The role of spatial analysis in decision-making processes for REDD+ and NBSAPs

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Overview

- What is the role of spatial analysis in decision-making processess for REDD+ and NBSAPs?
- What are some of the synergies between making and using maps for REDD+ and for NBSAPs?
- Examples of spatial analysis relevant to REDD+ and the Aichi Targets
- Conclusions

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Why incorporate spatial data and mapping into REDD+ and NBSAPs?

- **Spatial data and mapping** can provide a useful way to:
  - **Gather**, store, and communicate **information**
  - Identify **spatial patterns**
- To inform policy and **decision-making by:**
  - Assessing **trends and** analyzing **trade-offs**
  - Measuring **policy impact**
  - Considering **future scenarios**
- Identify **national priorities** and allow for **strategic targeting** of resources
  - **Establish baselines**
  - Set targets
  - **Implementation and monitoring strategies**

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Key thematic areas for using spatial information in REDD+ and NBSAPs

1. **Biogeographic regions**
2. **Ecosystem services**
3. **Key Biodiversity Areas**
4. **Land Cover**
5. **Land use**
6. **Protected areas**
7. **Species distribution**
8. **Conservation planning**

- 8 key thematic areas identified through which the application of spatial data and mapping can significantly contribute to the development REDD+ national strategies or plans of action and national target setting, implementation and reporting against the Aichi Biodiversity Targets

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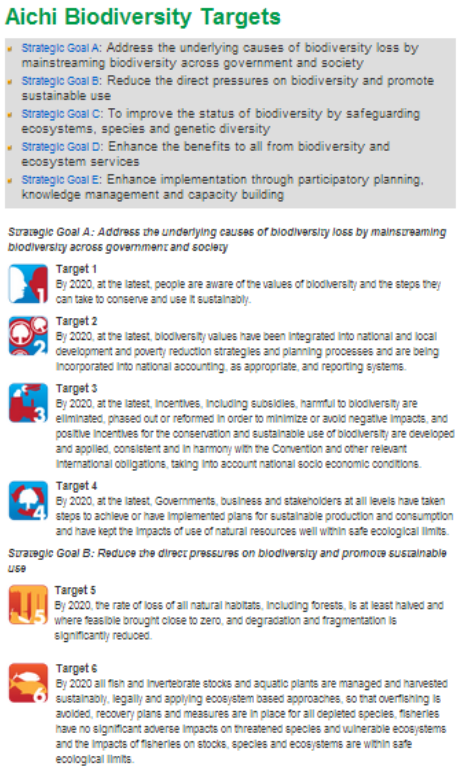
How to incorporate spatial data and mapping into the NBSAP process

- The CBD recommends 7 key steps in preparing or updating an NBSAP:

1. **Getting organised**
2. **Engaging and communicating with stakeholders**
3. **Gathering information**
4. **Developing strategies and actions**
5. **Developing implementation and resource mobilization plans**
6. **Implementing the NBSAP**
7. **Monitoring and reporting**

- **Entry points** for incorporating spatial data and mapping exist at **every stage** of the NBSAP updating process



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Developing strategies for NBSAPs: the role of spatial information

❖ An **overarching strategy for your NBSAP** can…

✓Provide a vision and direction for achieving goals

❖**Spatial data and mapping** can help in…

✓Precise target setting

✓Developing realistic future scenarios

✓Identifying scientifically-informed strategic options

KEY TASKS

- Establish national vision
- Set national targets
- Identify specific strategies

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The role of spatial analysis in REDD+

- The development of a national REDD + strategy may involve –
  - Reconciling different demands for land use
  - identifying the potential benefits that can be achieved
  - planning to avoid or minimize potential risks

- Biodiversity and ecosystem services distributed unevenly across space; spatial data helps identify areas important for different benefits and combinations of benefits

- combination of spatial analysis of priority areas for social and environmental benefits with cost assessments of REDD+ can help decision makers spatially locate REDD+ actions in a cost-effective manner that ensures environmental and socioeconomic benefits

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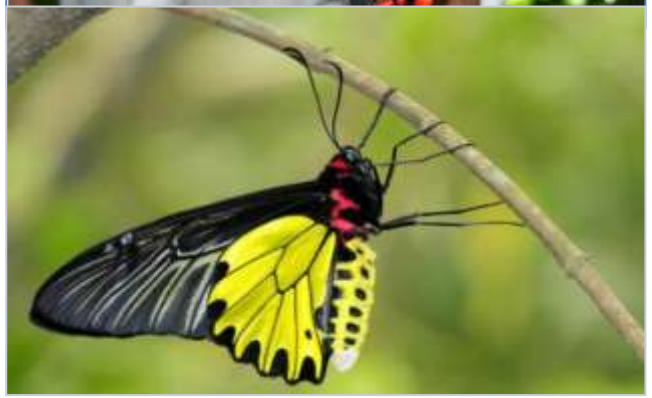
REDD+ and Multiple Benefits

- When **forests** are **retained** or **restored** through **REDD+**, they deliver **additional benefits** beyond climate change mitigation

- The multiple benefits of REDD + are all of the benefits - social, environmental, economic - that may result from the implementation of REDD + (sometimes called "co-benefits")



Types of multiple benefits

1. Enhancement of ecosystem services
2. Biodiversity conservation
3. Livelihood and social benefits

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Potential benefits of REDD+ depend on where and how actions are implemented

Forest patrolling

Ecotourism

plantation

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Where you implement different REDD+ interventions will also impact on the **potential risks**

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How can the priority areas for REDD+ actions be identified?

Identify goals for REDD+ for the country: what benefits is REDD+ expected to deliver?

Identify REDD+ actions that can achieve those goals

Identify the potential risks and benefits associated with these actions

Identify priority areas where REDD+ actions could be implemented

Design the implementation of the REDD+ actions to minimize risks and promote benefits

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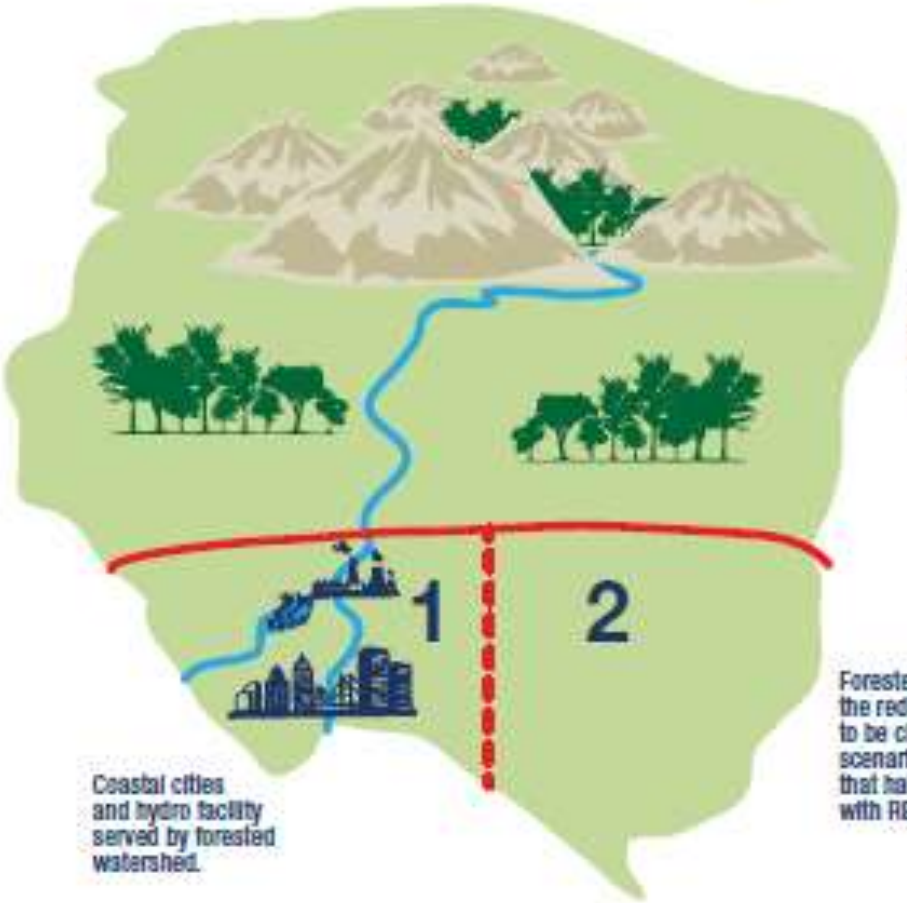
Identifying priority areas for REDD+

Figure 3.4 The climate change mitigation benefit of options 1 and 2 for forest retention is similar, but the water quality and sediment control benefit of option 1 is much higher



SOURCE: UNEP-WCMC

Opportunities for synergies between REDD+ and the Aichi Biodiversity Targets - examples

- Designating protected areas in forests that are of particular importance for biodiversity and ecosystem services, or include forest types that are currently under-represented in protected area systems
- Designating areas to increase connectivity between patches of natural habitat
- Making use of protected area categories that allow local land uses compatible with conservation, such as community conserved areas or indigenous areas
- Existing legal and institutional arrangements for protected areas make their designation and improved management relatively straightforward as REDD+ actions

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How can priority areas for REDD+ actions that also help to achieve Aichi Biodiversity targets be identified?

Country examples

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Key questions to consider

- Which REDD+ activities are a priority?
- Which Aichi Biodiversity Targets are a priority?
- Which spatial data layers and analyses could be used to show these priority areas?
- What could these maps be used for, and by whom?
- How can maps help to identify the linkages between REDD+ and the Aichi Biodiversity Targets?

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Aichi Biodiversity Targets related to **REDD+**

2: Biodiversity values integrated

5: Habitat loss halved or reduced

7: Sustainable agriculture, aquaculture and forestry

9: Invasive alien species prevented and controlled

11: Protected areas increased and improved

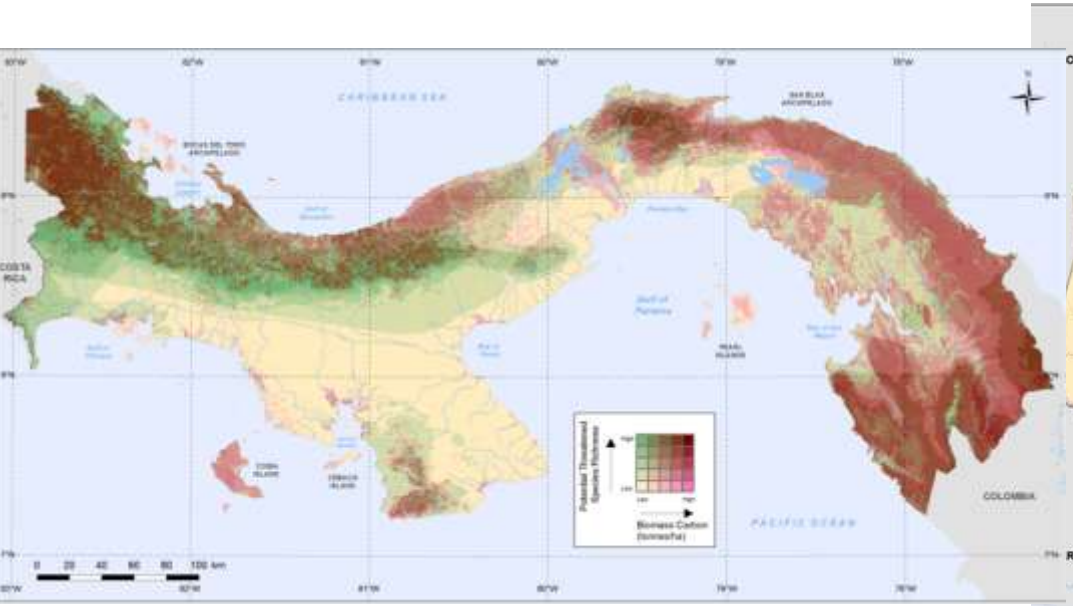
12: Extinction prevented

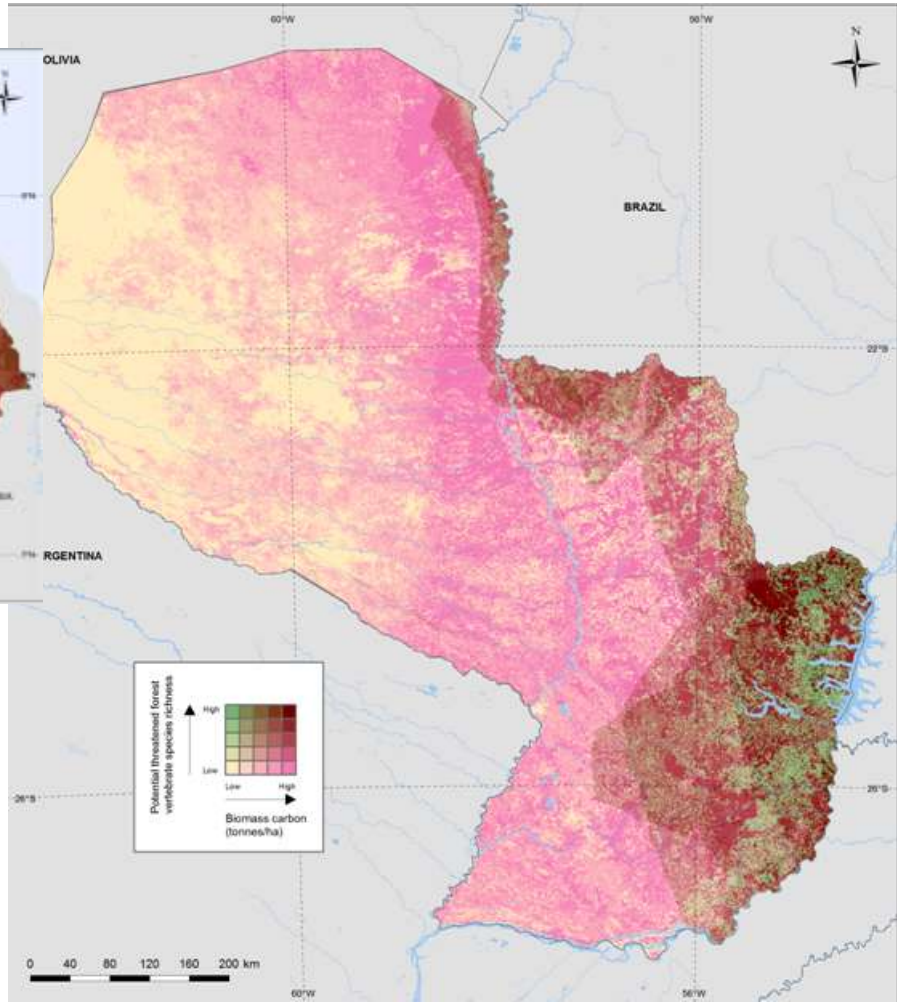
14: Ecosystems and essential services safeguarded

15: Ecosystem restored and resilience enhanced

18: Traditional Knowledge

Biomass carbon and potential richness of threatened species: examples from Panama and Paraguay (Aichi Targets 2, 5, 12, 15)





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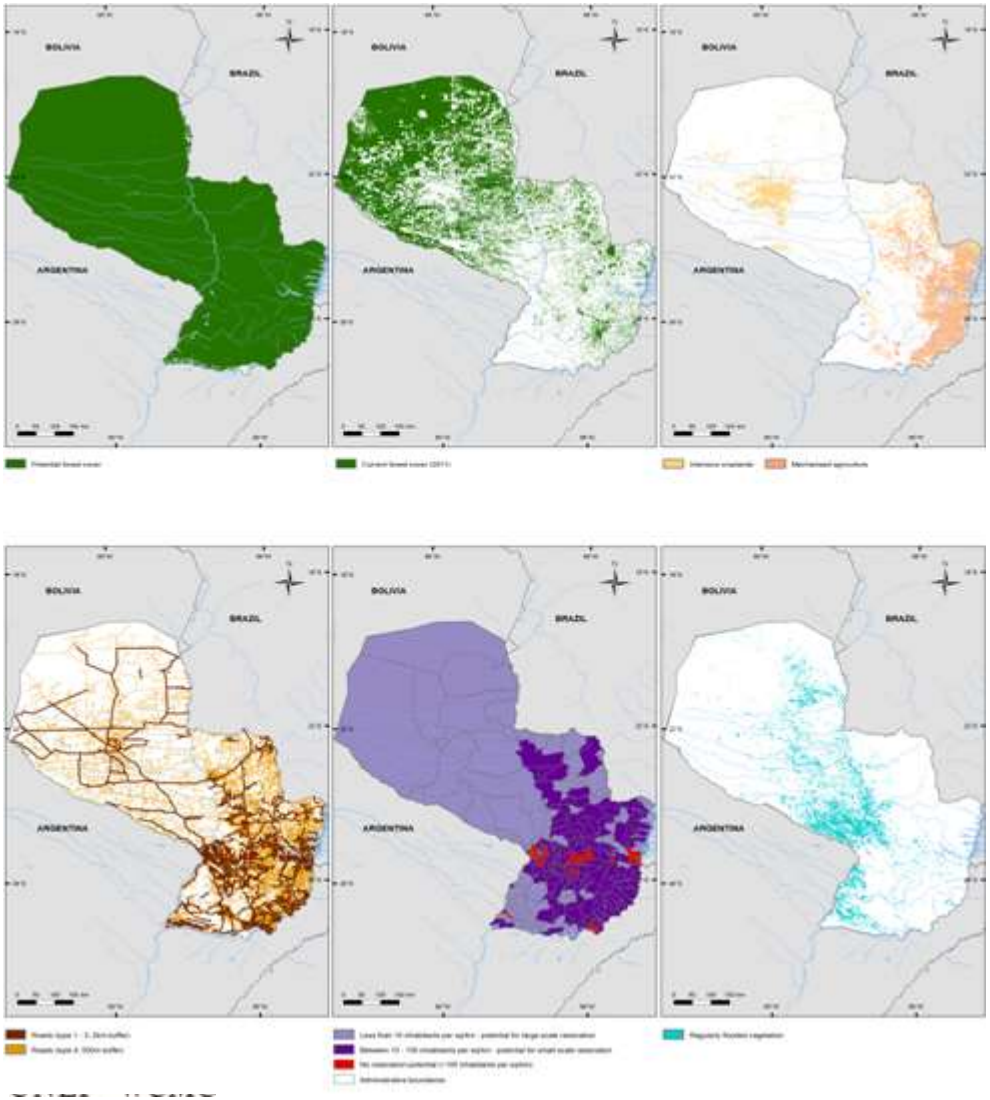
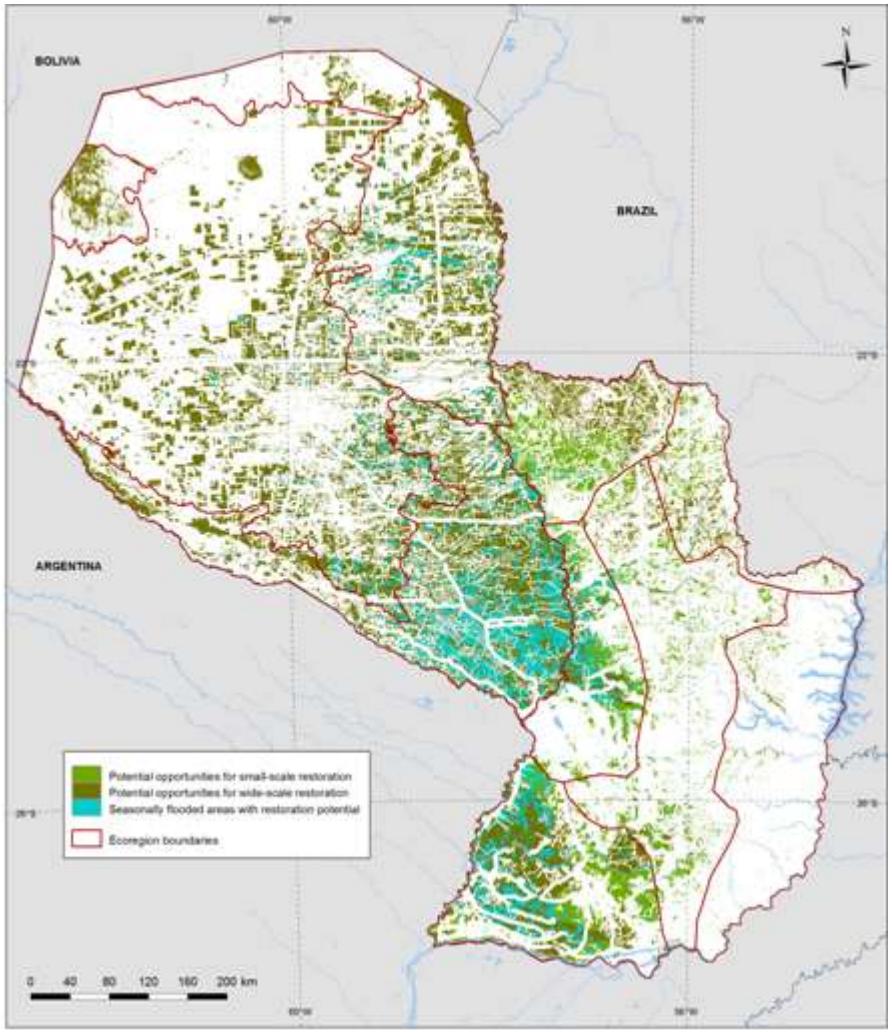
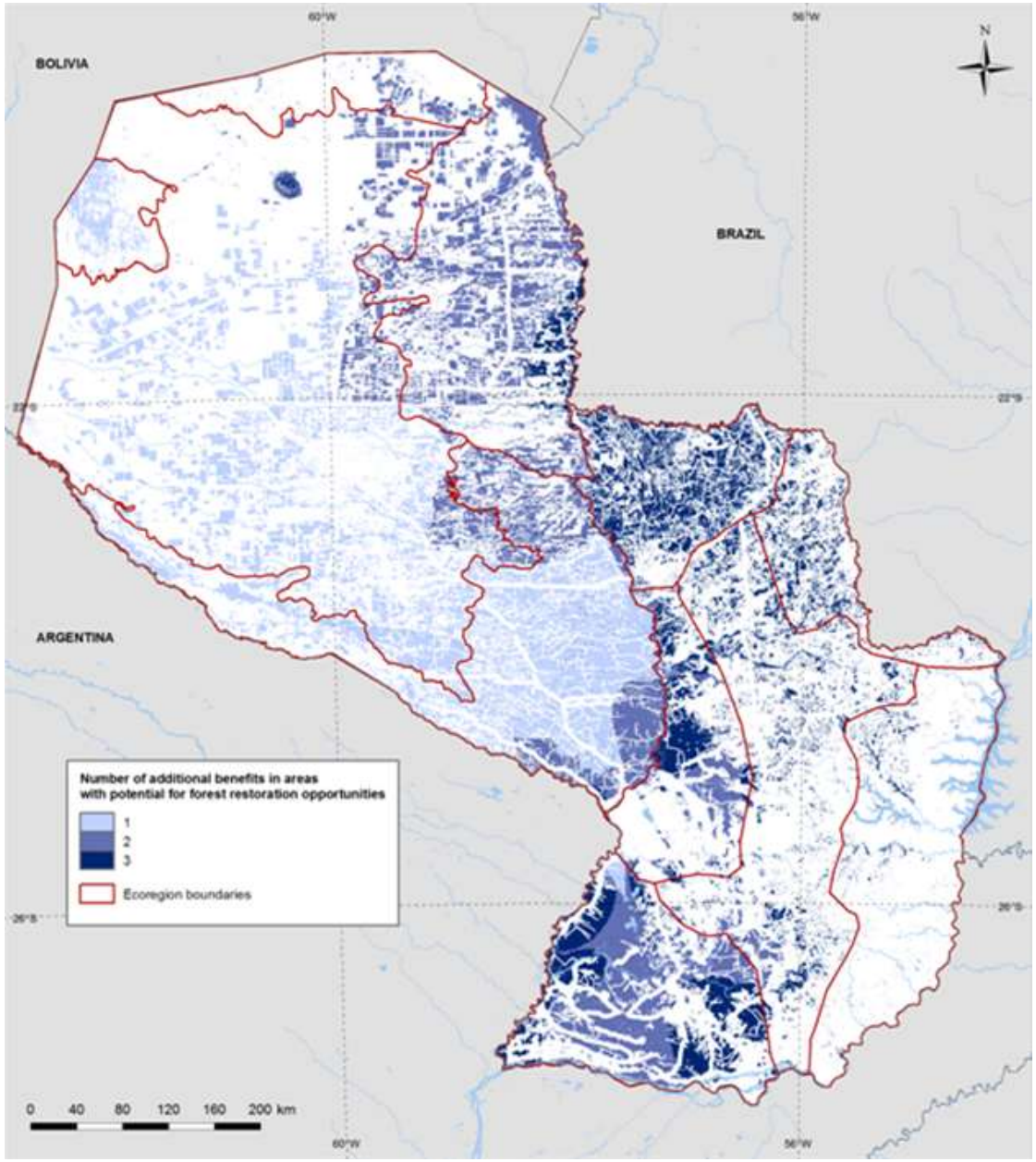
Identification of areas with potential opportunities for forest restoration in Paraguay (Target 15)





Multiple benefits of forest restoration in Paraguay

- Support for livelihoods (Targets 2, 14)
- Conservation/potential to increase biodiversity (potential richness of threatened species) (Targets 5, 12)
- Soil erosion control (Target 14)



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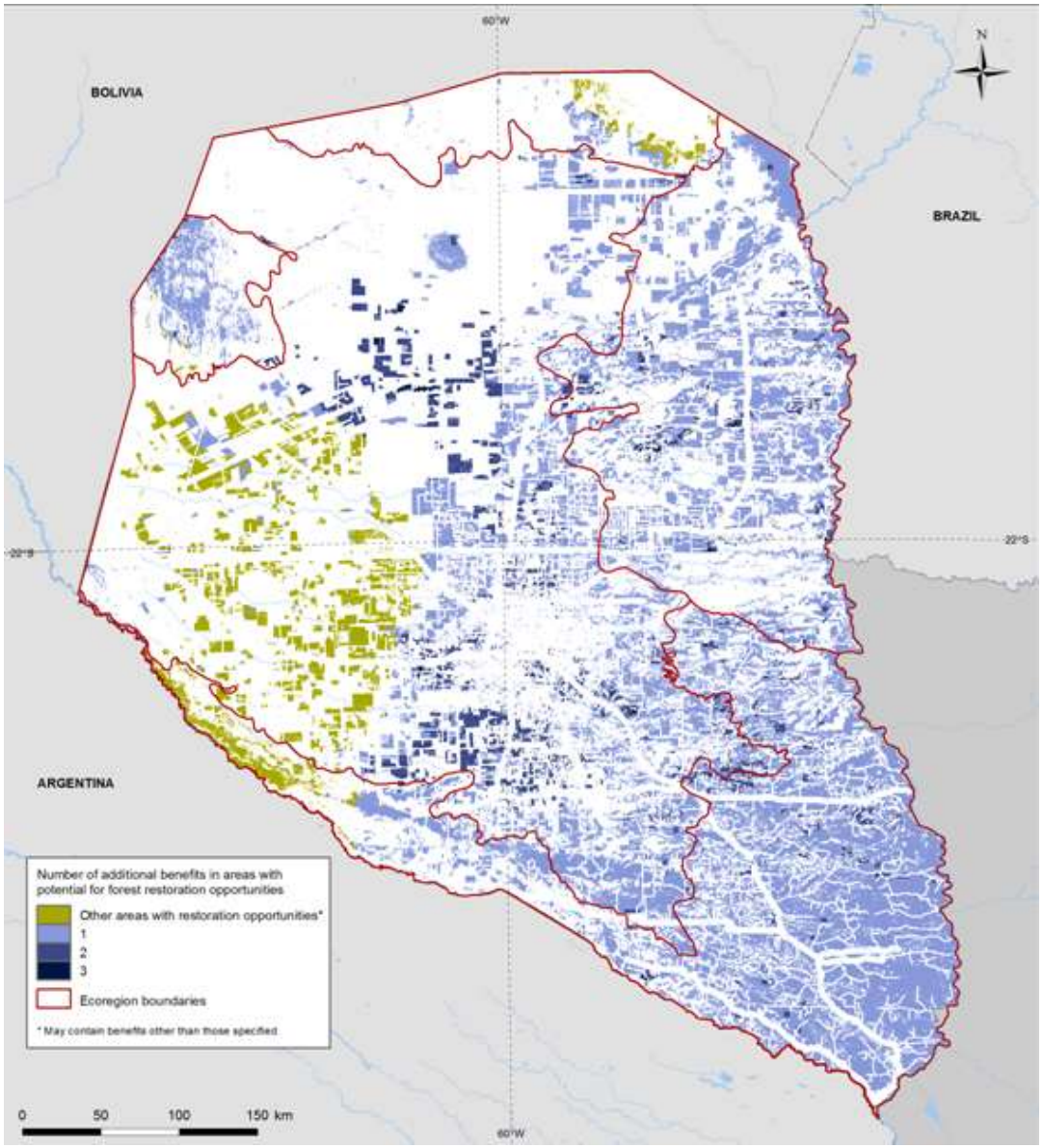
Multiple benefits of forest restoration in the Paraguayan Chaco (Targets 5, 12, 15)

- priority sites for endemic species (plants, amphibians, mammals and birds)
- areas considered of value to the diversity of habitat
- fragile ecosystems
- biodiversity corridors (GEF 2003)



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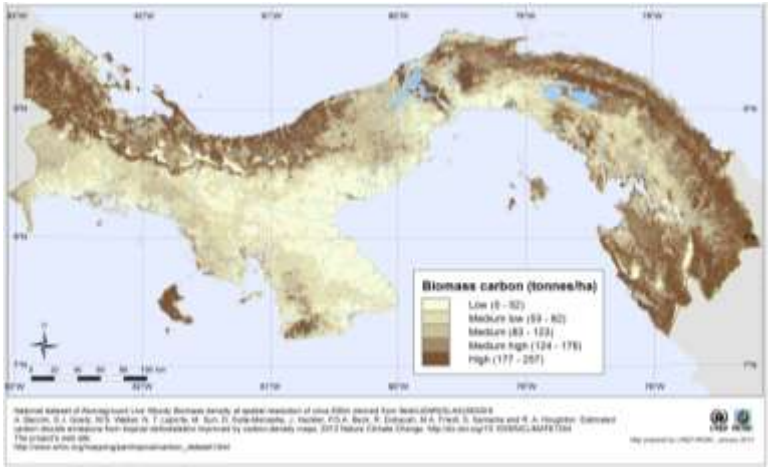
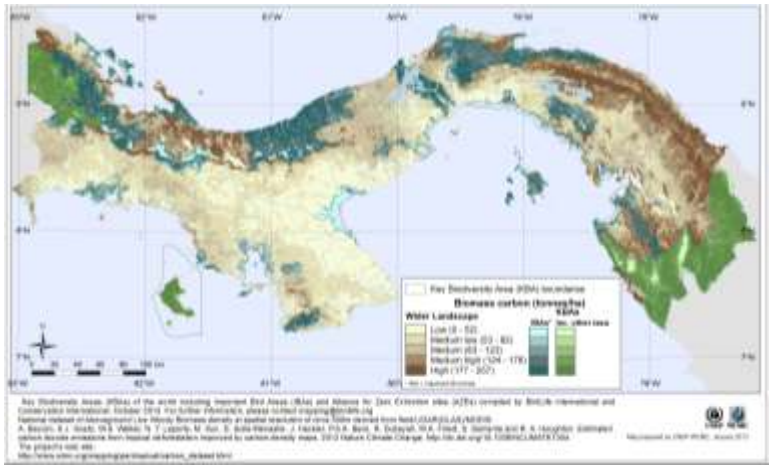
Spatial variation of potential benefits: example from Panama

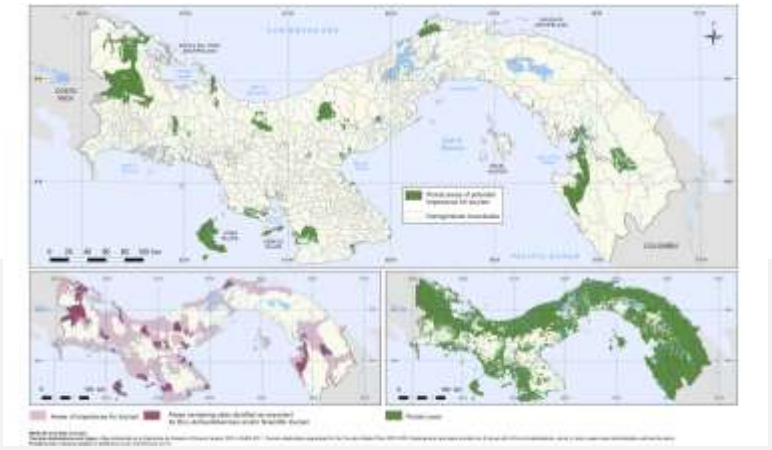
Biomass carbon reserves (Target 15)



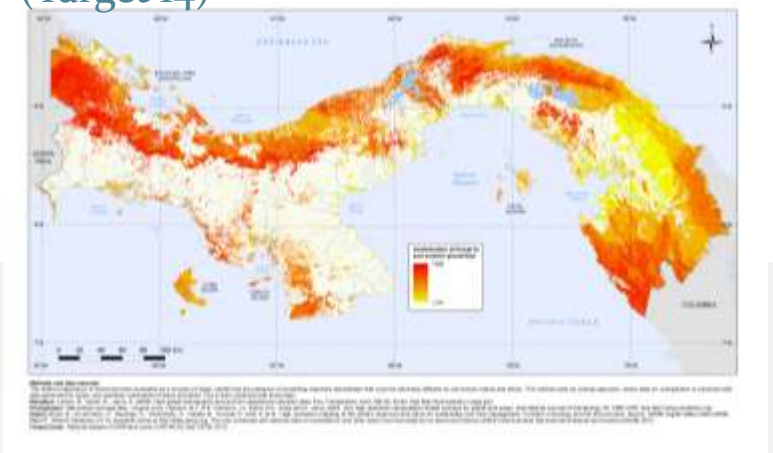
Key Biodiversity Areas (Target 5)



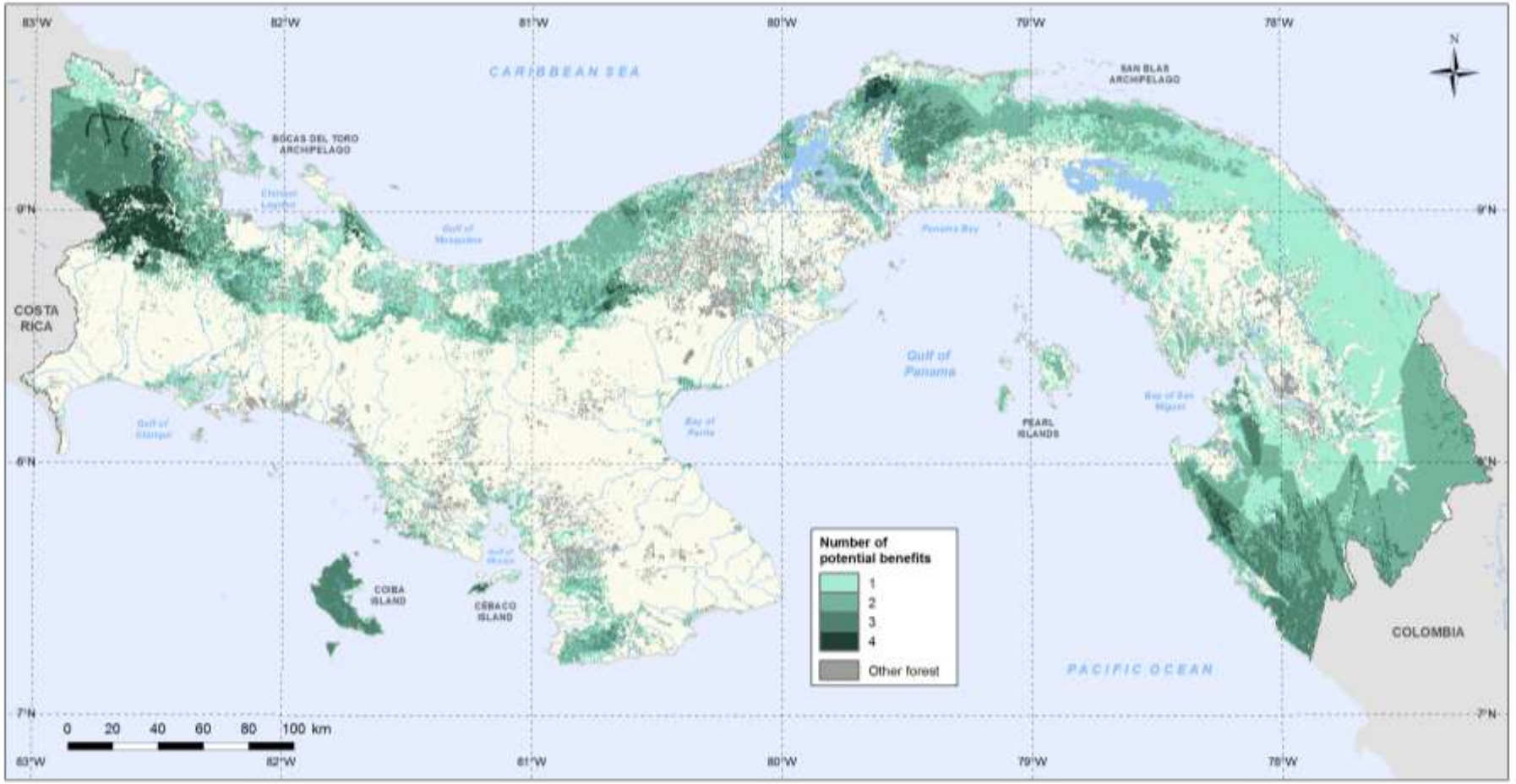
Importance of forest for tourism (Targets 2, 14)



Importance of forest for soil erosion control (Target 14)

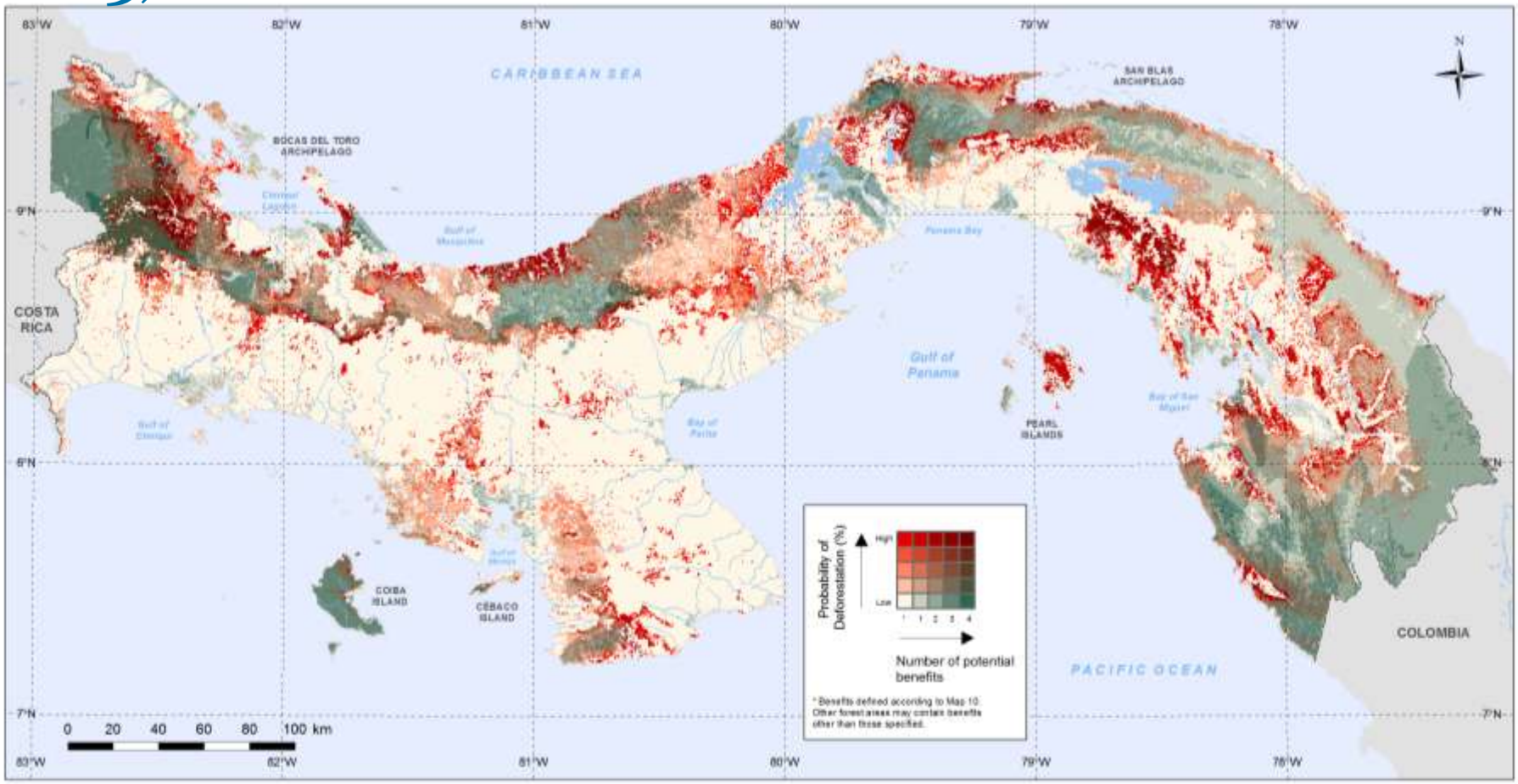


Forest areas with potential for multiple benefits (carbon, biodiversity, tourism, soil erosion control)



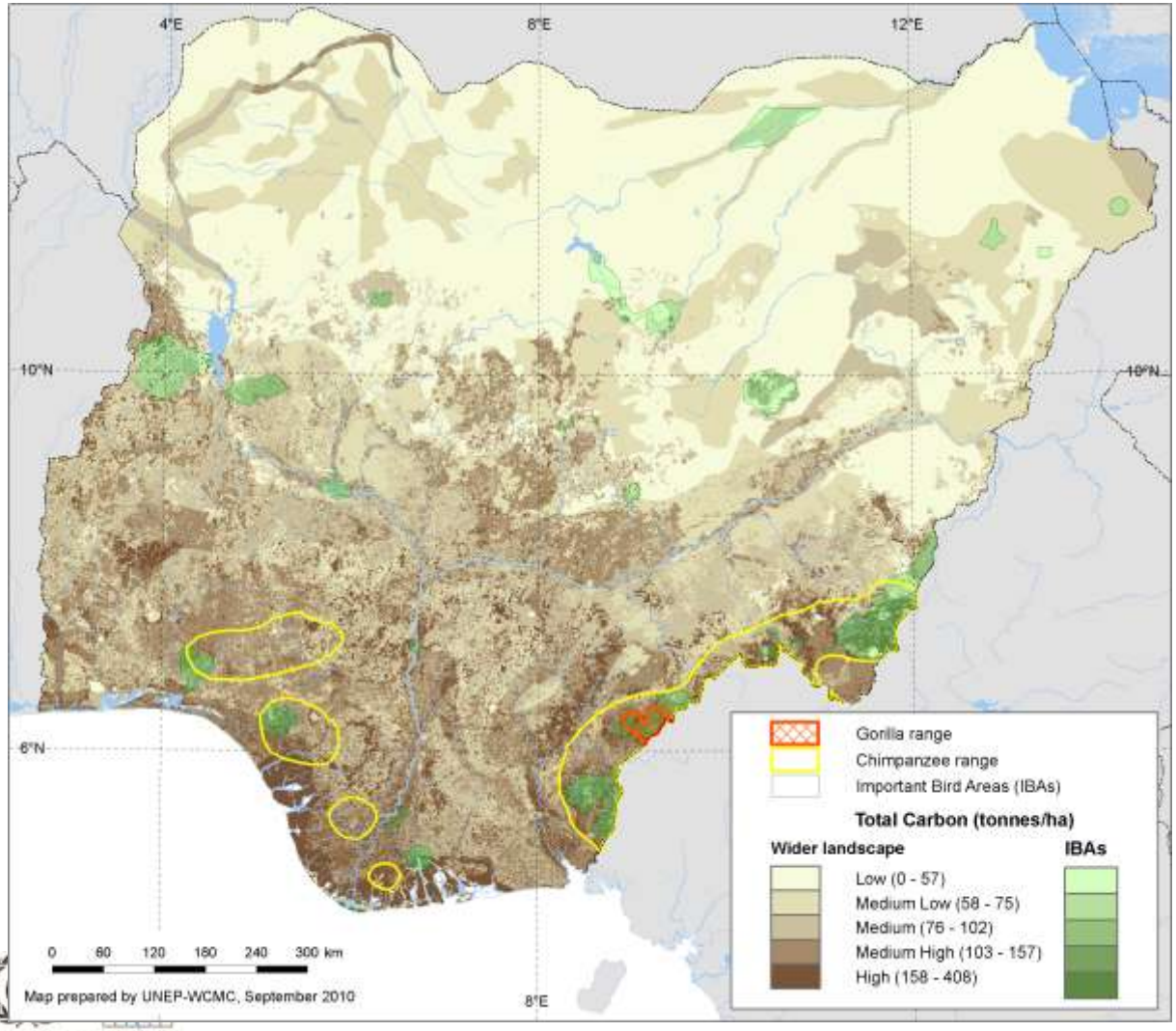
Methods and data sources:
Biomass Carbon: Asner, G., Mascaro, J., Anderson, C., Knapp, D., Martin, R., Kennedy-Bowdoin, T., van Breugel, M., Davies, S., Hall, J., Muller-Landau, H., Potvin, C., Sousa, W., Wright, J., and Bermingham, E. (2013) High-fidelity national carbon mapping for resource management and REDD+. Carbon Balance and Management 8:7. http://www.cbmjournal.com/content/8/1/7. Ecosystem-specific conversion factors (IPCC 2006) were used to add below-ground carbon to this map. The top two classes of biomass carbon "medium high" and "high" (see map 3) were used to represent areas of highest importance for carbon in this map. **Tourism:** Atlas Ambiental de la República de Panamá (Primera Versión 2010). ANAM 2011. Tourism destinations generated for the Tourism Master Plan 2007-2020. Destinations have been divided into 8 zones with 26 tourist destinations, which in many cases used administrative political divisions. These were then clipped to forest area (see map 9). **Biodiversity:** Key Biodiversity Areas (KBAs) of the world including important Bird Areas (IBAs) and Alliance for Zero Extinction sites (AZEs) compiled by BirdLife International and Conservation International, October 2012. For further information, please contact mapping@birdlife.org (see map 6). **Soil erosion:** The relative importance of forest has been evaluated as a function of slope, rainfall and the presence of something important downstream that could be adversely affected by soil erosion (dams and lakes). The top three classes from map 8 have been used to identify areas of greatest importance here. Elevation: Lehner, B., Verdin, K., Jarvis, A. (2008): New global hydrography derived from spaceborne elevation data. Eos, Transactions, AGU, 89(10): 93-94. Precipitation: Hijmans, R.J., S.E. Cameron, J.L. Parra, P.G. Jones and A. Jarvis, 2005. Very high resolution interpolated climate surfaces for global land areas. International Journal of Climatology 25: 1965-1978. Dams: Lehner, B., R-Liermann, C., Revenga, C., Vörösmarty, C., Fekete, B., Crouzet, P., Döll, P. et al.: High resolution mapping of the world's reservoirs and dams for sustainable river flow management. Frontiers in Ecology and the Environment. Source: GWSP Digital Water Atlas (2008). Map 81: GRanD Database (V1.0). Available online at http://atlas.gwsp.org. This was combined with national data on hydroelectric and other dams from Autoridad de los Servicios Públicos (ASEP) and Autoridad Nacional del Ambiente de Panamá (ANAM) 2012. **Forest:** National dataset of 2008 land cover (CATHALAC 2011).

Forest areas with potential for multiple benefits at risk of future deforestation (CATIE 2013)



Methods and data sources:
Probability of Deforestation (2008 – 2020): CATIE (2013). Análisis de cambio de uso de la tierra (1992 – 2008) y formulación de escenarios de deforestación futura de los bosques de Panamá. Turrialba, Costa Rica. Centro Agronómico Tropical de Investigación y Enseñanza (CATIE). This map features the probability of deforestation outputs from the dynamic-EGO model of future deforestation, which have been divided using a quantile classification scheme and combined with biomass carbon.
Multiple benefits: Biomass Carbon: A. Baccini, S. J. Goetz, W.S. Walker, N. T. Laporte, M. Sun, D. Sulla-Menashe, J. Hackler, P.S.A. Beck, R. Dubayah, M.A. Friedl, S. Samanta and R. A. Houghton. Estimated carbon dioxide emissions from tropical deforestation improved by carbon-density maps. 2012 Nature Climate Change. http://dx.doi.org/10.1038/NCLIMATE1354. **See:** http://www.whrc.org/mapping/pantropical/carbon_dataset.html. Ecosystem-specific conversion factors (IPCC 2006) were used to add below-ground biomass to this map. In addition, based on expert consultation the above dataset was combined with the national dataset of 2008 land cover (CATHALAC and CATIE 2011), where biomass carbon values for "Rastrojo" were substituted to 46.2 tC/ha and for "Uso agropecuario" to 28.35 tC/ha.The top two classes of biomass carbon "medium high" and "high" (see map 3) were used to represent areas of highest importance for carbon in this map. **Tourism:** Atlas Ambiental de la República de Panamá (Primera Versión 2010). ANAM 2011. Tourism destinations generated for the Tourism Master Plan 2007-2020. Destinations have been divided into 8 zones with 26 tourist destinations, which in many cases used administrative political divisions and then clipped to forest area (see map 9). **Biodiversity:** Key Biodiversity Areas (KBAs) of the world including Important Bird Areas (IBAs) and Alliance for Zero Extinction sites (AZEs) compiled by BirdLife International and Conservation International, October 2012. For further information, please contact mapping@cifb.org. (see map 6). **Soil erosion:** The relative importance of forest has been evaluated as a function of slope, rainfall and the presence of something important downstream that could be adversely affected by soil erosion (dams and lakes).The top three classes from map 8 have been used to identify areas of greatest importance here. Elevation: Lehner, B., Verdin, K., Jarvis, A. (2008): New global hydrography derived from spaceborne elevation data. Eos, Transactions, AGU, 89(10): 93-94. Precipitation: Hijmans, R.J., S.E. Cameron, J.L. Parra, P.G. Jones and A. Jarvis, 2005. Very high resolution interpolated climate surfaces for global land areas. International Journal of Climatology 25: 1965-1978. Dams: Lehner, B., R-Liermann, C., Revenga, C., Vorosmarty, C., Fekete, B., Crouzet, P., Döll, P. et al.: High resolution mapping of the world's reservoirs and dams for sustainable river flow management. Frontiers in Ecology and the Environment. Source: GWSP Digital Water Atlas (2008). Map 91: GRanD Database (V1.0). Available online at http://atlas.gwsp.org. This was combined with national data on hydroelectric and other dams from Autoridad de los Servicios Públicos (ASEP) and Autoridad Nacional del Ambiente de Panamá (ANAM) 2012. **Forest:** National dataset of 2008 land cover (CATHALAC and CATIE 2011).

Multiple benefits mapping: Nigeria



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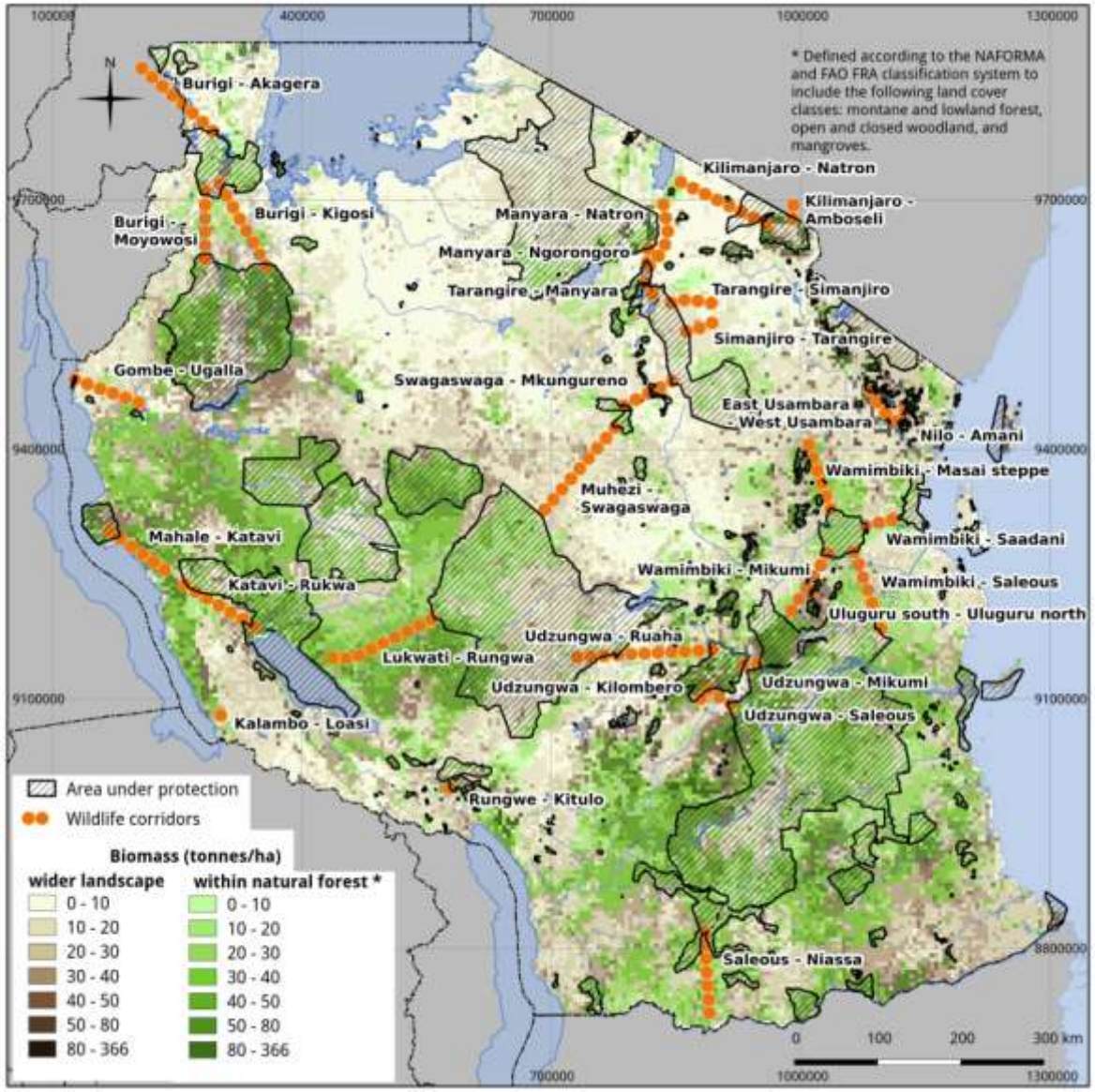
Carbon and Biodiversity (Targets 5, 15)

Density of **existing carbon stocks** (brown)
Important Bird Areas (green)
Gorilla ranges (orange)
Chimpanzee ranges (yellow)

Multiple benefits mapping: Tanzania

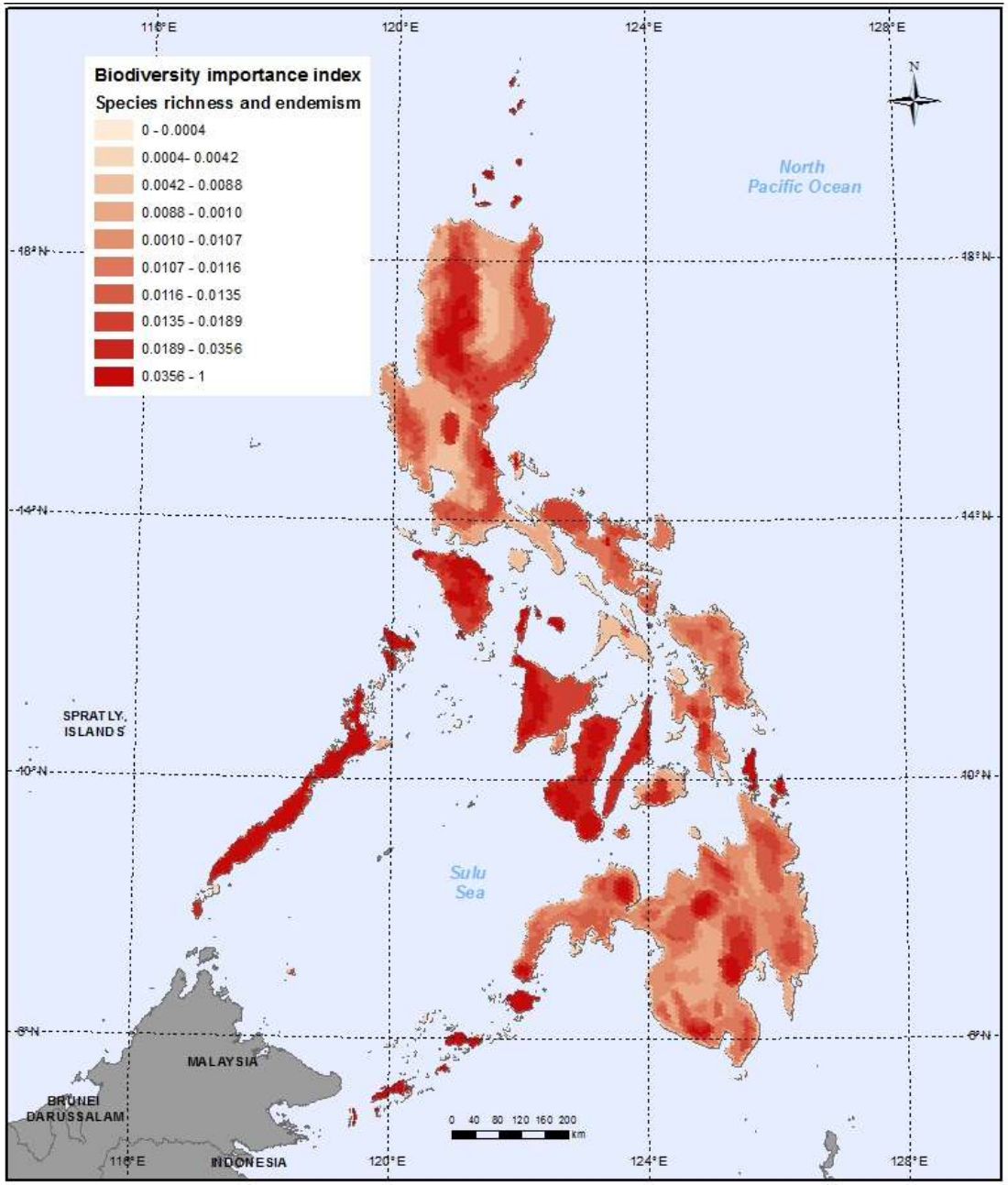


Where are major wildlife corridors located and how do they correspond with natural forest, carbon stocks and areas under protection? (Targets 5, 11, 15)

Map sources:
Biomass: NAFORMA woody biomass only. 5km preliminary datset base on field data only.
Natural forest: NAFORMA landuse landcover map 2010.
Wildlife corridors based on information provided at tzwildlifecorridors.org
Protected Areas and Forest Reserves: TFS and WDPA 2013.

Biodiversity importance index: Philippines

Target 12
By 2020, the extinction of known threatened species has been prevented and their conservation status, has been improved and sustained.



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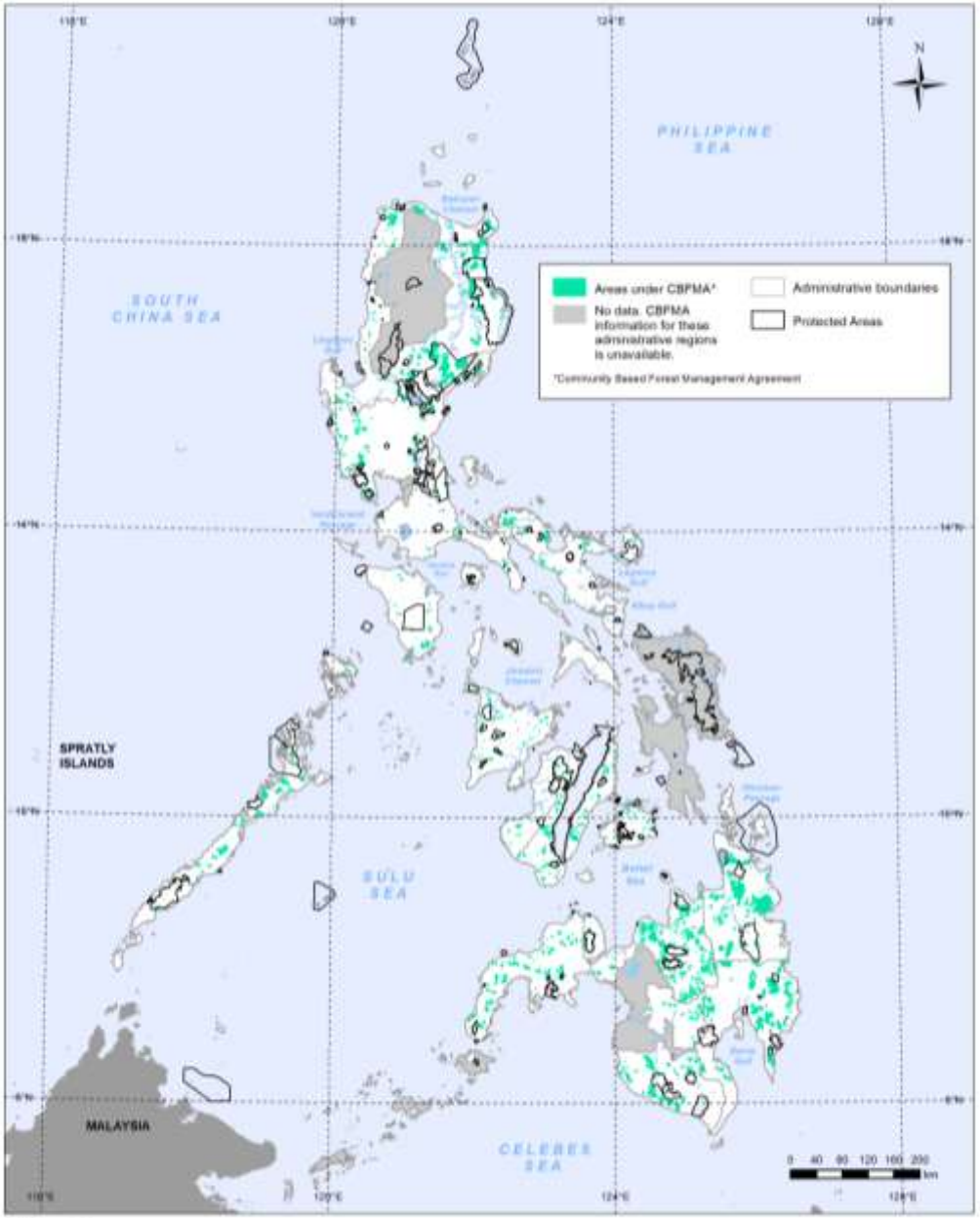
Sustainable management of forests: Philippines

Target 7
By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.



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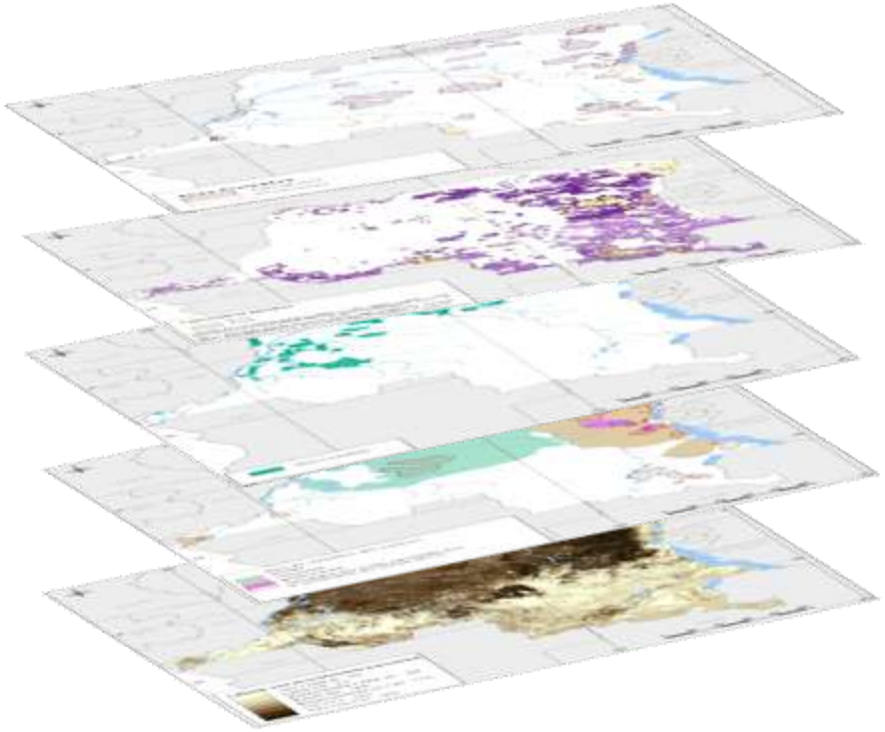
Spatial decision support software for land-use planning



- Countries face complex **challenges** when designing REDD+ land-use plans and planning for the Aichi Biodiversity Targets
- **REDD+ and NBSAP strategies must take into account other pressures**, e.g. urban expansion/ agricultural development /mineral extraction

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Other data needs

Social data, e.g.:

- Poverty data
- Population density
- Children as a % of the total population
- Percentage of population employed in forestry/ farming/ agricultural sectors
- Indigenous territories
- Distribution of communities leading traditional lifestyles

However, much of this social data doesn't exist/ and/or is not available in a spatial format

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Conclusions

- Spatial analysis can
  - **Support decision making** on **REDD+** and **Aichi** targets
  - Support **identifying priority areas for REDD+ actions** that **enhance benefits**
  - Help identify where REDD+ actions can be implemented so that they contribute towards the Aichi Biodiversity Targets
  - **Raise awareness** on the **benefits from forests** and how REDD+ action may enhance the benefits, but also on how benefits may **trade off** with each other
  - There are limitations to the availability and use of spatial data

- **National priorities and circumstances** will determine which REDD+ activities will be undertaken where, and how they can contribute to achieving the Aichi Biodiversity Targets
- Continued **interactions between national decision makers** involved in the NBSAP process and REDD+ processes is key

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Thank you!
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Introduction to interactive exercise

- This interactive exercise will illustrate the role of spatial information in planning for REDD+ that may also contribute to achieving multiple Aichi Biodiversity Targets, as well as other social and environmental benefits
- Participants will –
  - Investigate y the kinds of spatial information needed to determine suitable locations for different REDD+ actions as well as Aichi Biodiversity Targets, and develop clear rationales to justify decisions;
  - Examine how the benefits that are achieved will depend on the locations and manner in which the action is implemented;
  - Discuss and gain understanding of data requirements and strengths and limitations of spatial approaches
- There are no right or wrong answers – rather thinking about the logic/rationale for decision-making is important

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- **Part I (10 min):** Discuss key objectives for this REDD+ activity, noting overlap with achieving objectives related to the Aichi Biodiversity Targets

- **Part II (20 min):** Choose one base map and up to four priority transparency layers that provide important information needed to achieve their objectives, both for REDD+ and the Aichi Biodiversity Targets

- **Part III (30 min):** Identify three different REDD+ actions that also help achieve additional benefits for the Aichi Biodiversity Targets and draw one priority area for each action on the final map from part II

- **Paso I (10 minutos):** Discutir los objetivos para la acción REDD+, anotando los vínculos con las Metas de Aichi

- **Paso II (20 minutos):** Escoger un solo mapa de base (en los papeles blancos) y 4 láminas prioriatarias que proporcionan la información más útil/importante para lograr los objetivos REDD+ y las Metas de Aichi que escogieron

- **Paso III (30 minutos):** Identificar 3 acciones REDD+ que pueden a la vez lograr Metas de Aichi, más beneficios sociales y ambientales adicionales; dibujan una área prioritaria para cada acción en su mapa final del paso II

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