

# Beetle Damage Status in Bulgaria

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**1. Affected species** – mostly softwoods, pine (*Pinus sylvestris* L.) and rarely (*P. uncinata* Miller), European pine (*P. cembra* L.), black pine (*P. nigra*), spruce (*Picea abies* L.) and Douglas fir (*Pseudotsuga* spp.) aged 35-55 years attacked by pine engraver beetle (*Ips acuminatus* Gyll.), European bark beetle (*Ips typographus*) (Linnaeus, 1758), pine shoot beetle (*Tomicus piniperda*) (Linnaeus, 1758), weevil (*Ips sexdentatus*) (Boerner, 1776)<sup>5</sup>.

[hardwoods (e.g., oak, beech), softwoods (e.g., spruce, pine)]

**2. Severity** – variable. It is reported that more than 680,000 ha<sup>1</sup> of land in SW Bulgaria planted with white pine since the 1950s to help fight soil erosion are endanger, since they are planted at lower altitudes than they grow naturally.

**3. Timeframe** – approximate start (e.g., 2015) and forecasted duration (e.g., 2021+)

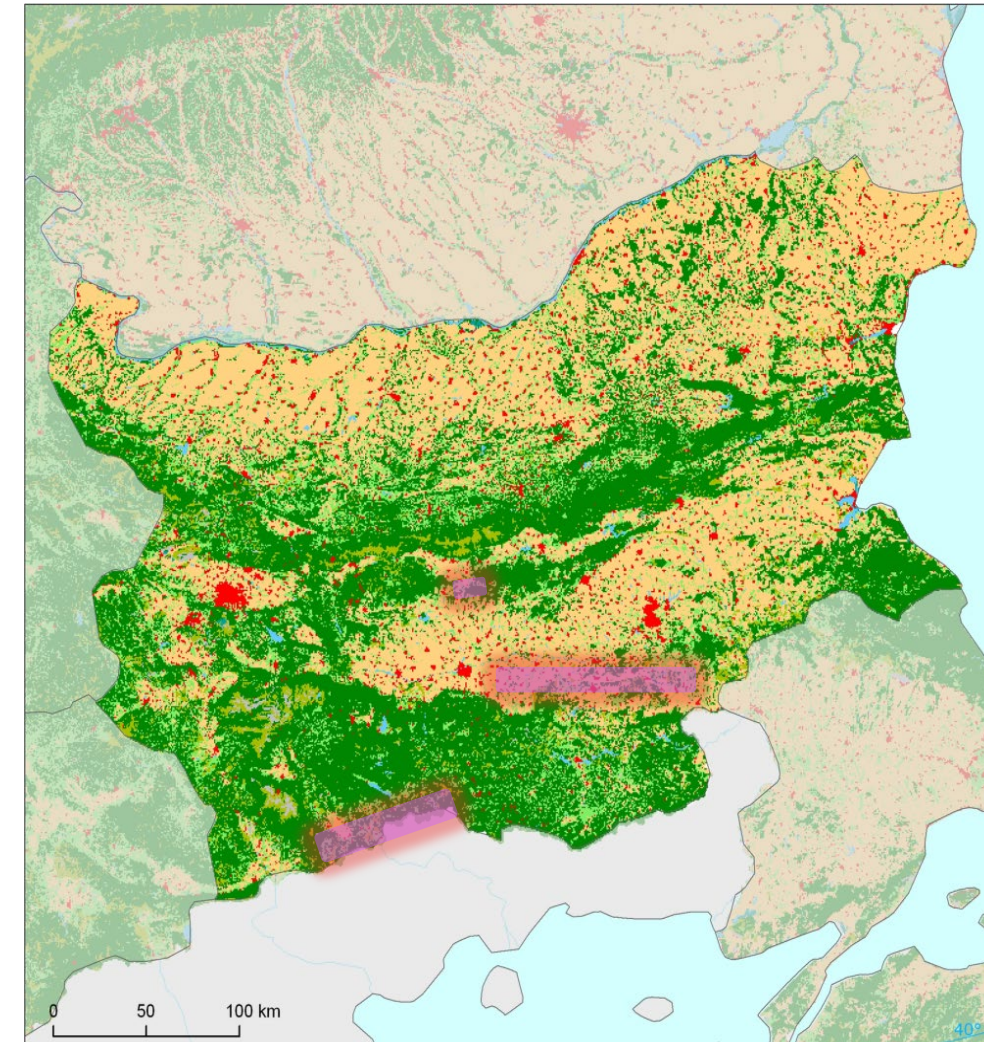
## **4. Most important causes and key factors**

*natural* – climatic factors: summer heat waves and lower moisture availability, wind throws<sup>6</sup>, age<sup>4, 5</sup>, winter damages (ice, heavy snow)<sup>5, 6</sup>









*anthropogenic* – planting at lower elevation than the natural region and at high density.

**5. Remote sensing detection and monitoring** – local aerial surveys; research: MS camera survey from UAV<sup>2</sup>, multispectral (Landsat /NASA/, Sentinel /ESA/) and hyperspectral satellite data (CHRIS-PROBA /ESA/<sup>6</sup>, EO-1/Hyperion /NASA/); CORINE land cover comparisons to ground observations<sup>1</sup>.

**References** – next slide



## **CORINE Land Cover types - 2006**

 Artificial areas	 Forested land	 Wetlands
 Arable land & permanent crops	 Semi-natural vegetation	 Water bodies
 Pastures & mosaics	 Open spaces/ bare soils	

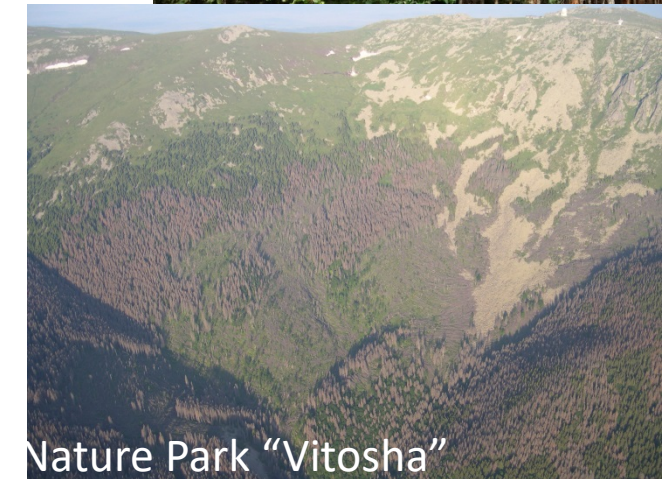


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Total area affected by beetle in the period 2015-2019 (dka). **Blue** – affected area; **Green** – with planned measures.



**References:** 1) T. Tonchev, R. Koleva\*, and Y. Tepeliev (2018). Detection and mapping of coniferous forests in western Bulgaria damaged by biotic and abiotic factors in the frame of the 'CORINE land cover 2018' project. 2) M. Stoyanova, A. Kandilarov, V. Koutev, O. Nitcheva, P. Dobrova (2018). Potential of multispectral imaging technology for assessment of coniferous forests bitten by a bark beetle in Central Bulgaria. 4MATEC Web of Conferences 145, 01005 (2018); 3) Reuters 2016 (<https://tinyurl.com/y45upp65>) 4) Проследяване на разпространението и нападенията от корояди по иглолистните в България. МАФ. 2020. <https://tinyurl.com/y5xydjux5> 5) Иглолистните гори в България загиват. bTV. 2017. <https://tinyurl.com/yye2stag6> 6) L. Filchev, M. Panayotov, F. Ling (2013) A study of Ips typhographus pest infestation with the use of multi-angular CHRIS-Proba data. CD Proceedings of the ESA Living Planet Symposium, SP-722, 259–262. 9–13 September, 2013, Edinburgh, UK.