



The Baetic-Rifan firs (*Abies pinsapo* and *Abies marocana*): Geospatial reference data for comparative analysis and conservation

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1. Biogeographical setting



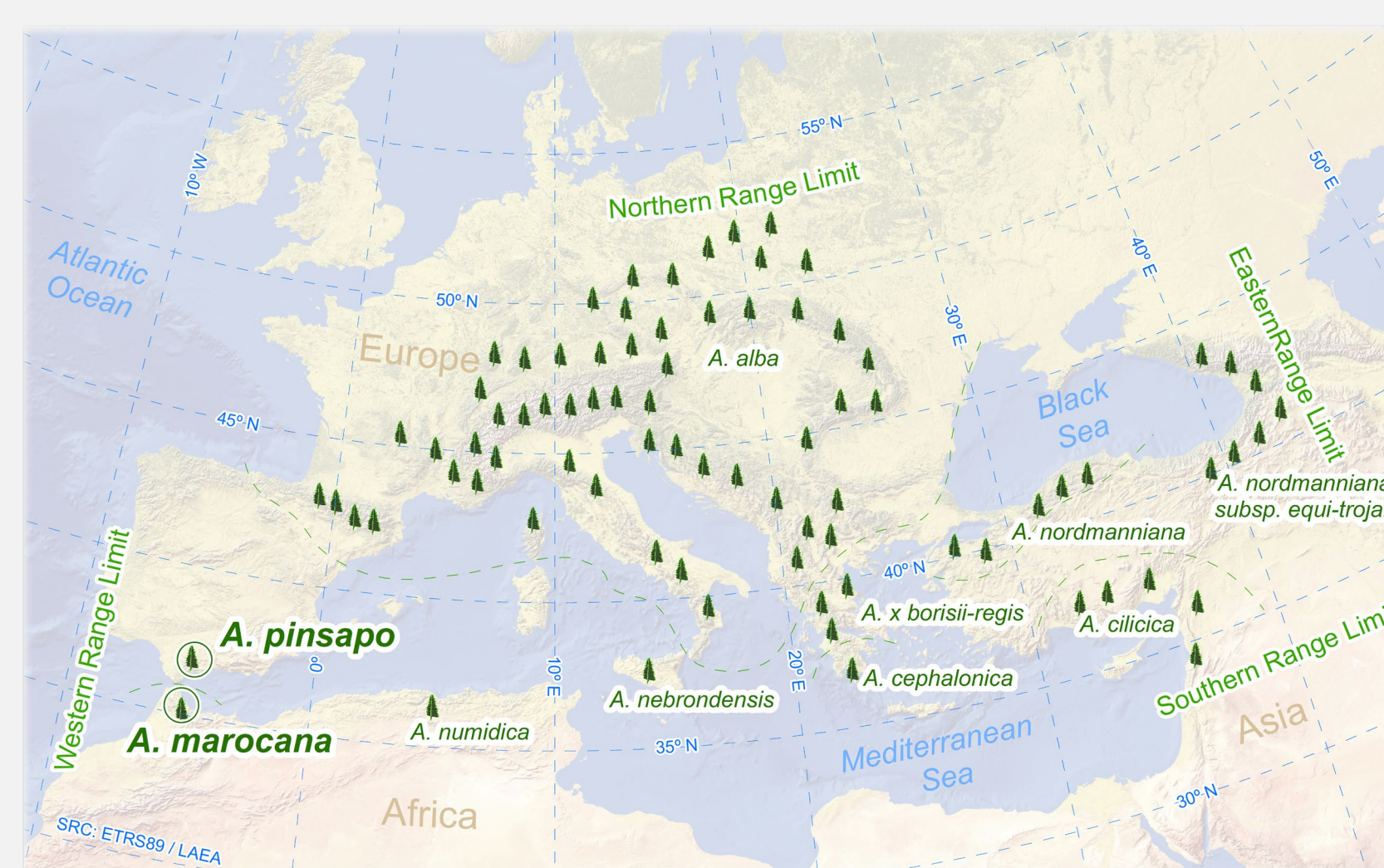
- The Baetic–Rifan firs, represented by *Abies pinsapo* Boiss. in southern Spain and *Abies marocana* Trab. in northern Morocco, constitute the south-westernmost limit of the circum-Mediterranean fir group, their ranges being divided by the Strait of Gibraltar. ⁽¹⁾
 - Despite long-standing debate, recent evidence favors recognising the Baetic–Rifan firs as separate but closely related taxa. ⁽²⁾
- The Baetic–Rifan firs hold an endangered IUCN status, mainly due to habitat fragmentation, climate stress, and wildfire risk. ^{(3) (4)}
- Harmonising GIS data within a common Baetic–Rifan framework is essential to advance biogeographical research and conservation across the Intercontinental Biosphere Reserve of the Mediterranean.

1.1. The Southwestern Limit of the Circum-Mediterranean Firs (*Abies*, Pinaceae)



Figure 1

The circum-Mediterranean firs



The Baetic–Rifan form the south-westernmost outposts of the circum-Mediterranean group, their ranges being separated by the Strait of Gibraltar. Source: Author's own work.

Figure 2

An Intercontinental Biosphere Reserve



The Intercontinental Biosphere Reserve of the Mediterranean hosts relict fir forests on shaded slopes, within humid to perhumid bioclimates marked by summer drought. Source: Author's own work.

2. Harmonised Mapping



- A GIS database is under development to integrate historical and current forest cover data of *Abies pinsapo* and *A. marocana*, harmonised under the WGS84 datum and projected to UTM zone 30N.

2.1. Unified Legend for Tree-Cover Mapping



- High-resolution aerial imagery and ancillary data (tree cover percent, canopy height, etc.) were used to develop a unified legend for tree-cover mapping, based on physiognomic, landscape, and operational criteria:

- Pure stands: almost exclusively firs (*Abies*).
- Mixed dominated: fir prevails with other species present.
- Mixed secondary: other trees dominate, fir is secondary.
- Scattered: only isolated fir trees or small groups.

3. EARLY RESULTS AND KEY INSIGHTS

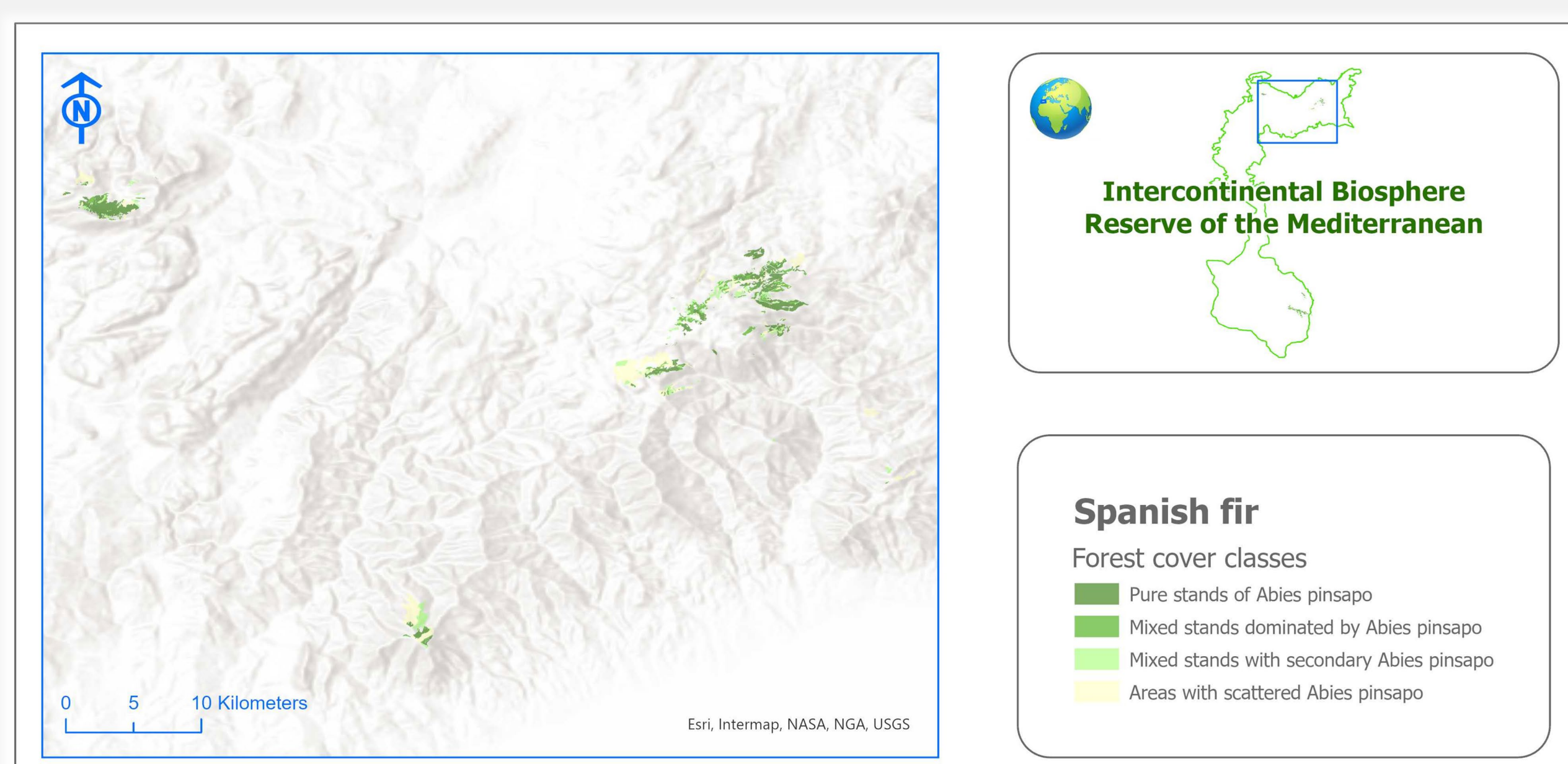


3.1. Comparative mapping of Baetic–Rifan fir forests using a common scale and legend



Figure 3

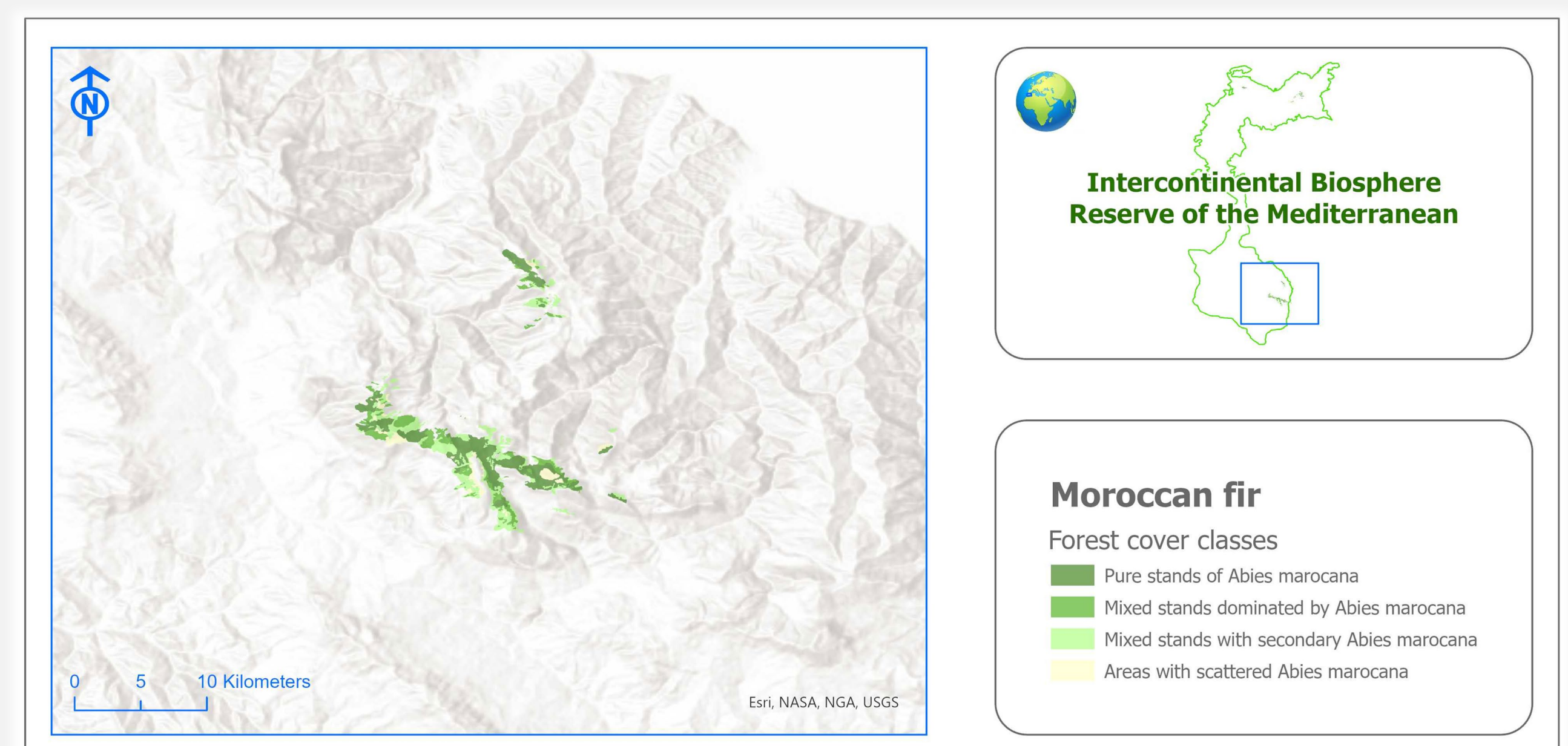
Spanish fir forests (southern Spain)



Abies pinsapo currently covers 2,690 hectares, including 918.99 hectares of pure stands, 407.02 hectares of mixed stands dominated by *A. pinsapo*, 414.88 hectares of mixed stands with secondary *A. pinsapo*, and 949.81 hectares of areas with scattered *A. pinsapo*. Source: Author's own work. ⁽⁵⁾

Figure 4

Moroccan fir forests (northern Morocco)



Abies marocana currently covers 4,206 hectares, including 1,648.25 hectares of pure stands, 802.40 hectares of mixed stands dominated by *A. marocana*, 1,385.26 hectares of mixed stands with secondary *A. marocana*, and 370.96 hectares of areas with scattered *A. marocana*. Source: Author's own work. ⁽⁶⁾

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