GRID Infrastructure Supporting Long Term Asian Soundscape Monitoring

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Soundscape Ecology –
A new challenging research field in landscape ecology

• The World Soundscape Project in 1970s [http://www.sfu.ca/~truax/wsp.html]

• Landmark papers

• Recent special issues in three journals

• The new textbook
Data Issues on Soundscape Ecology

• Big Data
  - Data volume for one site soundscape recording in one year:
    \[(16 \text{ bits} \times 44.1 \text{ KHz} \times 2 \text{ channels} \times 60 \text{ seconds} \times 5 \text{ minutes} \times 2 / \text{hour} \times 24 \text{ hours} \times 365 \text{ days} / \text{hours}) / (8 \text{ bits} / \text{byte} ) \times 10^{-6} \]
    \[= 927 \text{ GB} \sim 1 \text{ TB} \]
  - Many sites many countries in long term: ??? PB...??? ZB
  - How to manage, share, and utilize?

• Big Science
2014 Asian Soundscape Workshop

• Sharing experiences and consensus on open data
• Developing a soundscape monitoring protocol for Asia
• Collaboration on long-term joint monitoring of Asian soundscape
• Creating Big Open Linked Data (BOLD) environment
• Fostering soundscape research, conservation, education in Asia
• Initiating Soundscape Alliance in Asia
Asian Soundscape
http://soundscape.twgrid.org

2014/11/17-20 Asian Soundscape Workshop,
Lienhuachih Research Center, TFRI, Taiwan
Exploring soundscape by date and time of different sites
Browsing soundscape by map

This archive has 12,322 soundfiles from 6 sites in 6 collections.

There are 6 sites with soundfiles. Some markers may be hidden behind others. Zoom in to see all the sites.
Forest soundscape in Sanyi Township, Miaoli County, Taiwan
Listening to and browsing metadata of a soundscape recording
Exploring the components of soundscape by spectrogram

Biophone: bird song

Anthrohone: traffic...
Selecting range of frequency band and identifying soundscape components
Comparing soundscape from different sites
Forest soundscape from Taiwan, Vietnam, and Thailand
Analyzing Soundscape – Computing 5 soundscape indices in R

Data: 123 WAV files (51 MB each, 6GB in total)

CPU: Intel Xeon 2.0GHz 6 Cores x 2 (20 threads used for computing; 88% used)

Memory: 24GB (87% used)

Time: 3,140.45 seconds
Normalized Difference Soundscape Index (2015-01-24)

Taiwan  Vietnam  Thailand
Future challenges of the long-term soundscape monitoring for the GRIDs

• Demands on high speed internet for uploading field data as well as distributed high volume storage and powerful computing for ever-increasing soundscape data

• Interdisciplinary collaboration and innovations for developing applications on visualizing and analyzing soundscape big data to inform public, decision, and policy on natural soundscape conservation

• Establishing partnership between soundscape ecologists and GRID center in each country for long-term archiving, sharing, and using the World soundscape big data
Thanks for your attention