



Insects of the Muni-Pomadze Ramsar site

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Abstract. A variety of collection methods were used to inventory the insect diversity of the Muni-Pomadze Ramsar site along the Ghana coastline. A total of 75 butterfly species in five families were collected and identified. Twenty-six percent of the butterfly species were open country species. The butterflies were all typical of the coastal zone and no endangered or narrowly endemic species were recorded. The Muni-Pomadze site was also rich in other insect species (67 insect species belonging to 15 orders) as a result of the diverse terrestrial habitats surrounding the lagoon. Butterfly species composition changed with habitat indicating a fine-grained response by the butterfly communities to habitat changes. Data from long-term monitoring of butterfly communities at Muni-Pomadze could prove useful as indicators of habitat quality.

Key words: biodiversity, butterfly, Ghana, insect, lagoon, Lepidoptera

Introduction

The ecotones between wetland and their surrounding habitats are critical interfaces between aquatic and terrestrial ecosystems. There may be substantial flows of genes, energy, nutrients and pollutants across these ecotones.

The biodiversity of such systems are therefore an important and unique resource that could play a role in the maintenance of the wetland/dryland interface. The insect fauna especially the butterflies could be used as useful ecological indicators. Their short generation times, abundance, conspicuousness and well-known taxonomy make them good candidates for monitoring environmental changes or habitat disturbances such as farming, burning and pollution. Butterflies can also offer ecotourist attractions and income generation for local communities.

It is therefore imperative that in any assessment of the biodiversity of a wetland and its immediate surroundings, the diversity for butterflies be determined in relation to habitat characteristics.

Survey sites and methods

At each site, butterflies were collected with butterfly nets, killed with ethyl acetate and stored in glassine envelopes for later examination, pinning, setting and identification. Three Charaxes traps were also baited with banana and palm wine and examined on

various occasions throughout each day of sampling. Because of shortage of time and a lack of baseline inventory data, no formal effort was made to assess relative abundance. The main intention was to compile species lists for the period of sampling and to develop monitoring methods by which changes in the butterfly community could be tracked over different seasons and years. Butterflies were identified with reference to collections in the Zoology Department Museum of the University of Ghana and the National Museums of Kenya, as well as with the help of D'Abrera (1980, 1997) and Larsen (1993). M. Clifton of the National Museums of Kenya assisted with the identification of the *Euphaedra* and hesperid species.

In addition to the butterfly sampling, insects were collected opportunistically and by sweep netting, pitfall trapping and light trapping. These methods yielded large numbers of many different and taxonomically difficult groups, which were identified to order only. A few were identified to species. These insects are not considered further here: they have been deposited in the Zoology Department of the University of Ghana as reference collections for later study.

Results and discussion

Seventy five species of butterflies which were caught during the survey at Muni-Pomadze. The butterfly communities were basically typical of the coastal scrub zone found throughout southern Ghana, enriched by some secondary forest species from regenerating forest at Onyadze and degraded secondary forest at Yenku Block A. No endemic or endangered species were found.

Twenty-two butterfly species were common (24% of the total) and include such typical open country species as *Papilio demodocus*, *Danaus chrysippus*, *Acraea epoinina*, *A. pseudogina*, *Belenois calypso*, *B. gidica*, *B. creona*, *Catopsilia florella*, *Eurema brigitta*, *E. hecabe* and *Junonia oenone*. *Charaxes varanes*, which ranges through both forests and open country, was found at all three sites. *Danaus chrysippus* (normally a dry season butterfly in Ghana) was also common despite the season. The Muni butterfly fauna included several forest-dependent species such as *Charaxes tiridates*, *C. fulvescens*, *Papilio meneustheus*, *Graphium adamastor*, *G. agamedes* and the various *Euphaedra* species. The presence of these forest butterflies in particular makes the Muni site distinctly different from other coastal sites (unpublished data).

Three different habitats were surveyed at Muni-Pomadze: the grassland/thicket at Mankoadze, the regenerating forest and plantation at Onyadze, and the degraded natural forest at Yenku (Table 1). The highest number of butterfly species (58) came from the degraded natural forest at Yenku followed by Onyadze (47) and Mankoadze (33). Figure 1 shows how the species are shared between the three habitats: 22 species (29.3%) were common to all three habitats, 26 (34.7%) only in Yenku, 6 (8.0%) only in Onyadze and 2 (2.7%) only at Mankoadze. The similarity coefficients show the

Table 1. List of butterfly species in three different habitats at Muni-Pomadze in July 1997.

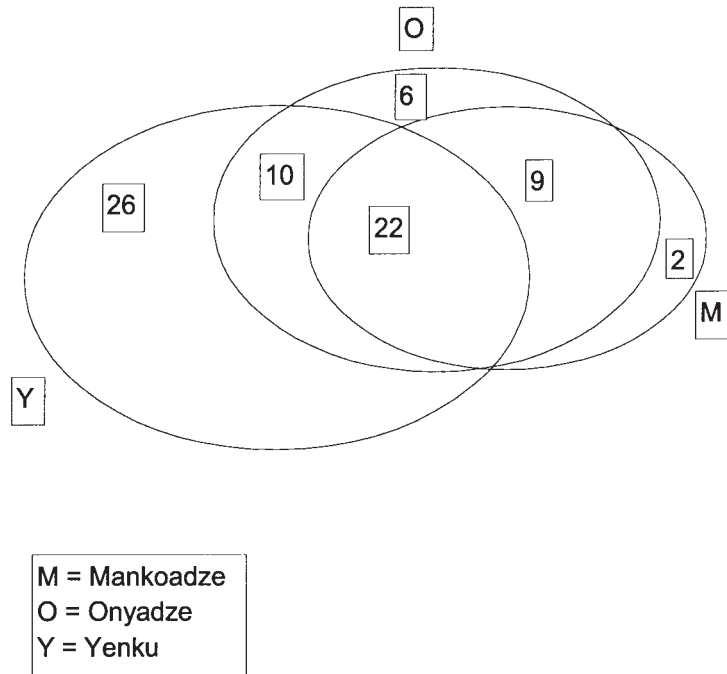
Family Species	Locality		
	Mankoadze	Onyadze	Yenku
Papilionidae			
<i>Papilio demodocus</i>	x	x	x
<i>Papilio menestheus</i>			x
<i>Papilio nireus</i>	x	x	x
<i>Graphium adamastor</i>			x
<i>Graphium agamedes</i>			x
Pieridae			
<i>Appias epaphia</i>			x
<i>Belenois calypso</i>	x	x	x
<i>Belenois creona</i>	x	x	
<i>Belenois gidica</i>	x	x	x
<i>Belenois hedyle</i>			x
<i>Belenois ianthe</i>	x		
<i>Catopsilia florella</i>	x	x	x
<i>Colotis antevippe</i>	x	x	x
<i>Colotis euipe</i>	x	x	x
<i>Eurema brigitta</i>	x	x	
<i>Eurema hecabe</i>	x	x	x
<i>Mylothris chloris</i>		x	x
<i>Leptosia alcesta</i>		x	x
<i>Leptosia wigginsii</i>		x	x
<i>Nepheronia argia</i>			x
<i>Nepheronia thalassina</i>			x
<i>Nepheronia pharis</i>			x
Lycaenidae			
<i>Zizula hylax</i>	x	x	
<i>Axiocerses harpax</i>	x	x	x
<i>Leptotes pirithous</i>	x	x	
<i>Eicochrysops hippocrates</i>			x
<i>Euchrysops osiris</i>		x	
<i>Hypolycaena philippus</i>	x	x	
Nymphalidae			
<i>Amauris niavius</i>		x	x
<i>Amauris tartarea</i>			x
<i>Danaus chrysippus</i>	x	x	
<i>Melanitis leda</i>	x		
<i>Bicyclus safitza</i>	x	x	
<i>Bicyclus milyas</i>			x
<i>Bicyclus angolosa</i>		x	
<i>Bicyclus vulgaris</i>			x
<i>Ypthimorpha itonia</i>	x	x	x
<i>Ypthima doleta</i>	x	x	x
<i>Charaxes fulvescens</i>			x
<i>Charaxes tiridates</i>			x
<i>Charaxes varanes</i>	x	x	x
<i>Aterica galene</i>			x
<i>Pseudacraea lucretia</i>		x	

Table 1. Continued.

Family Species	Locality		
	Mankoadze	Onyadze	Yenku
<i>Neptis morosa</i>	x	x	x
<i>Neptis serena</i>		x	x
<i>Ariadne enotrea</i>		x	x
<i>Byblia anvata</i>		x	
<i>Bebearia sophus</i>			x
<i>Hypolimnas anthedon</i>		x	x
<i>Hypolimnas salmacis</i>		x	x
<i>Salamis anacardii</i>		x	x
<i>Salamis cacta</i>			x
<i>Junonia chorimena</i>	x	x	x
<i>Junonia hierta</i>		x	
<i>Junonia oenone</i>	x	x	
<i>Junonia sophia</i>			x
<i>Junonia stygia</i>			x
<i>Junonia terea</i>	x	x	x
<i>Catacroptera cloanthe</i>	x	x	x
<i>Phalanta phalantha</i>	x	x	x
<i>Acraea egina</i>			x
<i>Acraea epaea</i>			x
<i>Acraea eponina</i>	x	x	x
<i>Acraea neobule</i>	x	x	x
<i>Acraea pseudogina</i>	x	x	
<i>Acraea zetes</i>	x	x	x
<i>Euphaedra harpalyce</i>			x
<i>Euphaedra medon</i>		x	x
<i>Euphaedra nearrezia</i>			x
<i>Euphaedra reziodes</i>			x
<i>Euphaedra afzelii</i>		x	
Hesperiidae			
<i>Coeliades chalybe</i>			x
<i>Coeliades pisistratus</i>			x
<i>Pyrrhades lucagus</i>	x	x	x
<i>Pyrrhocalcia iphis</i>	x	x	x
Totals	33	47	58

expected pattern with the lowest value (0.484) for the comparison between Yenku and Mankoadze and the highest (0.775) for that between Yenku and Onyadze.

Several of the butterfly species at Mankoadze were strongly associated with the thickets: these include *Papilio demodocus*, *P. nireus*, *Neptis morosa*, *Bicyclus safitza*, *Charaxes varanes* and an unidentified *Euphaedra* which was not captured. At least in the case of the two *Papilio* species, this association was probably due to the frequent presence in the thickets of their larval foodplant *Xanthoxylon*. Also common in the grassland and not included in the table were two species of diurnal arctiid moths, *Utetheisa pulchella* and *Argina amanda*. A third diurnal moth, the lymantrid



	Mankoadze	Onyadze	Yenku
Mankoadze	x	x	x
Onyadze	0.775	x	x
Yenku	0.484	0.610	x

Figure 1. Insects.

Othroedea vesperina, was also present at Mankoadze, particularly in the more bushy areas, but was commoner at Onyadze and Yenku. In general the butterfly community at Mankoadze was characteristic of open habitats throughout Africa with species such as *Cratacroptera cloanthe*, *Hypolyceana philippus*, *Eurema hecabe*, *Belenois gidica*, *B. calypso*, *Junonia oenone*, *Danaus chrysippus*, *Acraea neobule*, *A. zetes*, and *A. pseudogina*.

Most of these open country species were also found in the other two habitats which included patches of grassland and roads and paths along which they dispersed. The tiny lycaenid, *Zizula hylax*, which was present at Mankoadze, was particularly common along the paths at Onyadze, while *Papilio nireus*, *P. demodocus* and *Charaxes varanes*, which were present in the thickets at Mankoadze, were

considerably more abundant in this habitat. The Onyadze collection also contained several secondary forest and transitional butterflies, absent from Mankwadze: these included such attractive butterflies as *Leptosia alcesta*, *L. wigginsii*, *Hypolimnas anthedon*, *H. salmactis*, *Salamis anacardii*, *Amauris niavus* and *Euphaedra medon*. At Yenku, more forest dependent species were found, such as *Papilio menestheus*, *Graphium adamastor*, *G. agamedes*, *Belenois hedyle*, *Nepheronia argia*, *N. pharis*, *Aterica galene*, *Euphaedra harpalyce*, *Amauris tartarea*, *Salamis cacta*, *Charaxes fulvescens*, *C. tiridates*, *Acraea epaea*, *Coeliades chalybe* and *C. pisistratus*. Two diurnal moths the arctiid *Euchromia lethe* and the lymantrid *Othroedeia caffra* were also frequently encountered at Yenku.

Other insects

A total of 3151 other insect and arthropod specimens were collected and sorted as far as possible into individual taxa, but nearly all identified only to order. Of these, 786 came from the pitfall trapping, 1751 from the light trap, and 614 from sweeping (Table 2). These do not include the immature forms, of which large numbers (especially of grasshopper nymphs) were collected. Personnel and time constraints preclude all but an outline of these results. Pitfall traps were dominated by the Hymenoptera (mostly ants), light traps by the Coleoptera and Lepidoptera, and sweep net samples by Hymenoptera and Homoptera.

The pitfall traps were analysed in detail. Of the 786 arthropod specimens collected, 81.2% were insects, and of these the Hymenoptera made up 64.5%, Coleoptera 14.4% (Table 2). The vast majority of the hymenoptera were ants of which the most common species was the large ponerine, *Paltothyreus tarsatus*. Amongst the other arthropods spiders and woodlice predominated making up 64.7% and 14.7% respectively of the total catch of 132 specimens.

The 654 insect specimens collected from pitfall traps were sorted into 67 presumed species with Coleoptera most strongly represented (33 species) followed by Hymenoptera (15 species).

Catches from the light trap at Muni totalled 1751 specimens with the majority (1497) coming from the Onyadze site. Only 254 insects were collected in the light traps at the Mankwadze site. The great disparity in the catches probably reflects the greater exposure to wind at the Mankwadze site which reduces flying activity at night. Again the beetles were the most strongly represented with 1034 specimens, followed by moths with 413 specimens.

A total of 614 insect specimens were collected by sweep nets and identified to order (Table 2). The collections were dominated by hymenopterans (170), followed by hompterans (118) and Diptera (93). Large numbers of nymphal grasshoppers and microlepidoptera were ignored.

Table 2. Numbers of insects and other arthropods collected at Muni-Pomadze.

Taxon	Pitfall traps		Light traps Individuals	Sweep nets Individuals
	Individuals	Species		
Insecta				
Thysanura	4	1	0	0
Dermaptera	1	1	0	0
Orthoptera	66	6	30	19
Phasmida	0	0	0	3
Isoptera	0	0	0	57
Homptera	2	2	71	118
Heteroptera	7	5	10	65
Lepidoptera	1	1	413	1
Coleoptera	114	33	1034	77
Diptera	16	3	83	93
Hymenoptera	443	15	88	170
Odonata	0	0	1	4
Tricoptera	0	0	21	–
Neuroptera	0	0	0	3
Dictyoptera	0	0	0	4
Aranaea	92	–	–	–
Diplopoda	3	–	–	–
Chilopoda	1	–	–	–
Acarina	10	–	–	–
Isopoda	26	–	–	–
Totals	786	67	1751	614

Conclusions

The butterflies that were captured were all fairly typical of the coastal zone and no endangered or narrowly endemic species were discovered. However, the survey did reveal respectable levels of biodiversity (e.g. Muni has more butterfly species than the whole of the British Isles) as well as clear differences in the butterfly fauna of the various habitats. These differences indicate a fine-grained response by the butterfly communities to habitat changes and suggest that butterfly monitoring at Muni, would provide useful ecological indicator data to complement mammal, bird and plant monitoring. Monitoring protocols were tested and are being refined. In addition, there are several species which are beautiful and conspicuous and which could be useful ecotourist attractions. Some of these are also of commercial interest for both the livestock and the deadstock trade, offering other opportunities for sustainable utilisation and income generation for local communities.

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