Harp Traps, Mist Nets & Acoustic Sampling:

Advantages & Disadvantages

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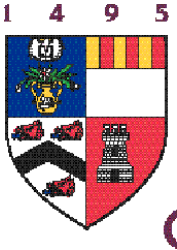

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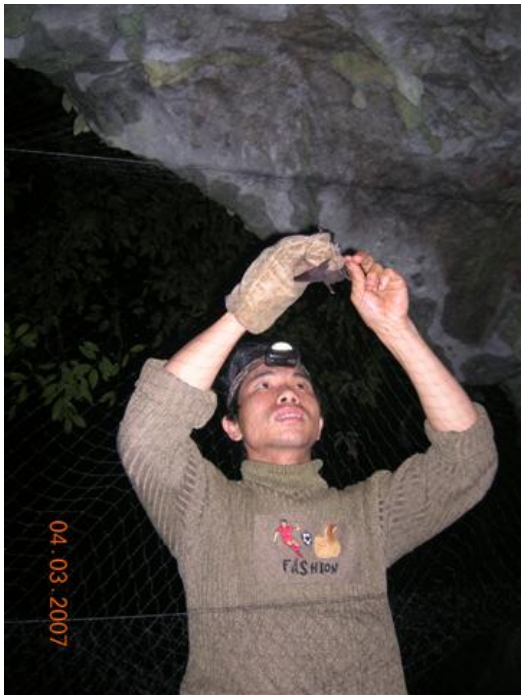


Mist-Nets

Very lightweight and easy to set up

Variable catch area, so good for larger flyways

Easily damaged & must be attended constantly

Ideal for catching fruit bats (Pteropodidae)

Less useful for high-frequency insectivorous bats

Trap effort: metres squared, net hours (m^2nh)

Harp Traps

Much more robust and heavier, so less portable

Generally small catch area (2-3 m^2)

Can be left unattended for short periods, but this is not advisable in caves

Best for catching high-frequency insectivorous bats

Trap effort: metre squared, harp trap hours (m^2hth)

Bat Echolocation

‘*Seeing with sound*’

- Species identification
- Ecological studies

Well studied in temperate areas
Poorly known in SE Asia

Ground-based trap surveys often fail to catch high flying bats

Acoustic sampling can overcome this problem but still largely untested in mainland SE Asia

Above-ground Sample Sites

Each site ≥ 8 km apart

In larger homogenous areas

Baseline Inventory + Call Data

240 net & 180 harp trap nights

Simultaneous Sampling

14 nights in each habitat

Cave Monitoring

8 nights trapping + acoustic sampling
4 in 2006 and 4 in 2007 (wet season only)

Results: Call Data

1,740 minutes of recordings of free-flying bats

= 1,260 minutes from above-ground habitats (3)

480 minutes from An Tinh Cave #1 (ATC#1)

Echolocation calls from 367 bats of 30 species analysed

Family	No. spp.	No. Bats
Megadermatidae	1	8
Rhinolophidae	8	122
Hipposideridae	5	78
Vespertilionidae	10	81
Phonic types	6	78

- one call measured per bat -

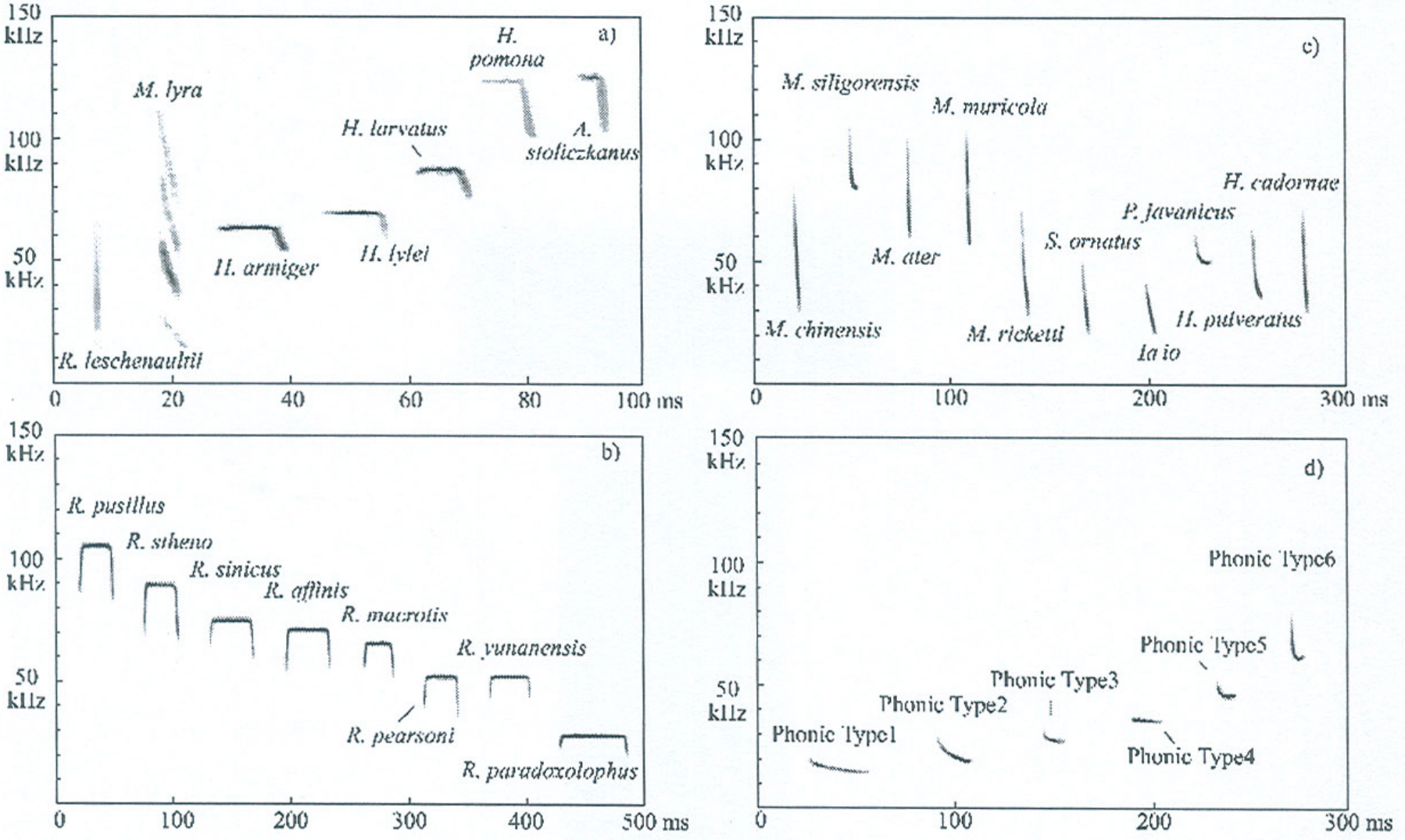


Fig.2 Echolocation calls of 31 species of bats at Kim Hy Nature Reserve: a) Pteropodidae, Megadermatidae and Hipposideridae; b) Rhinolophidae; c) Vespertilionidae; and, d) six unidentified phonic types.

Results: Multivariate Analyses

CF bats Rhinolophids & Hipposiderids = 13 spp./200 calls

92.0 % of cross-validated calls (184 / 200) correctly classified

Best Parameters: end frequency, peak frequency & call duration

FM bats Vespertilionids, Megadermatids & six phonic types = 17 spp. /167 calls

86.2 % of cross-validated calls (144 / 167) correctly classified

Best parameters: end frequency & peak frequency

Overall, 89.1% of calls correctly classified

Results: Live Traps vs. Acoustic Sampling

	Primary forest	Disturbed forest	Agriculture / degraded forest	ATC #1	
				2006	2007
Sampling nights	14	14	14	4	4
Live trapping (A)	**18**	**14**	**10**	**15**	**13**
Harp traps	11	8	3	13	9
Mist nets	10	11	7	9	8
Acoustic sampling (B)	**10**	**13**	**13**	**10**	**7**
Total (A+B)	23	22	19	17	14
% of additional species recorded acoustically	**22**	**36**	**47**	**12**	**7**
(A) vs. (A+B) (using nightly average)	p=0.009	p=0.006	p=0.001	p=0.036	

25 spp. in total, 10 only in mist nets, 7 only in harp traps, 8 in both

Overall Increases

Cave sample: **From 16 to 18 species (11 %)**

Above-ground: **From 25 to 35 species (29 %)**

All additional species were recorded only by acoustic sampling

Above-Ground Habitats

Simultaneous sampling = 7,296 m^2mnh + 490 m^2hth

Longer-term trapping = 35,829 m^2mnh + 4,165 m^2hth

Only 4 more species recorded…..

Summary

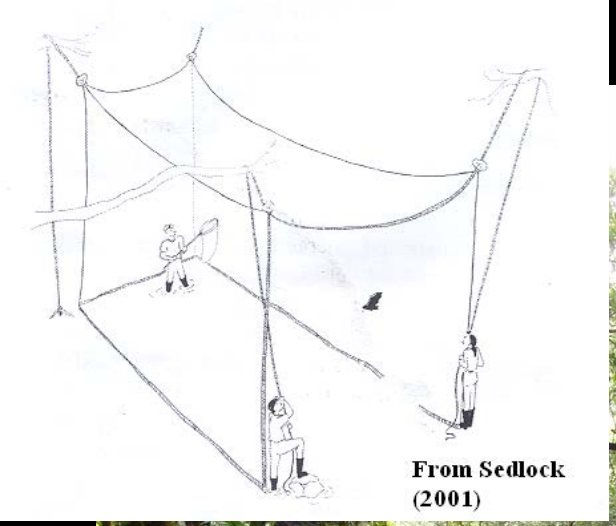
Harp traps and mist nets catch different species – both have their advantages and disadvantages

Acoustic identification of free-flying bats is feasible in SE-Asia, but call analysis can be time-consuming - good reference collections of calls are also needed

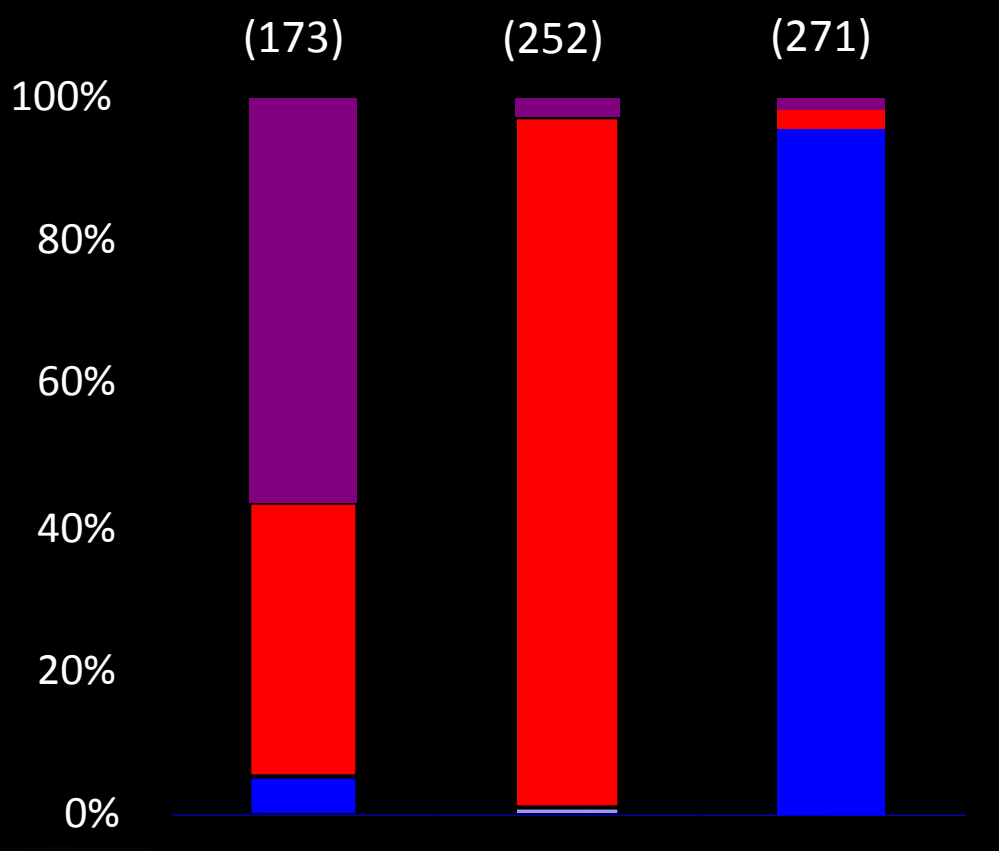
Acoustic methods record high-flying species that harp trap and mist nets don’t, but all of these methods are needed for inventory completeness in assemblage studies

Acoustic sampling is very useful for ecological studies, but is less useful where abundance data is needed

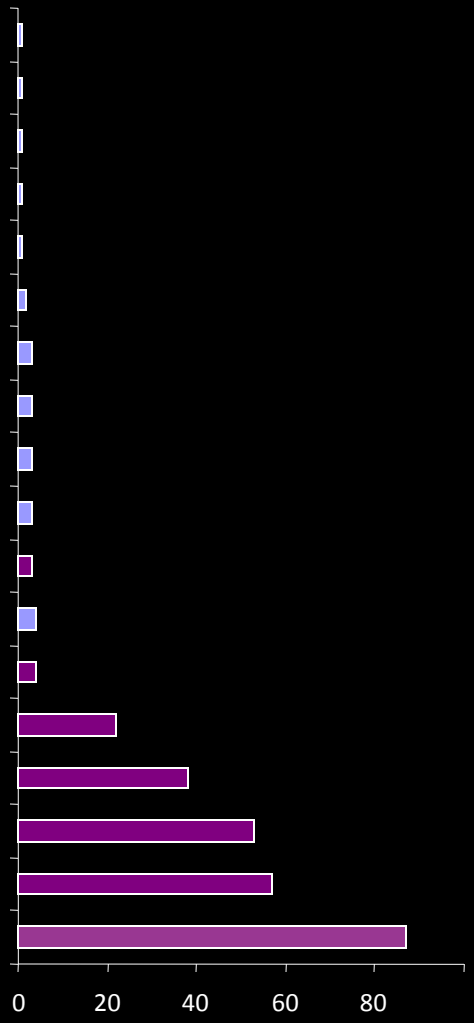
Tunnel trap "Background clutter species"



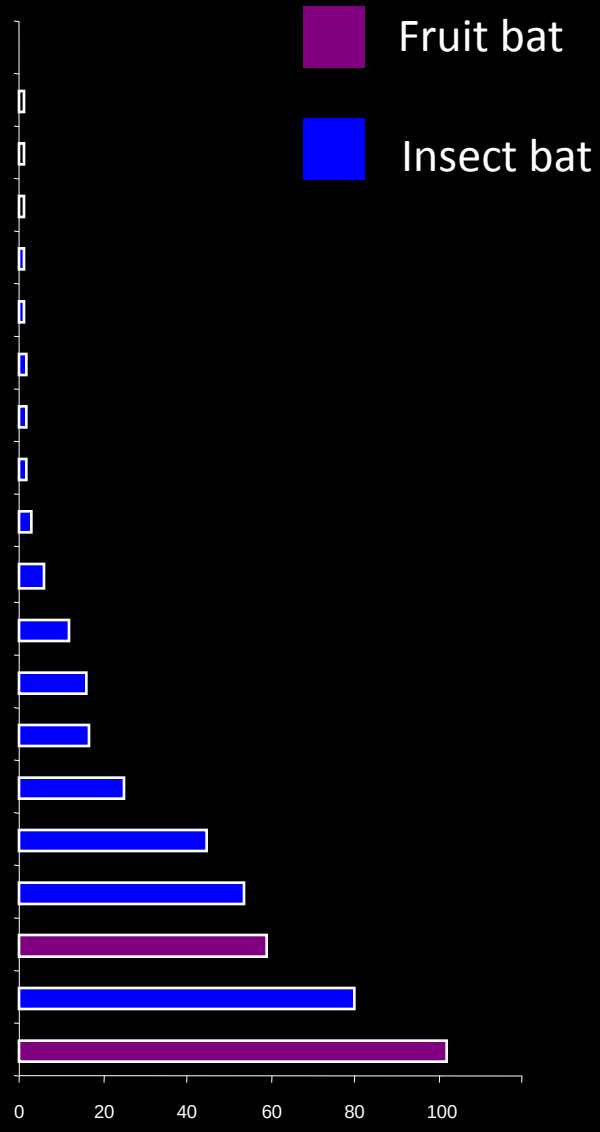
N = 709
S = 26


(173)
(252)
(271)
100%
80%
60%
40%
20%
0%
Tunnel trap
Mist net
Harp trap
Background Clutter/Insect
Frugivore
High Clutter/ Insect

Mt. Isarog, Luzon Id.



Heaney et al. 1999



Sedlock et al. 2008