FOREST ECOLOGY

Comment on “The extent of forest in dryland biomes”

Dmitry Schepaschenko,* Steffen Fritz, Linda See, Juan Carlos Laso Bayas, Myroslava Lesiv, Florian Kraxner, Michael Obersteiner

Bastin et al. (Reports, 12 May 2017, p. 635) claim to have discovered 467 million hectares of new dryland forest. We would argue that these additional areas are not completely “new” and that some have been reported before. A second shortcoming is that not all sources of uncertainty are considered; the uncertainty could be much higher than the reported value of 3.5%.

Bastin et al. (1) have discovered “467 million hectares of forest that have never been reported before” in dryland biomes, which “increases current estimates of global forest cover by at least 9%.” However, this result depends on the benchmark used for comparison.

The authors have used the Food and Agriculture Organization of the United Nations (FAO) Forest Resources Assessment (FRA) Global Remote Sensing Survey 2010, based on Landsat imagery, yet in the paper, the authors agree that this is not an appropriate resolution for mapping dry forests. Instead, they should benchmark against the FAO-FRA, but they state that they were unable to do so; because FAO-FRA “was not based on a global map we could not quantify the extent of dry forest omitted” [supplement of (1)]. However, a global percentage forest cover map consistent with FAO-FRA (2) exists that was missed by the authors. Using this map as a benchmark for comparison, one would reduce the additional 467 Mha of forests (1) to 270 Mha (Table 1). A result similar to (2) (825 Mha of dryland forest) is obtained using the European Space Agency Climate Change Initiative’s Land Cover 2015 (3), which is a better benchmark than GlobCover 2009. Almost half of this discrepancy can be found in Africa, where high-quality ground data and statistics are lacking. This deficiency can be attributed to funding, capacity, and accessibility issues, as well as the diverse forest definitions used in different countries.

Furthermore, not all sources of uncertainty have been sufficiently considered:

1) The largest source of uncertainty is in the imagery available for interpretation. Bastin et al. (1) have evaluated accuracy using plots from Australia, where the discrepancy is moderate (see Table 1). Australia is fully covered by very high resolution (VHR) imagery, according to our experience, whereas this coverage is much lower in Africa (2, 4). In the reported analysis, 18% of the imagery used for interpretation was not VHR, rendering visual interpretation virtually impossible in the majority of cases (Fig. 1, B and G). Hence, differentiation between trees and shrubs is not possible. For example, large differences in forest cover were found in Tanzania when...
Table 1. Area of forest in the world’s drylands. All values are Mha.

<table>
<thead>
<tr>
<th>Continent</th>
<th>Dryland assessment (I)</th>
<th>Global forest map calibrated with FAO-FRA (Z)</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>286</td>
<td>167</td>
<td>119</td>
</tr>
<tr>
<td>Asia</td>
<td>213</td>
<td>183</td>
<td>30</td>
</tr>
<tr>
<td>Europe</td>
<td>63</td>
<td>57</td>
<td>6</td>
</tr>
<tr>
<td>North America</td>
<td>204</td>
<td>142</td>
<td>63</td>
</tr>
<tr>
<td>Oceania</td>
<td>114</td>
<td>81</td>
<td>33</td>
</tr>
<tr>
<td>South America</td>
<td>197</td>
<td>179</td>
<td>18</td>
</tr>
<tr>
<td>Dryland total</td>
<td>1079</td>
<td>809</td>
<td>270</td>
</tr>
</tbody>
</table>

The Global Drylands Assessment (I) represents a considerable advance in the systematic assessment of forest extent. Some uncertainties could be mitigated if more than one person estimated each plot so that additional quality controls could be implemented. The ability to specify the range of tree cover in addition to the most probable value would also allow for fuzzy estimation of percentage tree cover. For now, these results should be treated with care. Overestimation of forest area can lead to increasing pressure on existing forest resources.

REFERENCES AND NOTES

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