khatib Bongsu area. Of these 40 species, 22 are wetland associated species, out of which 3 are specifically mangrove dependent. The mangrove dependent species are : Crab-eating Frog, Dog-faced Water Snake & Malaysian Wood Rat. The Malaysian Wood Rat is regarded is locally uncommon. A Banded Krait, supposedly regarded as extinct by many experts, was recently found near the edge of

mangrove (March 2002). There was even a sighting of an Otter in an abandoned fish pond, although the identification of the species has yet to be determined.

ii) Sg Mandai Mangrove & Mudflat

The mudflats here, which extend all the way to Sg Kranji Estuary, are highly important feeding grounds for migratory shore (sandpipers, plovers, egrets) and resident wading birds (herons). The migratory shorebirds from Sg Buloh Wetland Reserve are also dependent on these mudflats for feeding during the low tides. Some ringed birds from Sg Buloh were spotted here. A study should be done to determine the extent of this dependency.

The mudflat at the estuary of Sg Mandai Besar and also at the contiguous mudflat of Sungei Pang Sua are well-known breeding grounds of the Mangrove Horseshoe Crabs (*Carcinoscarpius rotundicauda*). The Mangrove Horseshoe Crab is listed in **The Singapore Red Data Book** (2008) as Vulnerable. There is a fairly sizable population of Mangrove Horseshoe Crab here. A survey conducted by the Nature Society in 2009 estimates a population of 70,000 (plus or minus 13,000). In an island-wide survey of Horseshoe Crabs, also by the Society in 2009, this sector of our main coastland has the highest count of the Horseshoe Crab population. The Nature Society has been conducting a Horseshoe Crab rescue and study here since 2007. Moulting and mating specimens can be found throughout the year. The tidal mudflat here appears ideal for the Mangrove Horseshoe Crab and most probably is the best habitat area for this species in the whole of Singapore, including the other islands.

This patch of mangrove is well-studied by botanists in the past. Although a big part of the mangrove here has been largely destroyed, especially the patch along Sg. Mandai Kechil, those at the estuary of Sg. Mandai Besar are somewhat still intact. Most of the stands there are mature trees. However, even at the reclaimed shoreline at Sg Mandai Kechil, the mangrove is making a come-back to form a continuous belt with those at Sg Mandai Besar --- which portends very well of its future recovery somewhat if it be given the opportunity.

Given that such an ecosystem is rare in our national territory, being reduced from an original of 13 % in the 1820s to less than 1 % of the total land area in Singapore, it is worth doing our best to preserve it as a habitat for wetland wildlife, scientific/educational resource, recreational and aesthetic/scenic values. The medical value of the Horseshoe Crab's blood for anti-septic purpose is famous. The planned URA reclamation project here should be completely disallowed.

iii) Pulau Semakau Island & Mangrove

By “Pulau Semakau and Mangrove”, we are referring to the intact island of Semakau and the western shoreline/mudflat of the island --- which are all to the west of the Semakau Landfill. The island has become forested, after the phasing out of the fishing villages. The western shoreline is the haunt of the Grey Heron and Great-billed Heron, listed in **The Singapore Red Data Book (2008)** as Vulnerable and Critically Endangered respectively. There are indications that they may be nesting in the mangrove area to the south of the island. Pulau Semakau shoreline is from our observations the best habitat for the Great-billed Heron in terms of the number and frequency of the species sighted.

This forested island with the mangrove shoreline is the haunt of the rare Mangrove Whistler and many uncommon resident species and these are the Oriental White-eye, Ashy Tailorbird, Copper-throated Sunbird, Oriental Magpie Robin and the Changeable Hawk Eagle. The Oriental Magpie Robin and the Changeable Hawk Eagle are listed in **The Singapore Red Data Book (2008)** as both Endangered. The rare Pied Imperial Pigeon, a Non-breeding Visitor, is also sighted here. The forest also harbours migratory species such as the Oriental Honey Buzzard, flycatchers and warblers. As it develops into a denser and more mature forest, more typically forest-resident species will be able to find a haven on this island.

2) Add in Other Areas Not Originally in the SGP

There are other areas not in the original **SGP (1993)** nor in the current **SGP (2012)** that are worth preserving for their rich and interesting biodiversity. Important examples of these are:

i) Lorong Halus Ponds & Marsh

The area is bordered by Lg. Halus, Sg. Blukar, Sg. Serangoon and the track leading from Lg. Halus to site of the former Charcoal Warehouse by the bank of Sg. Serangoon. Although this area was a rubbish dump now capped, it has become very green over the years with patches of woodlands emerging. The general area is highly scenic and beautiful with the variegated landscape of grasslands, scrublands and wooded hills created by the capped Landfill. Again like Khatib Bongsu, the whole area should be made into an outdoor recreational area with part of it a Nature Area. We propose that the area around the Grebe Pond, Sg Blukar and the belt of woodlands around the hill to the west of Sg Blukar be designated a Nature Area.

Apart from its rich and interesting bird & butterfly species, this is the only known site for the breeding of the Little Grebe, a species listed in **The Singapore Red Data Book (2008)** as Critically Endangered. Only about 4-5 individuals are estimated to be now extant in Singapore. The area is well-known and much studied for its birdlife. 135 bird species have been recorded, which is about 37 % of the total bird recorded in Singapore (364). Apart from the Little Grebe, other Rare and/or Endangered species are the Lesser Whistling Duck, Crested Goshawk, the Grey-headed Fish Eagle, Black-crowned Night Heron, etc.

Apart from the birdlife, the area is also rich in butterflies --- where 20 species have been recorded (in 2007 by the Society’s Butterfly Interest Group), 4 of which are

rare in Singapore and they are: the Common Tiger, the Grey Pansy, the Great Eggfly and the Silver Forget-Me-Not.

ii) Bukit Brown

The area is roughly bordered by Lornie Road, Kheam Hock Road, Gymkhana Avenue and the Caldecott housing estate.

Although a cemetery area, the old trees and other plants have become a interesting wildlife habitats. 84 species of birds, resident and migratory, are found in this area, which is 23 % of the total species found in Singapore. Apart from many Uncommon bird species, it is astounding that we have recorded 11 that are listed in **The Singapore Red Data Book** (2008) and these are: the White-bellied Woodpecker, Rusty-breasted Cuckoo, Violet Cuckoo, Blue-crowned Hanging Parrot, Spotted Wood Owl, Red-legged Crake, Changeable Hawk Eagle, White-rumped Shama, Straw-headed Bulbul, Thick-billed Pigeon and Oriental Magpie Robin. Most of these species are forest birds.

Given this, we consider this area an important extra foraging/nesting ground for birds from the Central Catchment Nature Reserve across Lornie Road. As an old cemetery, the graves are also of great interest as cultural artefacts. Surprisingly for cemetery area, there are a people from the residential neighbourhood using the quiet and winding roads for jogging and strolling. The scenic value is good in some stretches. Bt. Brown should be designated as a Public Park-cum-Nature Area.

iii) Simpang Grassland/Scrubland

The area is roughly bordered by the Simpang Kiri Canal to the west, Sg. Khatib Bongsu to the east, Johore Straits to the north and Yishun Industrial Park A to the south.

Apart from the mangrove at the uncanalised Sg Simpang and the many interesting grassland birds species here, there are extensive grassland patches abounding in wild orchids. *Arundinia graminifolia* (Bamboo Orchids) and *Spathoglottis plicata* are growing wild in extensive profusion in the grassland. To say that the area is a 'sea of orchids' is not misplaced. Such wonderful and lovely sights are worth preserving but management of the open sunny patches is essential as these species would not thrive in tree-covered, shady conditions. Also, two rare species of orchids have been discovered here --- *Dendrobium lobii* (Critically Endangered), which was thought at one time by local botanists to be extinct in Singapore, and *Liparis ferruginea* (also Critically Endangered). The *Dendrobium lobii* can only be found here. Again these two orchids require a open grassy areas to thrive.

There is in the **SGP** a lack of grassland habitat with its own typical wildlife. Certain part(s) of the Simpang area will be a good example of such a habitat to put into the **SGP**. The scenic value is also great. Part of the area should be designated a Nature Area-cum-Area of Scenic Beauty.

The designation "Area of Scenic Beauty" should be introduced like in other countries, e.g. the UK. Being a small nation, our "areas of scenic beauty" are rather unspectacular, but they have a charm of their own if our sense of scenic beauty is not constricted by what we see overseas in our holidays. If we bother to move around our countryside in our holiday or leisure time, instead of scampering abroad, we can get to

know our own backyard with its scenic beauty better. Designating and publicizing “Areas of Scenic Beauty” is one good way whereby we can induce in our people a love for their land/nation.

There should be a careful study of the Simpang area where the remaining mangrove there and certain open grassy patches where the orchids (including the rare ones) are found in great numbers be designated a Nature Area.

iv) Bidadari

The graves are all exhumed but the luscious trees and vegetation are still standing attracting many interesting species of birdlife. The area is a well-known haunt for many migratory bird species as well as bird photographers. Apart from the Common migrant, the following Rare/ Uncommon migratory species have been sighted: the Hooded Pitta, Orange-headed Thrush, Indian Cuckoo, Drongo Cuckoo, Blue-and-White Flycatcher, Dark-sided Flycatcher, Yellow-browed Flycatcher, Grey Nightjar, Chestnut-winged Cuckoo, Malay Night Heron. Most of these species are also beautiful and photogenic --- hence it has become increasingly popular with the nature photographers and nature lovers. There is also a pair of the resident Spotted Wood Owl nesting in the area. The Spotted Wood Owl is listed in **The Singapore Red Data Book (2008)** as Critically Endangered.

Our proposal here is that this should be made into a Park-cum-Nature Area with all the trees kept intact. It is also a rare green lung in this very suburban area.

v) Springleaf Woodlands

The area is roughly bordered by Yishun Avenue 1 in the north, Seletar Expressway in the south, Lentor Avenue in the east and the Springleaf housing estates to the west.

The woodlands are on both sides of the Sungei Seletar. A connector has been constructed along the banks of the river leading from Upper Thomson to the Lower Seletar Reservoir. It is heartening to know that the woodland north of the Sungei Seletar with some patches of the marshy ground has been designated as a Park. However the patch of woodland south of the river and running adjacent to Lentor Avenue should also be made part of the Park. The general area has high scenic value. The proposed designation “Area of Scenic Value” can be also applied to this area too.

The woodland here is important for birdlife such as the Violet Cuckoo (Endangered), Straw-headed Bulbul (Endangered), Changeable Hawk Eagle (Endangered), Grey-headed Fish Eagle (Critically Endangered), etc. The rare Twin-barred Tree Snake has also been recorded here.

D) The Values of these Green Areas: Recreational, Aesthetic, Cultural, Educational, etc.

These green areas should not all be simply regarded as merely land banks for future economic development. They are our living treasures and natural heritage --- a heritage that deserves to be retained simply because of their own intrinsic worth or even rights to life as well as for the reason that they will enhance Singapore's "liveliness" and liveableness in the following ways:

- 1) Cooling down our ambient temperature and reducing the cost of air-conditioning;
- 2) Beautifying and softening up our landscape and enhancing the charm and value of our homes whether this is in the public or private housing estate;
- 3) Offering us a rich diversity of non-human neighbours to appreciate or commune with;
- 4) Opening up a wider horizon and recreational ground for our outdoor pursuits;
- 5) Because most of these areas were once our farmlands, orchards, rubber plantations and vegetable gardens, they are the banks for our cultural memories that connect us to our agricultural past & beginning. It gives us a sense of roots.
- 6) These areas would be an easily accessible arena for school natural history studies as well scientific studies of wildlife and its habitats in the context of urban and countryside ecology.

E) Their Value as Carbon Sinks & Carbon Credits

Given that these areas are also well-wooded and/or covered with other types of greenery, they also play an important role as carbon sinks. We have been doing a lot of planting to cope with the global crisis of destructive CO₂ emission. Our carbon emission contribution is pretty high.

Although our total emission may be a tiny percentage of what has been emitted in a country like China, in terms of per capita emission, we are closer to that of the United States and the Western European countries. That is pretty bad. Planting individual trees is less effective in creating carbon sink, especially after clearing woodlands, than if we were to allow woodlands as they are or to emerge naturally with all the undergrowths and biodiversity. The 40% plus of greenery that we have now should be preserved as carbon sinks and traded for carbon credits.

There should be initiated a study of the carbon credit value of our forests, woodlands and other greenery towards gaining carbon credits while leaving them as they are for the sake of the values outlined above. Even if the carbon credit is small, these green areas will offset to some extent the CO₂ emission we are guilty off as well as compensate for the big eco-footprint we have developed to arrive at a global-city status. Our eco-footprint we must not forget is larger than our national boundary. In this regard we will set a great and shining example to the

world of what this little Red Dot can do to help in averting the environmental crisis.

We are prone to decry and protest about the burning of the forest and other greenery in Malaysia and Indonesia --- for the haze produced and the carbon emission. Our protest sounds very hollow and false if we were to continue to progressively wipe out our remaining greenery all over the country until what is left are the Nature Reserves and Public Parks with perhaps some of the Nature Areas, designated in the SGP, which all in all constitute only about 10 % or less of the total land area in Singapore. The carbon sinks that constitute about 30 % plus of the total land area in Singapore will be systematically and knowingly destroyed.

To talk about Sustainable Development if this is the Master Plan becomes meaningless and a mockery --- given that we accept the extremely dire situation we are in now and the predictions of the climate-change experts, where the responsibility to avert the critical tip-over point lies in all nations' hands, whether big or small, to the best of their capabilities before it is too late.

For future developments, we should utilize brown-field sites (like old public housing estates and industrial sites) and use the reclaimed lands that we have amassed over the decades --- like such big tracts at Pulau Tekong, Tuas, Marina South-and-East, and the Changi Coast.

V) Marine Issue

An issue of particular importance is the future survival of our intertidal and marine biodiversity and habitats. The four Coral Conservation Areas in **The Singapore Green Plan** (1993) --- Sudong, Hantu, St John & Semakau --- have been delisted from the **Green Plan 2012** (2002), reducing marine conservation to an utterly wretched state, where only the corals around the pair of tiny Sisters Islands are officially designated as worth conserving. This is an extremely urgent matter as 60 % of our coral life have been wiped out through land reclamation and siltation. Nonetheless the remaining 40 % are still rich, as has been stated on a number of occasions by marine biologists and as will be documented in the forthcoming **Blue Plan** being put together by a coalition of dedicated citizen groups concerned about marine conservation. The least that should be done immediately, in this the **International Year of the Reef**, is to re-designate these four Coral Zones in the **SGP**. We also strongly urge that Chek Jawa be also listed as part of the Pulau Ubin Nature Area.

VI) General Issues of Sustainability

Whilst we appreciate the start in considering certain aspects of Sustainable Development such as energy use, freshwater provision, recycling and proper management of the biodiversity in our already designated Nature Reserves, there remain a great many other aspects of Sustainable Living that have not been touched upon by the Inter-ministerial Committee. These are issues of resources used in production, especially import-based consumption, and in aspects of the service industries that make up much of Singapore's economy. Singapore has a carbon footprint that operates outside its own boundaries, and that operates in relation to the raw materials used in daily production and consumption, the semi-finished and the finished goods, and in the services provided. Singapore companies are engaged in extraction (timber), production (palm oil and other raw and finished products) in the region and in the world in ways that may not be sustainable. Our liveability and "liveliness" may come at a great cost of damage and destruction elsewhere. Whilst these may be inconvenient truths, they will need to be faced at some stage, and for the sake of the only known liveable planet, they should be faced sooner rather than later.

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