National Protected Area Systems Analysis

Case Study: Forestry

Problem statement:

How does the MARXAN Analysis outcome serve the logging industry?

Introduction:

While the MARXAN analysis of NPAPSP analysis includes some forestry related targets (timber production forests), it does not focus on it. So, the question remains, whether the result provided in the <*seeded_02*> version (figure 1) allows for a long term survival of a logging industry in Belize.

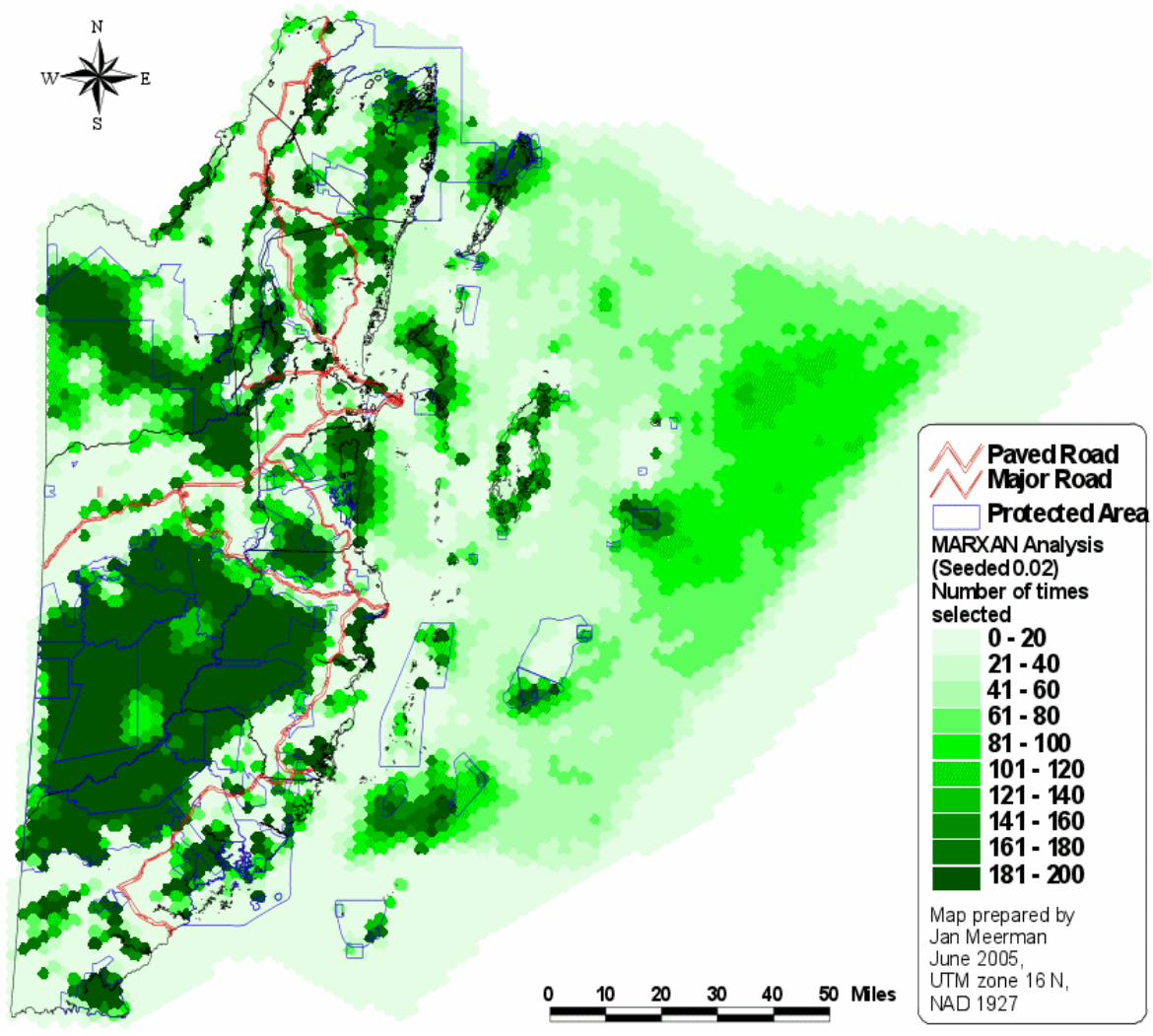

Figure 1. MARXAN analysis of conservation targets in Belize (seeded version). Compare with figure 3.

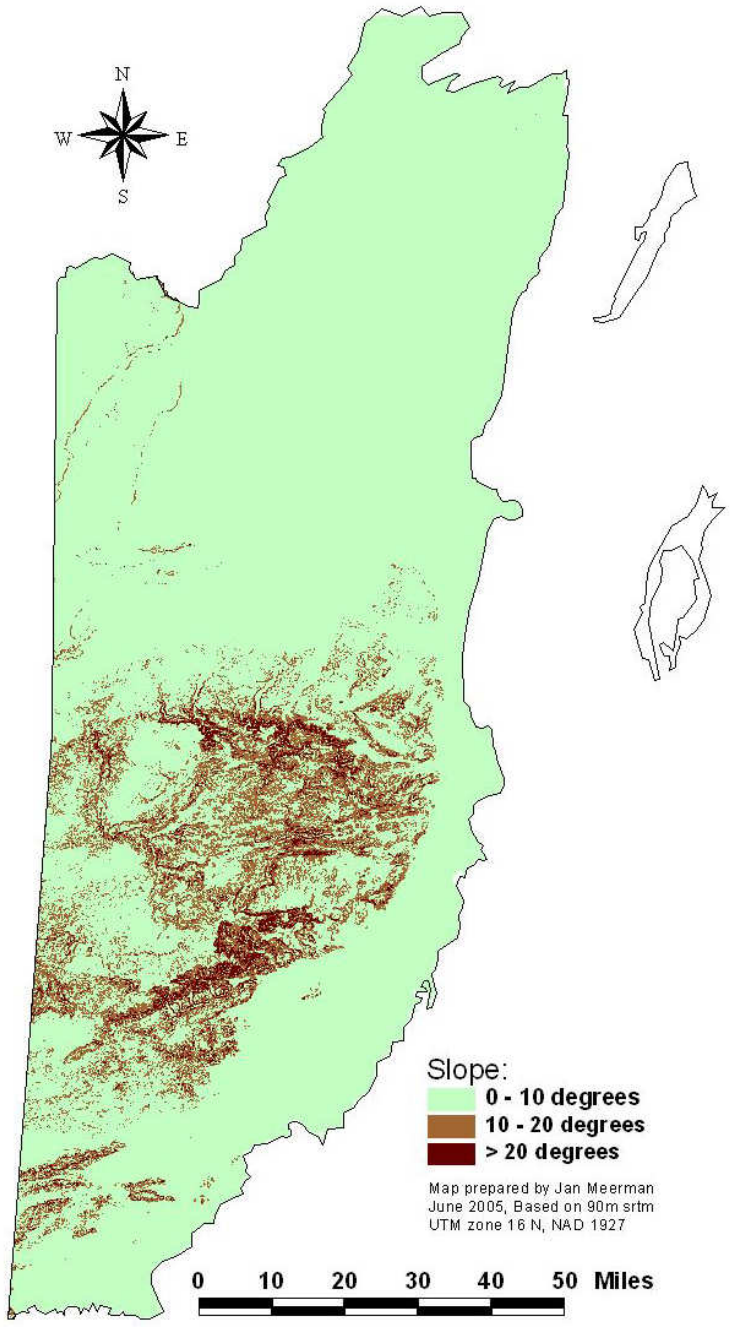

Figure 2. Areas with steep slopes based on 90 m SRTM for Belize.

Methodology:

To answer this question, the result would need to compared with an all-encompassing analysis exists of the forest resources of Belize. Unfortunately such an analysis does not exist. In 1993, the Forest Department published "A First Approximation at Estimating the Country's Forest Resources" (Bird, 1993). This report estimated that Belize had 1,150,100 ha (2,481,897 acres) of land with potential for timber extraction. Of this only 165,900 ha (409,939 acres) or 14 % was within Forest Reserves. This study did not specify exactly what would constitute "land with potential for forest extraction", but one of the main considerations for selecting forest as unsuitable for timber extraction was the type of terrain: steep slopes were excluded. No quantitative value (types and density of of timber trees) was assigned to the different forest types.

In the absence of better criteria, it is possible to carry out a new study along the same lines as Bird (1993).

Using a SRTM[1] with a 90 m resolution[2] makes it possible to map areas with steep slopes (figure 2).

[1] Shuttle Radar Topography Mission: specially modified radar system onboard the Space Shuttle Endeavour during February 2000.

[2] Using a SRTM with a resolution of 30 m would greatly increase accuracy.

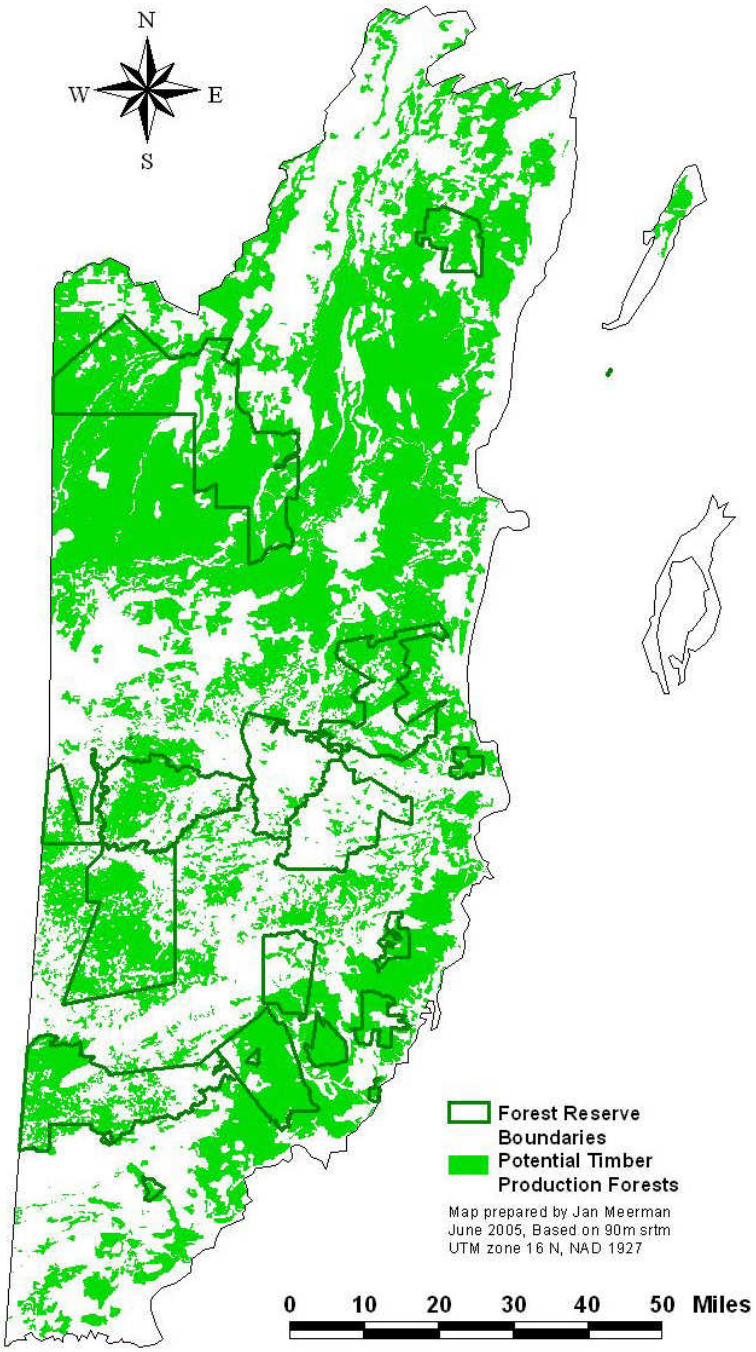

Figure 3. Lands with potential for timber production

Using steepness as a criterion for suitability it is very easy, by using this layer[3] as an overlay on the ecosystems map, to come to a map with potentially "suitable" timber extracting areas (defined as tall forest classes on slopes of less than 10%) (figure 3).

The total surface of this area is approximately 1,058,800 ha (2,616,300 acres) of which 177,000 ha (437,400 acres) or 17 % is within Forest Reserves. If the RBCMA is included as a Forest Reserve, this amount increases to 258,100 ha (637,800 acres) or 24 % (Figure 4).

Note that this analysis is merely a first attempt to establish a extraction forest approximation and does not take into account other factors potentially influencing timber potential.

[3] Given a 100 m buffer in order to prevent excessive fragmentation of border and inclusion areas.

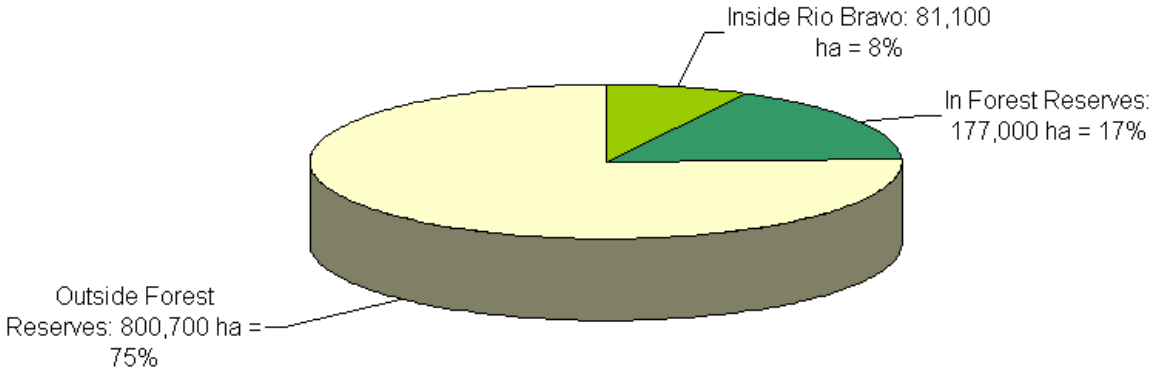

Figure 4. Distribution of lands with potential for timber extraction.

Conclusions:

Comparing figure 1 with figure 3 shows that the MARXAN analysis result does not bear a full resemblance to the exploitable forest cover. Conclusion is that the MARXAN analsysis in itself is not the ideal tool for setting aside lands for the purpose of future timber extraction.

Figure 3 clearly shows that currently Forest Reserves are not necessarily where the timber resources appear to be located. This first analysis indicates that possibly, some sections of National Parks, Wildlife Sanctuaries and Nature Reserve, may need to be re-zoned for the benefit of extractive use. Meanwhile, some sections of current Forest Reserves might be in need for a re-designation towards a management area with a stricter conservation mandate.

Such an exercise could result in major shifts in Protected Area category designations and should preferably be undertaken once a solid data base is available that qualifies existing forest ecosystems for their standing and potential timber value.

In addition, it would be possible to repeat this exercise using different slope gradients as criteria. The current 10% is applicable specifically for traditional, industrial extraction using heavy machinery. Small scale (i.e. community based) logging concessions that do not use heavy machinery could potentially be allowed to log on steeper slopes.

Even a re-designation of Government protected areas, may not be enough to guarantee a sustainable timber industry in Belize. Of all the lands that have potential for timber extraction, much is in private hands. The long term survival of a sustainable logging industry in Belize thus depends also on private land owners keeping forest lands under a forest cover and managing it for timber extraction. Under the current Land Tax regime, there is an enormous disincentive for landowners to retain these lands for sustainable timber extraction. While Government retains the right to nationalize lands for which Land Tax can not be collected, this may not the most economic way of guaranteeing sustainable management of these lands.