



Live stream from Mtwaru, Tanzania, 19-11-2014 by Grant Smith. Icon on soundmap of live streams by Locus Sonus 2008-2011 [locusonus.org/soundmap/](http://locusonus.org/soundmap/)

## Biosphere Open Microphones

### Ecoacoustics Congress

Brisbane, Australia 24-28 June 2018

A multi partner project to create a network of open microphones in the UNESCO Biosphere Reserves, relaying real-time sounds and establishing new long-term databases for public engagement and research. BIOM brings together a group of pioneering arts and science initiatives and builds on them to establish new live streams from places of exceptional ecological and acoustic interest.

It relies on approaches developed by Locus Sonus (Aix-Marseille, France), Biosphere Soundscapes (Brisbane, Australia), Cyberforest (Tokyo, Japan), Jasper Ridge Biological Preserve (Santa Cruz, California, United States) and SoundCamp (London, United Kingdom).

It provides a forum for existing work with live environmental sound and supports setting up new live streams from a variety of habitats, by developing and sharing technical information, advice, training and resources.

Live streaming is increasingly available for work in the fields of ecoacoustics, sound art and music, ‘citizen-art-science’ and environmental advocacy. It can be an alternative to remote field recording for ecological research. It can add value to dispersed projects, and contribute to an awareness of ecological connections, by allowing listeners to share sounds in real time and make ‘forays’ by ear into remote habitats.

Live streams can be recorded, as at Cyberforest, creating a long-term archive of seasonal and circadian variations, towards a real-time acoustic observatory.

## Objectives

To install resilient open microphones in participating BRs, with the sounds publicly available for remote listening in real-time (with streaming servers hosted by Locus Sonus).

To record the audio from the open microphones, creating long term public data-sets for the sites (with archive servers hosted by Cyberforest, University of Tokyo).

To analyse the sounds using the latest chirplet technology (led by SABIOD, University of Toulon).

To further develop citizen science activities in and across sites, creating innovative kinds of engagement locally and remotely (design and evaluation with Aberdeen Centre for Environmental Sustainability).

To be led by local groups in the setup and maintenance of the open microphones, making them a hub for learning and engagement in the BRs.

To support the use of the network for a range of participants, including ecoacoustic researchers, conservationists, environmental activists, advocates and artists.

To continue to develop art-science projects, residencies, exhibitions and participatory projects in relation to the live streams, as ways to expand and diversify public engagement around ecology, place and sustainability.

To grow the network through an iterative process converging with the Man and the Biosphere Strategy 2015-25 and Lima Action Plan 2016-25.

## Working Group (in collaboration with BRs and partners by site)

Biosphere Soundscapes, Brisbane, AUS  
Cyberforest, University of Tokyo, JP  
Feral Arts, Brisbane, AUS  
Jasper Ridge Biological Preserve, Stanford University, CA  
Locus Sonus, CNRS, PRISM, Aix Marseille University, FR  
Sound and Environment, University of Hull, UK  
SoundCamp, London, UK

## Affiliates, Supporters, Expert Associates

World Network of UNESCO Biosphere Reserves  
UNESCO Man and the Biosphere Program (MAB)  
Balance-Unbalance (conference, platform)  
Sound + Environment with S+E Research Group (University of Hull)  
Ecoacoustics 2018 Congress & WFAE 2018 Conference (Queensland University of Technology, Queensland Conservatorium, Griffiths University, Brisbane)  
Streaming Museum ([streamingmuseum.org/](http://streamingmuseum.org/))

Hervé Glotin, SABIOD, CNRS, University of Toulon (data analysis)  
René van der Wal, Centre for Environmental Sustainability, University of Aberdeen (environmental engagement)



Daybreak on 7 May 2017. Soundcamp at Gyorae Forest Park, Jeju Biosphere Reserve, South Korea, by Weather Report (Jiyeon Kim, Gangil Yi). Photo: Jiyeon Kim

## Aims

Biosphere Open Microphones brings together projects working with live audio to relay environmental sounds. It aims to create an increasingly detailed and diverse account of planetary soundscapes, available in real-time via an online soundmap, as a public resource for artists, researchers and activists. The current pool of live streams spans from domestic interventions to formal research programs, across the arts and sciences. BIOM will preserve this diversity, working with local groups to set up and operate live streams, using a range of approaches from commercial broadcasting technologies to DIY streamboxes and mobile apps.

Each open microphone is also an opportunity for exploration and engagement with a particular point of listening, whether in a remote rural location or the inner city. The UNESCO Man and the Biosphere program has long provided a context for people to engage in innovative ways with their environments, and to share learning and experiences across sites. BIOM aims to use this framework to make compelling connections between places of acoustic and ecological significance, and establish long term datasets for environmental monitoring and analysis.



Open Microphones

Cumbria Open Microphone Network (COMN)

South Walney Island, Cumbria, UK  
Cumbria Wildlife Trust, Octopus Collective,  
SoundCamp



CWT and Octopus Collective, a sound arts organi-  
sation based in Barrow-in-Furness, are collaborat-  
ing on a live stream from a remote coastal location  
on South Walney Island as part of a program of  
public engagement with the site - an SSSI with a  
distinctive shingle ecology. A Raspberry Pi based  
streambox places the listener low down on the  
beach among nesting seabirds. A residency by

Soundcamp including field studies, DIY audio  
workshops and a live stream installation in the  
market at Barrow, explored connections between  
the city and the island for the Full of Noises  
Festival. Rebecca Chesney and Maja Bugge are  
currently the resident artists. The image shows an  
oyster catcher on the Spit from a remote camera,  
by Sarah Dalrymple, CWT.

cumbriawildlifetrust.org.uk/reserves/south-walney  
octopuscollective.org/  
soundtent.org/south\_walney/GULLSPIT.html  
octopuscollective.org/events/full-of-noises-4-5-gull-spit-27-281017/  
Listen live at locus.creacast.com:9001/south\_walney.mp3

Jeju Biosphere Reserve

Jeju Island, South Korea  
Weather Report



Weather Report, an arts collaborative based in Jeju  
and Seoul, have operated a temporary open micro-  
phone from the island over 3 years. In 2017 they  
organised a soundcamp there (see image on inner  
cover). Future projects include a planned long  
term stream from a listening point in the Jeju BR,  
and collaboration with the NGO, Gotjawal People  
and a local art space. Weather Report have devel-  
oped work with music and live remote streaming  
of environmental sounds, that enables local and

remote urban audiences to become more aware  
of acoustic and environmental changes over time.  
This links to research and advocacy around plan-  
ning and development in the area, characterised  
by patches of biodiverse bush forest on volcanic  
substrate (Gotjawal). Complementary projects  
in Seoul have included a wetland soundcamp in  
2018 with Jingwan-dong Wetland and the Muljari  
wetland and advocacy group. Image of Gotjawal  
woodland by Jiyeon Kim.

Jeju BR goo.gl/oGBa9N  
weatherreport.kr/  
gotjawal.com  
cafe.daum.net/butterfri/FnVv/133  
streams.soundtent.org/2018/streams/utc9\_seoul

Golden Gate Biosphere Reserve

Jasper Ridge Biological Preserve, CA, USA  
Stanford University, Golden Gate Natural  
Recreation Area, Bodega Marine Reserve



The BR is a highly diverse and culturally rich com-  
plex of urban, multi-use and wild environments  
with coastal forests, chaparral, scrub, prairies, rare  
serpentine grasslands, and islands. Birdcast, a live  
audio stream by Trevor Hebert, shares a changing  
soundscape of waterfowl, amphibians, songbirds,  
large mammals and overflying aircraft. Launched  
in 2013, Birdcast soon became popular with

online communities, letting ornithologists and lay  
experts supplement conventional bird surveys, lis-  
ten out of hours and hone ID skills, and providing  
contact with the site for older and less able bird-  
ers. New streams, archiving and additional remote  
sensing equipment would reach new ecosystems  
above and below water, opening collaborations  
with other stakeholders.

Golden Gate BR unesco.org/mabdb/br/brdir/directory/biores.asp?mode=all&code=USA+42  
jrbp.stanford.edu/about/facilities/live-audio-stream  
bml.ucdavis.edu/bmr/about.html  
Listen at locus.creacast.com:9001/jasper\_ridge\_birdcast.mp3

Shiga Highland Biosphere Reserve

Shiga Nature Education Park, Nagano, Japan  
Cyberforest (University of Tokyo), Shinshu  
University Institute of Nature Education



A long term stream is operated in the BR by  
Cyberforest in collaboration with the Shinshu  
University Institute of Nature Education. The  
project comprises real time stereo sound trans-  
mission, data logging and public engagement,  
including remote bird census using the open mi-  
crophones, phenological research, citizen science  
activities and machine based audio analysis by the

SABIOD big data program at CNRS, University  
of Toulon. The live data includes a video link.  
Part of a program streaming live data from the  
University of Tokyo forests since the early days of  
the public internet.

Shiga Highland BR unesco.org/mabdb/br/brdir/directory/biores.asp?code=JPN+03&mode=all  
Project page cf4ee.nenv.k.u-tokyo.ac.jp/en/pad/otanomo.php  
Listen live at mp3s.nc.u-tokyo.ac.jp/OTANOMO\_CyberForest.mp3

Monarch Butterfly Biosphere Reserve

Cerro Pelón, State of Mexico  
University of Hull, Universidad Autónoma de  
México, Forestry Service, Arborists’ training  
program, Morelia



A collaboration between Rob Mackay (Univer-  
sity of Hull, UK), Pablo Jaramillo (University.  
Autónoma de México, David Blink (College of the  
Sisquiyous, USA), Soundcamp (London, UK),  
the Forestry Service and a local arborists’ training  
project. In early 2017 the team installed a live  
solar powered stream in the Monarch Butterfly  
Biosphere Reserve in the mountains above More-  
lia, the butterflies’ main Winter roosting place.  
The stream has attracted wide interest among the

network of Monarch researchers and advocates, as  
a tool for public engagement, live music composi-  
tion, and expanding appreciation of this habitat’s  
value and fragility. It is a pilot for an extended  
project to link key points in the butterflies’ migra-  
tion routes from Mexico as far North as Canada,  
drawing attention to the need for collaborations  
across disciplines and borders to conserve a charis-  
matic indicator species. Photo by Rob Mackay.

en.wikipedia.org/wiki/Monarch\_Butterfly\_Biosphere\_Reserve  
texasbutterflyranch.com/2018/02/07/symphony-of-wings-sound-of-millions-of-monarch-butterflies-available-via-live-stream/

Noosa Biosphere Reserve

Noosa, Queensland, Australia  
Biosphere Soundscapes



The Noosa BR comprises 60 distinct ecosystems,  
with more than 300 bird species and 1300 plant  
spe- cies, with many endemics. An ocean corridor  
supports marine fauna including some 18,000  
humpback whales on annual migration. Perma-  
nent streams are under development as part of  
an extended research and public engagement  
project by Biosphere Soundscapes, exploring the

Biosphere Reserve via a range of recording, field  
studies and live streaming activities, and through  
public and specialist research programs with  
attention to both terrestrial and aquatic ecolo-  
gies. Soundcamps in 2017 and 2018 included a  
live stream of an underwater dawn chorus with  
snapping shrimps and grunting catfish.

Noosa BR noosabiosphere.org.au/biospheresoundscapes.org  
Listen at soundcloud.com/leah\_barclay/dawn-in-the-noosa-biosphere-reserve-excerpt-from-reveil2017-live-stream

Pilot Projects

Further live streams are in development at sites in  
Biosphere Reserves in the Philippines, Vanuatu,  
Brazil, Estonia, Australia, India, Mexico, United  
States, Canada, United Kingdom and Tanzania.  
We welcome proposals for new sites

Timetable

Launch: Sound + Environment, Hull, 29/6 –2/7  
2017 soundenvironment.net/  
Presentation + new streams: Braunton Burrows,  
N Devon BR, Balance-Unbalance, Plymouth, 21/8  
- 23/8 2017 balance-unbalance2017.org/  
Presentation at Perspectives on Listening, Bris-  
bane, 7-9 December 2017  
92 live streams for Soundcamp / Reveil, May 2018  
Presentation and technical workshops at  
Ecoacoustics conference, Brisbane 2018. Conver-  
gence with the MAB Strategy 2015-25 and Lima  
Action Plan 2016-25 unesdoc.unesco.org/imag-  
es/0024/002474/247418E.pdf

Technical

Streaming guidelines are available at soundtent.  
org with how-to’s, parts lists and technical notes  
for new approaches as they become available.  
soundtent.org/how\_to/stream\_reveil\_2018.pdf  
paper.dropbox.com/doc/Raspberry-Pi-Streambox-  
and-other-recipes-Workshop-notes-Brighton-Digi-  
tal-Festival-12-10-17-Onca-Gallery-Hull-SE-Univ-of-  
Hull-3-7-17-YYeCzq4c7oX92LeOuGJ42

Disseminate / Present / Engage

We envisage the production of site-specific sound  
art installations in public spaces and an online  
platform for the live streams. Field studies activ-  
ities, DIY broadcasting workshops and outdoor  
gatherings are opportunities for new publics and  
volunteers to engage with the sounds and ecolo-  
gies of the sites - locally and remotely. Commu-  
nity involvement in the setup and maintenance  
of the streams will make them a hub for learning,  
innovation, and citizen science.