Convention on Biological Diversity

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The CBD PoWPA Gap Analysis: A tool to identify potential sites for action under REDD-plus

CBD Secretariat

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REDD pilot and demonstration efforts and the CBD Programme of Work on Protected Areas

The Bali Action Plan adopted by the Conference of the Parties (COP) to the UNFCCC in decision 1/CP.13 mandated the negotiation of a post-2012 legal instrument, including financial incentives and capacity building for forest-based climate change mitigation in developing countries. In its decision 2/CP.13, the UNFCCC COP elaborated the implementation of reducing emissions from deforestation and forest degradation (REDD) as a key action in mitigating the threat of global climate change, advising in the Annex (para 8) that demonstration activities should note relevant provisions of partners such as the Convention on Biological Diversity (CBD). In present discussions under the UNFCCC, the term 'REDD-plus' is used to combine the various possible activities listed in the Bali Action Plan: *reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.*

The CBD Programme of Work on Protected Areas (PoWPA) gap analysis can provide solid mapping data and tools for landscape-level planning efforts of REDD-plus actions in more than 20 countries plus 20 more under completion. Many of these countries are pilot countries within the Forest Carbon Partnership Facility (FCPF) and/or the UN REDD Programme[1]. Through their national gap analyses, countries have identified high priority sites (HiPs) to expand or improve protected area systems and networks (see Figures 1-4). Technology and capacity is already available in countries that have completed or are undergoing gap analysis of their protected areas. HiPs are proposed for protection based on rigorous analysis of multiple GIS data layers including ecosystem characteristics. Relevant stakeholders have been involved in the national gap analysis. The identified areas are high value for biodiversity and important for the livelihoods of surrounding populations through the provision of ecosystem services. Protection of these areas under REDD-plus, or consideration of these areas e.g. as buffer zones and ecological corridors around and between protected areas, could maximize biodiversity conservation, while also securing key ecosystem services such as provision of water, and supporting sustainable livelihoods.

1 E.g. (Bolivia, Chile, Colombia, Costa Rica, Guatemala, Indonesia, Madagascar, Mexico, Nicaragua, Panama, Papua New Guinea, Peru)

Improving management of current protected area sites is of importance to REDD-plus, as biodiversity in many protected areas continues to be used unsustainably. With an estimated 15.2% of the global carbon stock currently under some degree of protection (an estimated 70Gt was held in the humid tropical forest biome in 2000), any “paper parks” are insufficient guardians of this resource. Forest loss from within protected areas between 2000 and 2005 is estimated to have resulted in emissions of 822-990 Mt of CO_2 equivalent, with approximately 75% of total emissions from deforestation in protected areas of the Neotropics[2] (see also Box 1). In fact, protected areas provide a *cost-effective opportunity*, as sites are already established, some infrastructure is in place, some analysis is completed, and the local communities have some awareness of the protection. Facing a lack of sustainable financing, REDD-plus actions fit naturally where management needs improvement and where new sites or expansions including biological corridors are proposed.

Box 1: Carbon storage and carbon loss from protected areas – global analysis[3]

Earth’s terrestrial ecosystems are estimated to store around 2,050 gigatons (Gt) of carbon in their biomass and soil (to 1 m depth). Protected areas worldwide cover 12.2% of the land surface, and contain over 312 GtC, or 15.2% of the global terrestrial carbon stock. Forest clearance contributes 20% of total global emissions of carbon dioxide (CO2) to the atmosphere (IPCC 2007). Reducing forest loss is therefore of utmost importance for climate change mitigation. As formally protected areas are one potential tool for achieving these emissions reductions, it is important to understand the extent to which protected areas are in fact subject to land use change, and whether improving the effectiveness of their management could contribute to reducing emissions from deforestation and forest degradation.

Carbon storage in protected areas
The approach used by UNEP WCMC in their study on carbon storage in protected areas can allow identification of areas of high carbon value which are not covered by the current protected areas network on a global and regional level. This provides a way to identify areas that are not just high in carbon, but also have high biodiversity value, increasing the scope for delivering ‘multiple benefits’ from climate mitigation. Key findings from UNEP WCMC analysis of the carbon storage role of protected areas include:

- South America is notable for both its large volume of carbon and for the high proportion of this carbon stored within protected areas; 27% of a total store of 340 GtC.
- By way of contrast, the Pacific has a low total carbon store but a high carbon density, and only 4% is stored within protected areas. Increasing protected area coverage in this region would provide a higher carbon benefit per unit area than for other regions.
- Amongst the IUCN categories, only 4% of the carbon stock is contained within protected areas designated under categories I-II, which generally place stringent restrictions on resource use.
- More research is required into the carbon storage implications of the various types of protected area management. A greater level of carbon loss would be expected from areas allowing sustainable forest management, for example, than those that restrict use of forest resources.
- If all of the carbon stored within ecosystems were to be valued according to current carbon market prices, a notional estimate of the financial value of the carbon storage services provided by the world’s protected area network would be €5,700 billion

Carbon emissions from forest loss within the protected area network of the humid tropical forest biome
UNEP WCMC examined the distribution of an estimated 21 million hectares of humid tropical forest loss between 2000 and 2005 (representing a 2% reduction in forest cover). Regions where protected areas are simultaneously rich in carbon and under pressure from land cover change were identified. Key findings include:

- The largest forest area loss was observed in the Neotropics. Rates of deforestation were similarly high in the Neotropics and Tropical Asia, 2.39 and 2.17% respectively.
- During the same period, over 1.7 million ha were estimated to have been cleared within protected areas in the humid tropics (0.81% of the forest they contained).

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2 Campbell et al. 2008. Carbon emissions from forest loss in protected areas. UNEP World Conservation Monitoring Centre

3 From Campbell et al 2008. Carbon Storage in Protected Areas – Technical Report and Campbell et al 2008. Carbon emissions from forest loss in protected areas. Both available from the UNEP World Conservation Monitoring Centre.

- Tropical Asia had the highest rates of deforestation within protected areas (1.33%).
- Despite low deforestation rates in protected areas in the Neotropics (0.79%), more than half the global total loss of humid tropical forest from within protected areas occurred in this region because of the large amount of forest protected there.
- Globally, more strictly protected areas (IUCN management categories I-II) had lower rates of humid tropical forest loss (0.53%) than the protected area network as a whole.
- Protected areas of the humid tropical forest biome contained an estimated 70Gt of carbon in 2000, over half of which was in the Neotropics.
- Forest loss from within protected areas between 2000 and 2005 was estimated to be 822 - 990 Mt of CO2 equivalent emissions. This accounted for around 3 % of total annual emissions from tropical deforestation during that period (IPCC 2007).
- Approximately 75% of total emissions from deforestation in protected areas were from the Neotropics with up to 15% coming from Tropical Asia. In both of these regions reducing deforestation in protected areas could provide significant emissions reduction benefits.
- Improving the effectiveness of protected area networks, particularly in regions like the Neotropics and Tropical Asia that have large carbon stocks subject to high deforestation pressures, could be an important strategy for reducing emissions from deforestation and degradation.

An available tool: gap analysis in the CBD Programme of Work on Protected Areas

The PoWPA, adopted by the COP to the CBD in decision VII/28, contains multiple objectives with time-bound targets. The overall goal is to complete ecologically representative networks of protected areas, and Parties were guided to begin by completing a gap analysis of their protected area systems with the full and effective participation of indigenous and local communities and relevant stakeholders by the end of 2006 (activities 1.1.4 and 1.1.5 of the PoWPA[4]). Details of the protected area gap analysis process including information on tools, and case-studies are available in a guide developed by Parrish and Dudley[5].

Accordingly, several Parties have completed or have nearly completed gap analyses of their protected area systems (Table 1). Currently, the UNDP GEF is supporting ongoing gap analysis in 22 countries (Table 2 lists 19 with their biomes). Portions of these biomes, many high in carbon stocks and currently without protection, hold the potential to be protected under REDD-plus.

Table 1. Status and contact for protected area gap analyses of selected countries.

Countries	Contact	Status	Gap Analysis link (if completed and provided)
Algeria	Nadia Chenouf chenoufnadia@yahoo.fr	Nearly completed	
Bahamas	Tamica J. Rahming trahming@bnt.bs	Completed	
Belize	Hannah St.Luce Martinez hannahstluce@yahoo.com	Completed	http://biological-diversity.info/Downloads/NPAPSP/NPAPSP_2005.pdf
Benin	Ferdinand Claude Kidjo fkidjo@yahoo.fr	Nearly completed	
Bolivia	Edwin Camacho ecamacho@sernap.gob.bo	Nearly completed	
Cape Verde	Sonia Indira Araujo soniaraujocv@gmail.com	Nearly completed	
Costa Rica	Marco Vinicio Araya marco.araya@sinac.go.cr	Completed	www.gruas.go.cr
Ecuador	Isabel Endara Guerrero	Completed	

4 https://www.cbd.int/decisions/cop7/?m=COP-07&id=7765&lg=0

5 Closing the Gap: https://www.cbd.int/doc/publications/cbd-ts-24.pdf

Countries	Contact	Status	Gap Analysis link (if completed and provided)
	iendara@ambiente.gov.ec		
Grenada	Augustus Thomas augmas007@yahoo.co.uk	Completed	http://www.oas.org/dsd/publications/Unit/oea51e/begin.htm
Guatemala	Raquel Sigüenza; Fernando Castro rsiguenza@conap.gob.gt; fercastro@conap.gob.gt	Completed	
Guinea	Maadjou Bah bahmaadjou@yahoo.fr	Nearly completed	
Honduras	Oscar Arias oscarhernanarias@yahoo.com	Completed	
Jamaica	Carla Gordon cgordon@nepa.gov.jm	Completed	http://www.jamaicachm.org.jm/Document/Jamaica%20NEGAR.pdf
Japan	Tetsuro Uesugi tetsuro_uesugi@env.go.jp	Nearly completed	
Liberia	Nathaniel T. Blama, Sr. natpolo2000@yahoo.com	Nearly completed	
Madagascar	Sahoby Ivy Randriamahaleo sahobyivyrandriamahaleo@yahoo.fr	Nearly completed	
Mexico	Arturo Peña Jimenez; Carlos Eduardo Muñoz Cortes arpena@conanp.gob.mx; cmunoz@conanp.gob.mx	Completed	http://www.conabio.gob.mx/gap/index.php/Portada
Nepal	Mr. Shiv Raj Bhatta shivabhatta@hotmail.com	Completed	
Peru	Luis Alfaro Lozano lalfaro@sernanp.gob.pe	Nearly completed	Análisis del Recubrimiento Ecológico del Sistema Nacional de Áreas Naturales Protegidas por el Estado (CDC-UNALM/TNC, 2006)
Saint Lucia	Lavinia Alexander lalexander@slunatrust.org	Completed	
St. Vincent and the Grenadines	Andrew Lockhart nationalparks@vincysurf.com	Completed	Workshop report http://www.protectedareas.info/upload/document/report_1st_gap_workshop_svg.pdf
Samoa	Niualuga Evaimalo niualuga.evaimalo@mnre.gov.ws	Nearly completed	
Swaziland	Wisdom M. Dlamini director@sntc.org.sz	Completed	http://www.sntc.org.sz/bcpd/reports/sppstudy.zip

Table 2. Countries supported by UNDP GEF[6] currently assessing gap analyses with carbon rich biomes with potential to implement land-use and forestry based mitigation measures, including REDD-plus

Biome (WWF ecological land classification system)	**Countries currently implementing gap analysis**
Flooded grasslands and savannas	Dominican Republic
Temperate coniferous forests (temperate, humid to semi-humid	Mongolia
Montane grasslands and shrublands (alpine or montane climate)	Afghanistan, Mongolia, Papua New Guinea
Mangrove (subtropical and tropical, salt water inundated)	**Dominican Republic, Panama, Papua New Guinea, Samoa, Nicaragua**
Tropical and subtropical moist broadleaf forests (tropical and subtropical, humid)	**Afghanistan, Antigua and Barbuda, Maldives, Micronesia, Dominican Republic, Panama, Papua New Guinea, Samoa, Solomon Islands, Fiji, Comoros**
Tropical and subtropical grasslands, savannas, and	Papua New Guinea, Mauritania

6 UNDP Supporting Country Action on the CBD PoWPA http://www.protectedareas.org/show/93082B15-F203-1EE9-B94F63E7C1525E11

shrublands	
Deserts and xeric shrublands (temperate to tropical, arid)	Afghanistan, Antigua and Barbuda, Armenia, Djibouti, Mongolia, Mauritania
Temperate broadleaf and mixed forests (temperate, humid)	Albania, Armenia, Bosnia and Herzegovina
Boreal forest/taiga (subarctic, humid)	Mongolia
Tropical and subtropical dry broadleaf forests (tropical and subtropical, semi-humid)	**Antigua and Barbuda, Dominican Republic, Panama, East Timor**
Mediterranean forests, woodlands, and shrub	Albania, Bosnia and Herzegovina
Tropical and subtropical coniferous forests (tropical and subtropical, semi-humid)	**Dominican Republic, Nicaragua**
Temperate grasslands, savannas, and shrublands	Afghanistan, Armenia, Mongolia
Marine biomes (coastal shelf)	Albania, Antigua and Barbuda, Djibouti, Dominican Republic, Maldives, Micronesia, , Panama, Papua New Guinea, Samoa, Solomon Islands, Nicaragua

The following four examples of protected area gap analysis in Mexico, Madagascar, Bolivia, and Bahamas are presented to further illustrate the wealth of REDD-specific information and capacity available.

The protected area gap analysis of Mexico

CBD protected area focal point: Dr. Ernesto Enkerlin-Hoeflich E-Mail: enkerlin@conanp.gob.mx

Gap analyses for Mexican terrestrial and marine protected area systems were completed by the National Commission of Mexico for Protected Areas (CONANP) in full partnership with the National Commission on Biodiversity of Mexico (CONABIO) and in consultation with NGOs and academia. Data were collected for the units of analysis (256 km2, 100 km2) by examining key elements of biodiversity (1450 elements), the criteria for conservation goals (goals of 5 to 99%), factors of threat and pressure (19 layers of information), and by using the MARXAN optimization program. Figure 1 presents the overall evaluation.

Several gap analyses were necessary at different scales, and an ecoregional analysis was needed in order to consider an effective network of protected areas. Within the state of Oaxaca (Fig. 2), is the example of the Chimalapas region, the focus of the WWF Selva Zoque Program. An area of high biodiversity, it encompasses the largest expanse of well-conserved lowland humid tropical forest and cloud forest in northern Mesoamerica. Already identified as an extreme priority under the gap analysis, and threatened by deforestation, arguments under REDD-plus could further inform the selection process and provide additional support toward protecting the biodiversity, including the carbon stocks, of the region.

Figure 1. The overall gap assessment of Mexico's terrestrial "spaces and species".

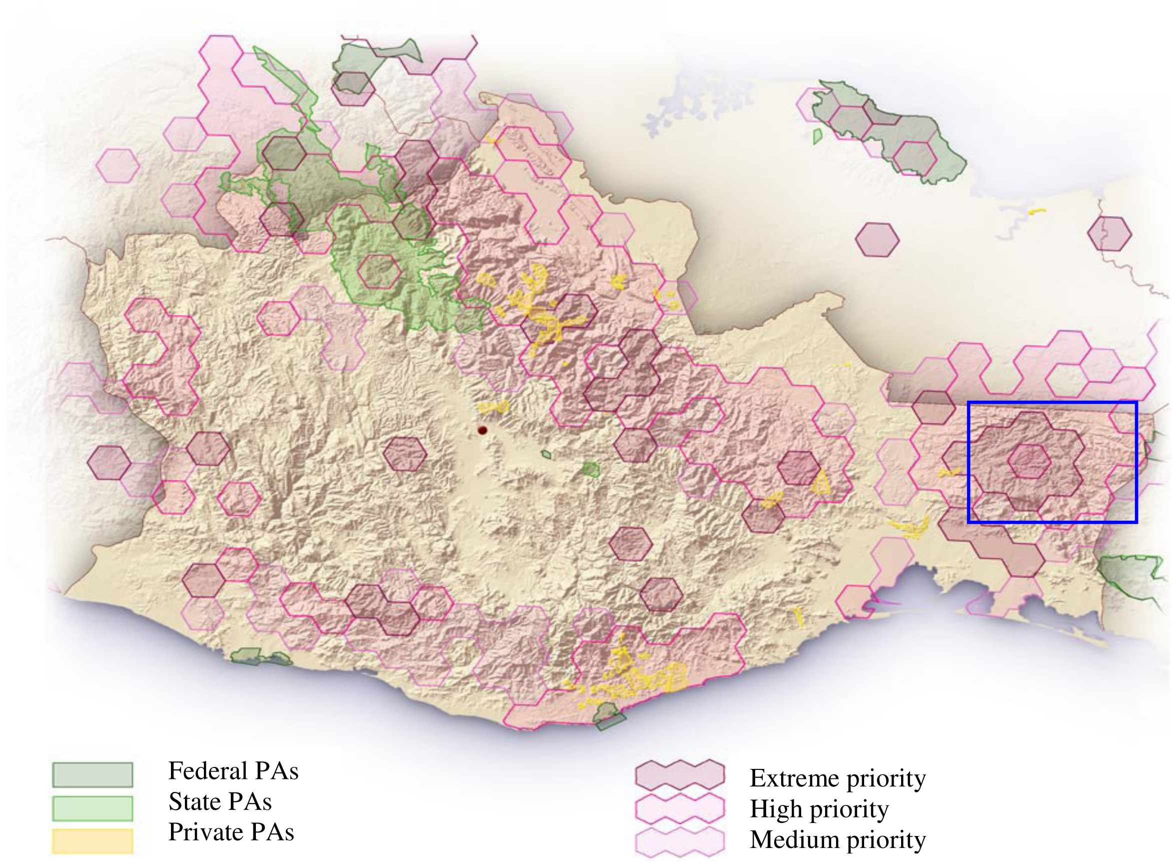

Figure 2. Protected areas vs areas of priority in the state of Oaxaca, Mexico. The Chimalapas region is located inside the blue box.

The protected area gap analysis of Madagascar

CBD focal point: Ms. Laurette Rasoavahiny E-Mail: sapm.dgeef@gmail.com

Madagascar, in cooperation with WWF Madagascar and the West Indian Ocean Programme has completed the gap analysis of its protected area systems by setting priorities, identifying goals, and acquiring mapping tools such as the MARXAN and Zonation computer programmes. Ecosystem maps of Madagascar were developed which identify critical areas for protection (e.g. Fig.3). The maps were used as a basis for establishing new protected areas, to support decision making for regional forest zoning and mining permits and to provide scenarios for biodiversity offsets. Areas in green, identified as potential areas of sustainable forest management, hold potential under REDD-plus schemes as well.

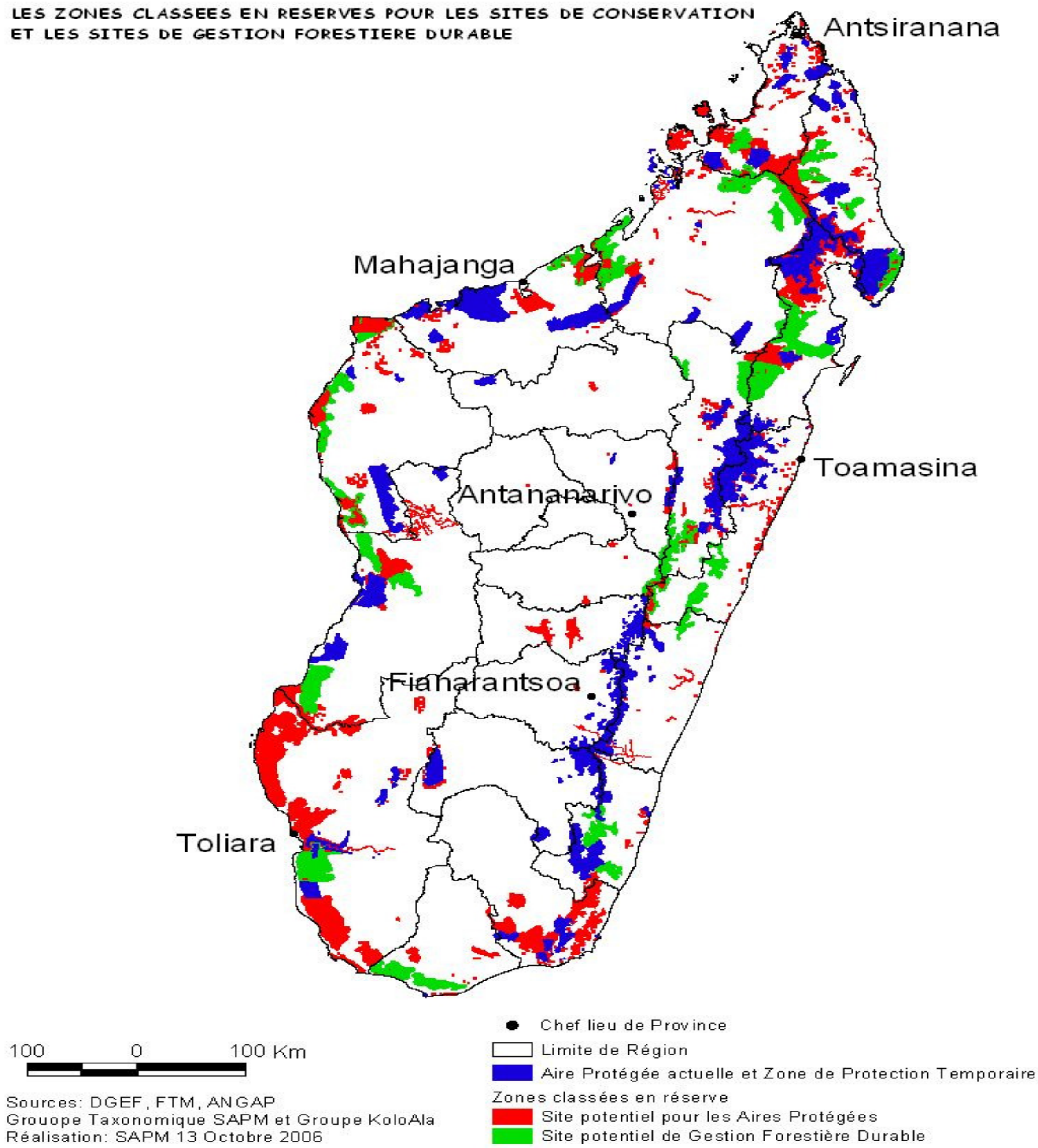

Figure 3. The results of the protected area gap analysis of Madagascar. Areas in green are potential sites for sustainable forest management.

The protected area gap analysis of Bahamas

CBD focal point: Dr. Philip Weech E-Mail: philipweech@bahamas.gov.bs

The Bahamas gap analysis was completed through collaboration between The Nature Conservancy (TNC), as the technical lead, the Bahamas National Trust (BNT), as the organizer of most partnership interactions, and the Bahamas Environment, Science and Technology Commission. Biodiversity targets were chosen and then assessed for data availability and confidence. Habitat level data were used as surrogates for many species lacking data. Ultimately, five terrestrial biodiversity targets (among others) were identified and included in the analysis. Specific goals were developed for each biodiversity target based on an assessment of key ecological attributes.

Terrestrial habitat protection was found to be concentrated on a few main islands. The minimum 10% goal for pine forest is met on two islands, dry broadleaf evergreen forest (coppice) while protected at 7% on average, is under-represented even though it is the most diverse terrestrial habitat found in Bahamas (Fig. 4).

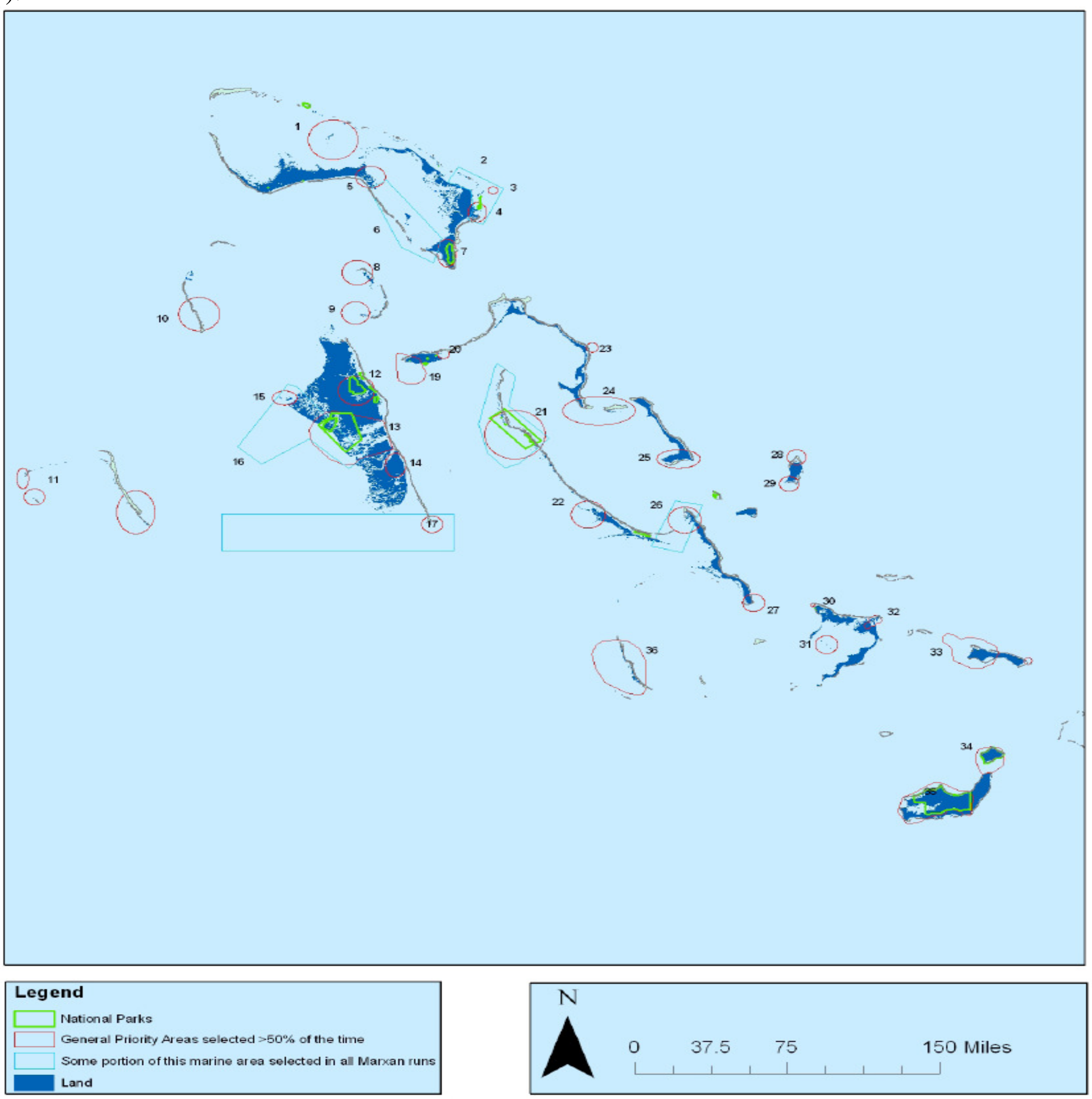

Figure 4. Synthesis of all Bahamas-wide MARXAN results showing general areas consistently identified as priority sites.

A lack of target representation across Bahamas was found (e.g. beach, coppice, and tidal creeks). Additional protected areas should be placed throughout the central and southern Bahamas to ensure greater representation and redundancy. The analysis determined locations to add protected areas in order to contribute significantly to both biodiversity coverage and to maintain connectivity. Support from REDD-plus could ensure that these areas come under levels of protection which deliver maximum biodiversity benefits and co-benefits.

The protected area gap analysis of Bolivia

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The protected area gap analysis of Bolivia was commissioned by the governmental protected area service (SERNAP), funded by UNDP GEF, and carried out by a consortium of national and international institutions[7]. The Bolivian gap analysis incorporates the concept of biodiversity viability and resilience. The re-definition, re-delimitation or re-categorization of existing protected areas was considered. Main focal biodiversity elements were large functional ecosystems expected to provide the best-possible resilience against effects of global-change and local/regional land-use change impacts (among other benefits). Conservation status of the ecosystems was determined using direct (e.g. deforestation) and proxy indicators (e.g. land-use history, sensitivity to degradation of ecosystem structure and composition). Anthropocentric high priority areas, such as areas important for ecosystem services (e.g. watershed protection) complemented the analysis acknowledging the important societal functions of protected areas.

Analysis of the high priority sites chosen would vet those best suited for action and support under REDD-plus, thereby securing valuable carbon stocks and ensuring maximization of co-benefits.

Conclusion

Action on REDD-plus is critical to the mitigation of the effects of global climate change. To facilitate early actions, and to avoid duplication of effort, data already accrued for many developing countries within the CBD PoWPA gap analysis can be used to determine the best actions on REDD-plus. The national gap analyses are the results of a government-driven, participatory process with the involvement of key national biodiversity experts, and they can be useful tool for the maximization of synergies between the Rio Conventions in the form of REDD co-benefits.

Through these gap analyses, countries have identified high priority sites to expand or improve the protected area system and network, often taking into account future effects of climate change to improve adaptation. Depending on the form and level of any future protection under possible REDD-plus efforts, these areas would provide considerable carbon sequestration, as well as biodiversity and livelihood benefits.

Areas currently “protected” cannot be taken for granted within deliberations on REDD-plus, as many protected areas are degrading through a lack of management effectiveness and financial sustainability. Protected areas represent the most significant investment for adapting to and also thereby mitigating climate change and the best collaborative actions across sectors and actors will be needed to make a difference for biodiversity and human well-being.

Ms. Lisa Janishevski, CBD Secretariat

7 “Closing the Gap” Chapter 15 includes the Bolivian Gap analysis by Pierre L. Ibisch, Christoph Nowicki, Natalia Araujo, Robert Müller and Steffen Reichle https://www.cbd.int/doc/publications/cbd-ts-24.pdf