

Bird Sounds Global: automated species recognition with machine learning

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A fascinating insight into how to harness your expertise to advance automated bird-sound identification, understanding of global biodiversity and enhance your own sound-recognition skills.



1 Birds identified from soundscapes at the Reserva Natural Los Yátaros in Gachantivá, Boyacá, Colombia, a LIFEPLAN sampling site, include the near-endemic Scrub Tanager *Stelgidopteryx serripennis* ('Montezuma Road', Risaralda, Colombia, November 2018; James Lowen: jameslowen.com).

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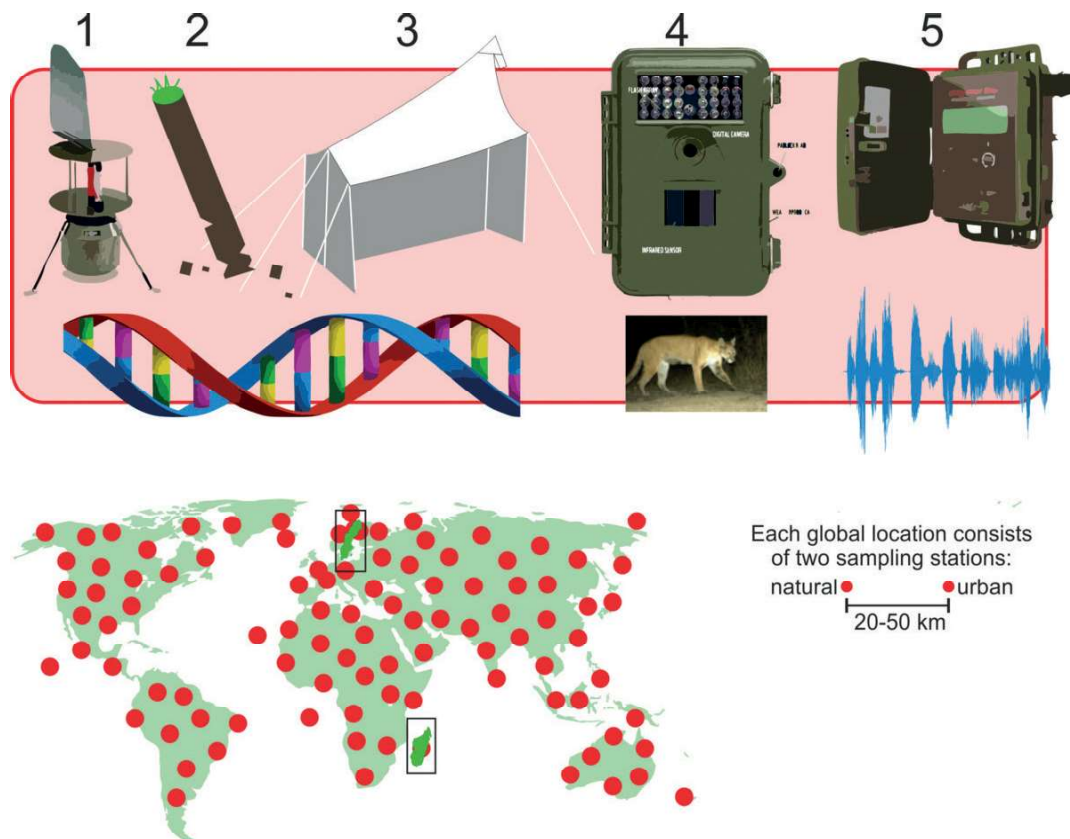
Bird Sounds Global (BSG) is part of the LIFEPLAN research programme (www2.helsinki.fi/en/projects/lifeplan), which aims to improve understanding of the global biodiversity and its driving factors. LIFEPLAN is a network of data collection through remote sensing, and it monitors a wide range of taxa with different sampling methods. It produces thousands of years of audio data from across the planet. Understandably, these data cannot be listened through by human experts. Therefore, automated species identification is required, and this represents the main goal of BSG.

Another important element of BSG involves enabling public participation in the research. BSG is about developing automated bird-sound identification by combining machine learning and citizen science. In BSG you can produce sound features alongside labelled training and testing material of the birds of the world. These are important steps for developing methods that will

eventually be used to recognize sounds produced by all the world's birds, mammals and amphibians. With such methods, machine learning and automated data collection can be used not only to understand current biodiversity and its drivers but also to predict future biodiversity.

The end products of BSG are an expert-validated sound-feature library for birds of the world and locally refined species-identification models for bird vocalizations. The end products will be openly available to everyone for further use. Open-access recognition models provide opportunities for other applications and their further development, such as the current state-of-the-art software applications, Merlin & BirdNET, developed by the Cornell Lab of Ornithology (birdnet.cornell.edu/).

Both Merlin and BirdNET are working well for targeted recordings, but since the LIFEPLAN project is producing audio data on *soundscape*s (i.e., passive recordings of all noises in the



2 The overall sampling scheme of the LIFEPLAN project, targeting a wide range of taxa. Fungi and bacteria are monitored with cyclone samplers (1) and soil samples (2), insects with Malaise traps (3), mammals and other vertebrates with camera traps (4) and birds, amphibians and bats with sound recorders (5).