NPAPSP Ecosystem Conservation Target Proposal

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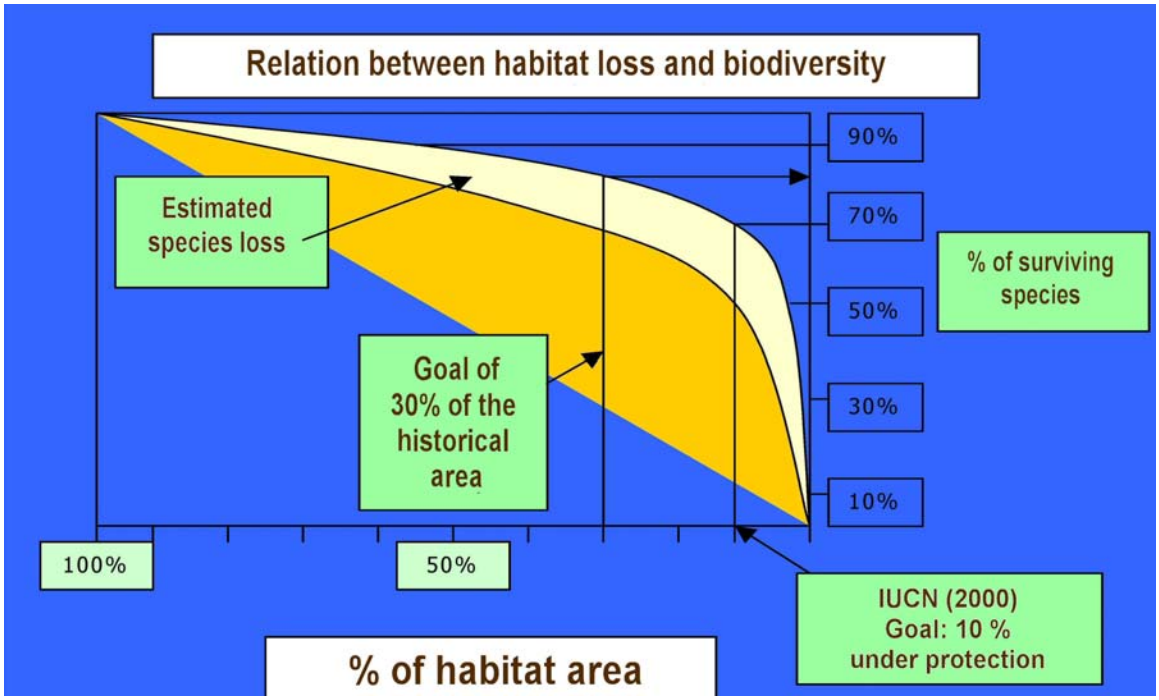
December 2004

This paper deals with the development of conservation targets for the various terrestrial ecosystems. These targets are important in the Marxan analysis.

Underlying thought is that a minimum area is required for each habitat/ecosystem. The IUCN recommends a minimum of 10% under protection for each habitat. Theoretically, this would enable the survival of 70% of the extant species. The ecoregional planning initiative used a minimum of 30% which would allow the survival of > 80% of the species (see diagram below).



I considered the 10% - 30% targets too arbitrary. There are certain ecosystems that would require more protection than just 10-30%. For example, a very rare ecosystem occurring only on 5 locations with a combined cover of 2000 acres is not served with 10 or even 30 % protection. For such ecosystems, the target should be much higher, even 100%. Also, there are ecosystems that provide vital environmental services; these too need a higher target. Some ecosystems are not suitable for any type of development and by default are best preserved and are able to receive very high conservation targets without obstructing development. Other important functions could also lead to a higher target. These will be discussed further on. Altogether, I used a minimum target of 30%. Ideally this percentage is taken from the original or historical extend of the habitat/ecosystem. For practical purposes however, I have taken the current extend.

Criteria

Criteria that I used in the establishment of a conservation target for each terrestrial ecosystem are the following:

Slope: Areas with steep slopes are unsuitable for development and have high erosion risks. Consequently, by default, such areas received high conservation marks.

Rarity: Ecosystems with coverage of < 5,000 acres were considered "rare". Ecosystems with coverage of 5,000-25,000 acres "uncommon" and ecosystems with 25,000 – 100,000 acres "fairly uncommon" and 100,000 – 1,000,000 acres: "common". The rarest ecosystems received the highest conservation ranks.

Count: Representing the number of polygons for this ecosystem. Anything under a count of 10 polygons received a slightly higher conservation rank.

Environmental Services: All ecosystems provide environmental services. In some cases these are particularly pronounced. Coastal fringe mangroves and Riverine mangroves are very important in erosion control and have great importance as nurseries for various aquatic organisms. These mangrove types received extra Environmental services points. Equally, the higher mountain ridges are extremely important for watershed functionality and fresh-water supply. These ridges also received extra points.

Timber: Some forest types are more important for timber production than others. This is reflected in extra points for timber production. Mahogany rich forests rank highest.

Agricultural value: Areas with low agricultural value are less suitable for agricultural development. Consequently, by default, such areas received higher conservation marks.

Wetlands: Wetlands are considered important locations for biodiversity and water control. Consequently, wetlands received extra conservation marks.

Biodiversity: All ecosystems have importance for biodiversity. No doubt, some are more important than other. But since data on this distinction is not readily available, biodiversity was not a criterion in the analysis.

Results

The results of my analysis are in the table on the following pages. On the last page is a map which visualizes these results. This map does not present a protected areas systems plan! Merely an indication of where the areas are located that have the conservation targets in the table. Interestingly, the highest targets are in the Maya Mountains. Not surprising because, the hills are steep, are important for freshwater supply, and are useless for agriculture. Another interesting result is that should the conservation targets proposed here, actually be achieved, the national (terrestrial) area under conservation would be 40%.

Unesco_code	UNESCO Description	Rationale	%Target
IA1a(1)(a)-C	Tropical evergreen broad-leaved lowland hill forest, Callophyllum variant	Slope+uncommon+low_count+timber_production	60
IA1a(1)(a)K-r	Tropical evergreen broad-leaved lowland hill forest on rolling karstic terrain	Slope+fairly_uncommon+timber_production	40
IA1a(1)(a)K-s	Tropical evergreen broad-leaved lowland hill forest on steep karstic terrain	Slope+fairly_uncommon	60
IA1a(1)(a)-VT	Tropical evergreen broad-leaved lowland hill forest, Vochysia-Terminalia variant	Uncommon+low_count+timber_production	100
IA1a(1)(b)K	Tropical evergreen broad-leaved lowland forest on calcareous soils	Rare+low_count+timber_production	80
IA1a(1)(b)P	Tropical evergreen broad-leaved lowland forest on poor or sandy soils	Timber_production_prime mahogany_land	40
IA1b(1)	Tropical evergreen broad-leaved submontane forest	Slope+uncommon+low_count+ecological-services+low_agriculture_value	100
IA1b(1)K-r	Tropical evergreen broad-leaved submontane forest on rolling karstic hills	Slope+uncommon+low_count+ecological-services+timber_production+low_agriculture_value	80
IA1b(1)K-s	Tropical evergreen broad-leaved submontane forest on steep karstic hills	Slope+uncommon+low_count+ecological-services+low_agriculture_value	100
IA1b(3)	Tropical evergreen broad-leaved submontane palm forest	Slope+uncommon+low_count+ecological-services+low_agriculture_value	100
IA1c(1)	Tropical evergreen broad-leaved lower-montane forest	Slope+uncommon+low_count+ecological-services+low_agriculture_value	100
IA1c(4)	Tropical evergreen broad-leaved lower montane palm forest	Slope+uncommon+low_count+ecological-services+low_agriculture_value	100
IA1f(2)	Tropical evergreen broad-leaved alluvial forest	Uncommon+timber_production	60
IA1f(2)(a)K	Tropical evergreen broad-leaved alluvial forest on calcareous soils	Fairly_uncommon+timber_production	40
IA1g(1)(a)	Tropical evergreen broad-leaved lowland swamp forest	Fairly_uncommon+timber_production	40
IA1g(1)(a)-AC	Tropical evergreen broad-leaved lowland swamp forest, Aguacaliente variant	Rare+low_count+low_agriculture_value+wetland	80
IA1g(1)(b)	Tropical evergreen broad-leaved permanently waterlogged lowland swamp forest	Uncommon+low_count+low_agriculture_value	60
IA1g(2)(b)-MA	Tropical evergreen broad-leaved permanently waterlogged lowland swamp forest with palms. Manicaria variant	Uncommon+low_count+low_agriculture_value	60
IA2a(1)(a)K-r	Tropical evergreen seasonal broad-leaved lowland hill forest, on rolling karstic terrain	Slope+fairly_uncommon+timber_production	40
IA2a(1)(a)K-s	Tropical evergreen seasonal broad-leaved lowland hill forest on steep karstic terrain	Slope	40
IA2a(1)(a)-ST	Tropical evergreen seasonal broad-leaved lowland hill forest, Simarouba-Terminalia variant	Slope+low_count+timber_production	60
IA2a(1)(a)-VT	Tropical evergreen seasonal broad-leaved lowland hill forest, Virola-Terminalia variant	Slope+fairly_uncommon+low_count+timber_production	80
IA2a(1)(b)K	Tropical evergreen seasonal broadleaf lowland forest over lime-rich alluvium	Fairly_uncommon+timber_production	40
IA2a(1)(b)K-BR	Tropical evergreen seasonal broad-leaved lowland forest on calcareous soils, Belize River variant	Fairly_uncommon+low_count+timber_production	40
IA2a(1)(b)K-CE	Tropical evergreen seasonal broad-leaved lowland forest on calcareous soils, Central Eastern variant	Timber_production_prime mahogany_land	40
IA2a(1)(b)K-CW	Tropical evergreen seasonal broad-leaved lowland forest on clacareous soils, Central West variant	Timber_production_prime mahogany_land	40

IA2a(1)(b)K-TP	Tropical evergreen seasonal broad-leaved lowland forest on calcareous soils, Tehuantepec-Peten variant	Timber_production_prime mahogany_land	40
IA2a(1)(b)K-Y	Tropical evergreen seasonal broad-leaved lowland forest on calcareous soils, Yucatan variant	Timber_production_prime mahogany_land	40
IA2a(1)(b)S	Tropical evergreen seasonal broad-leaved lowland forest on poor or sandy soils	Fairly_uncommon+timber_production	40
IA2a(1/2)(a)	Tropical evergreen seasonal mixed lowland hill forest	Slope+rare+low_count+timber_production	100
IA2a(2)(a)	Tropical evergreen seasonal needle-leaved lowland hill forest	Uncommon+low_count+timber_production	60
IA2a(2)(b)	Tropical evergreen seasonal needle-leaved lowland forest	Fairly_uncommon+timber_production	40
IA2b(1)	Tropical evergreen seasonal broad-leaved submontane elfin forest	Slope+rare+low_count+ecological-services+low_agriculture_value	100
IA2b(1)K-r	Tropical evergreen seasonal broad-leaved submontane forest on rolling karstic hills	Slope+fairly_uncommon+low_count+ecological-services+timber_production+low_agriculture_value	80
IA2b(1)K-s	Tropical evergreen seasonal broad-leaved submontane forest on steep karstic hills	Slope+fairly_uncommon+low_count+ecological-services+low_agriculture_value	100
IA2b(1)-ST	Tropical evergreen seasonal broad-leaved submontane forest, Simarouba-Terminalia variant	Slope+timber_production+low_agriculture_value	80
IA2b(1)-VT	Tropical evergreen seasonal broadl-leaved submontane forest: Virola-Terminalia variant	Slope+ecological-services+timber_production+low_agriculture_value	100
IA2b(1/2)	Tropical evergreen seasonal mixed submontane forest	Slope+fairly_uncommon+low_count+ecological-services+timber_production+low_agriculture_value	100
IA2b(2)	Tropical evergreen seasonal needle-leaved submontane forest	Slope+fairly_uncommon+low_count+ecological-services+timber_production+low_agriculture_value	100
IA2c(1)	Tropical evergreen seasonal broad-leaved lower montane elfin forest	Slope+rare+low_count+ecological-services+low_agriculture_value	100
IA2f(2)(a)	Tropical evergreen seasonal broad-leaved alluvial forest	Fairly_uncommon+timber_production	40
IA2g(1)(a)-SC	Tropical evergreen seasonal broad-leaved lowland swamp forest, Stann Creek variant	Rare+low_count+timber_production+low_agriculture_value	100
IA2g(1)(a)-Sh	Tropical evergreen seasonal broad-leaved lowland swamp forest, short tree variant	Fairly_uncommon+low_agriculture_value	30
IA2g(1)(a)-T	Tropical evergreen seasonal broad-leaved lowland swamp forest, tall variant	Timber_production+low_agriculture_value	40
IA3a(1)(a)	Tropical semi-deciduous broad-leaved lowland forest	Uncommon+low_count+timber_production+low_agriculture_value	60
IA5a(1)(a)	Caribbean mangrove forest; dwarf mangrove scrub	Fairly_uncommon+low_agriculture_value+wetland	40
IA5a(1)(b)	Caribbean mangrove forest; freshwater mangrove scrub	Fairly_uncommon+low_agriculture_value+wetland	40
IA5a(1)(c)	Caribbean mangrove forest; mixed mangrove scrub	Fairly_uncommon+low_agriculture_value+wetland	40
IA5a(1)(d)	Caribbean mangrove forest; coastal fringe mangrove	Fairly_uncommon+ecological-services+low_agriculture_value+wetland	60
IA5a(1)(e)	Caribbean mangrove forest; riverine mangrove	Uncommon+ecological-services+low_agriculture_value+wetland	80
IA5a(1)(f)	Caribbean mangrove forest; basin mangrove	Fairly_uncommon+low_agriculture_value+wetland	40
IB1a(2)	Tropical deciduous microphyllous lowland forest	Rare+low_count+low_agriculture_value+wetland	80
IIIA1b(1)(a)K-s	Tropical evergreen broad-leaved shrubland on steep karstic hills	Slope+rare+low_agriculture_value	100

IIIA1b(a)LE	Evergreen broad-leaved lowland shrubland dominated by leguminous shrubs	Fairly_uncommon+low_agriculture_value	30
IIIA1b(a)MI	Evergreen broad-leaved lowland shrubland, Miconia variant	Fairly_uncommon+low_agriculture_value	30
IIIA1f	Evergreen broad-leaved lowland peat shrubland with Sphagnum	Rare+low_count+low_agriculture_value+wetland	80
IIIB1b(a)	Deciduous broad-leaved lowland shrubland, well-drained, over poor soils	Uncommon+low_count	40
IIIB1b(a)2	Deciduous broad-leaved lowland disturbed shrubland	Fairly_uncommon	30
IIIB1b(b)	Deciduous mixed submontane shrubland over poor soils	Slope+uncommon+low_count+ecological-services+timber_production+low_agriculture_value +wetland	80
IIIB1b(f)H	Deciduous broad-leaved lowland riparian shrubland in hills	Uncommon+low_count	40
IIIB1b(f)P	Deciduous broad-leaved lowland riparian shrubland of the plains	Uncommon	40
SA1a	River	Uncommon+low_agriculture_value+wetland	60
SA1b(4)(b)	Freshwater Lake	Uncommon+low_agriculture_value+wetland	60
SA1b(5)	Brackish/saline lake	Fairly_uncommon+low_agriculture_value+wetland	40
SA1d(2)(a)	Coral reef of the Caribbean; Shallow Reefs	Marine	?
SA1d(2)(b)	Coral reef of the Caribbean; Patch Reefs	Marine	?
SA1d(2)(b)/s	Coral reef of the Caribbean; Patch Reefs scattered in seagrass beds	Marine	?
SA1d(2)(c)	Coral reef of the Caribbean; Spur and groove	Marine	?
SA3b	Caribbean inner lagoon	Marine	?
SA3c	Caribbean open sea	Marine	?
SA3d	Caribbean open sea	Marine	?
SA3f	Caribbean open sea - mesopelagic/bathyal	Marine	?
SA3g	Caribbean open sea - bathyal	Marine	?
SA3h	Caribbean open sea - abyssal	Marine	?
SPA	Agriculture	Disturbed	0
SPA(1)	Agriculture: non mechanized agricultural land uses including unimproved pasture	Disturbed	0
SPA(2)	Agriculture: mechanized agricultural land uses	Disturbed	0
SPA(2)b	Agriculture: Semi-woody perennial crops	Disturbed	0
SPA(2)c	Agriculture: Woody perennial crops	Disturbed	0
SPA(3)	Agriculture: Forest Plantations	Disturbed	0
SPC1	Fish ponds and shrimp farms	Disturbed	0
U	Urban	Disturbed	0
VA2a(1)(2)	Short-grass savanna with scattered needle-leaved trees	Timber_production+low_agriculture	30
VA2b(2)	Short-grass savanna with shrubs	Low_agriculture_value	30
VA2c(g)	Short-grass swamp savanna without trees or shrubs	Rare+low_count+low_agriculture_value+wetland	80
VD1a(1)	Eleocharis marsh	Rare+low_count+low_agriculture_value+wetland	80
VE1a(1)	Marine salt marsh rich in succulents	fairly_uncommon+low_agriculture_value	30
VF1c(1)L	Fire-induced lowland fern thicket	Disturbed - restauration	60
VF1c(1)SM	Fire-induced submontane fern thicket	Disturbed - restauration	100
VIB3a	Tropical coastal vegetation on recent sediments	Rare	60
VIIB1a	Tropical freshwater reed-swamp	Rare+low_count+wetland	80
VIIB4	Tropical lowland tall herbaceous swamp	Fairly_uncommon+wetland	30
VIIIA	Seagrass Beds	Marine	?
VIIIB1	Sparse algae/sand	Marine	?
VIIIB2	Sparse algae/silt	Marine	?
VIIIB3	Fleshy Brown Algae/Gorgonians	Marine	?

Proposed Terrestrial Conservation Targets by Ecosystem