

## Faunistic Study of Dragonflies (Anisoptera; Odonata) of Babuzai with Some New Records for District Swat, Pakistan

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### ABSTRACT

An explorative study has been made on the dragonfly fauna of Babuzai, a tehsil in the tourist-attractive district of Swat, Pakistan. The study was conducted between April 2021 and June 2022, from 8:00 a.m. to 12:00 p.m. and 2:00 p.m. to 5:00 p.m. Collection was made from different areas of the study area, which are Odigram, Qambar, Rahim Abad, Gulkada, Islampur, Banr, Mingora, Kokarai, Tindodag, Manglawar, Bishbanh, Saidu Sharif, Marghuzar, Dangram, Jambil, and Sangar. A total of 18 species belonging to 2 families were documented. Libellulidae, with the highest percentage (94%), secured the richest among the families. Family Ashenidae was represented by a single species, accounting for 6% of the total documented species. Four species, *Orthetrum iuzonicum*, *Sympetrum fonscolombii*, *Sympetrum commixtum*, and *Palpopleura sexmaculata*, were reported for the first time for District Swat. The current study contributes to the existing knowledge base regarding the Odonata fauna of district Swat. The findings offer valuable implications for biodiversity management and ecosystem conservation efforts in the area.

**Keywords:** Dragonfly, Babuzai, Swat, Insects diversity, Anisoptera, Faunistic.

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### INTRODUCTION

Odonata is one of the most important and potentially predatory orders and is an excellent indicator of ecosystem health. It is one of the most recognizable insect groups [1, 2]. Odonata is classified into three suborders: Anisoptera (dragonflies), Zygoptera (damselflies), and Anisozygoptera (primitive dragonflies) [3]. Approximately 3,000 different species of dragonflies can be found in various parts of the world except Antarctica [4]. Dragonflies are classified into eight superfamilies, 29 families, and 58 subfamilies, with approximately 600 genera and 6000 identified species worldwide [5, 6]. Odonates are among the most important predators. They serve a vital function as bioindicators of ecosystem health and pollution in an area [7]. Their larvae and adults serve as

biological control agents against a range of insect pests that hold medical relevance, thereby aiding in the management of infectious diseases such as dengue, filariasis, and malaria [2]. Dragonflies are extremely valuable insects, and studying the fauna is important for making decisions regarding crop management and environmental preservation [8].

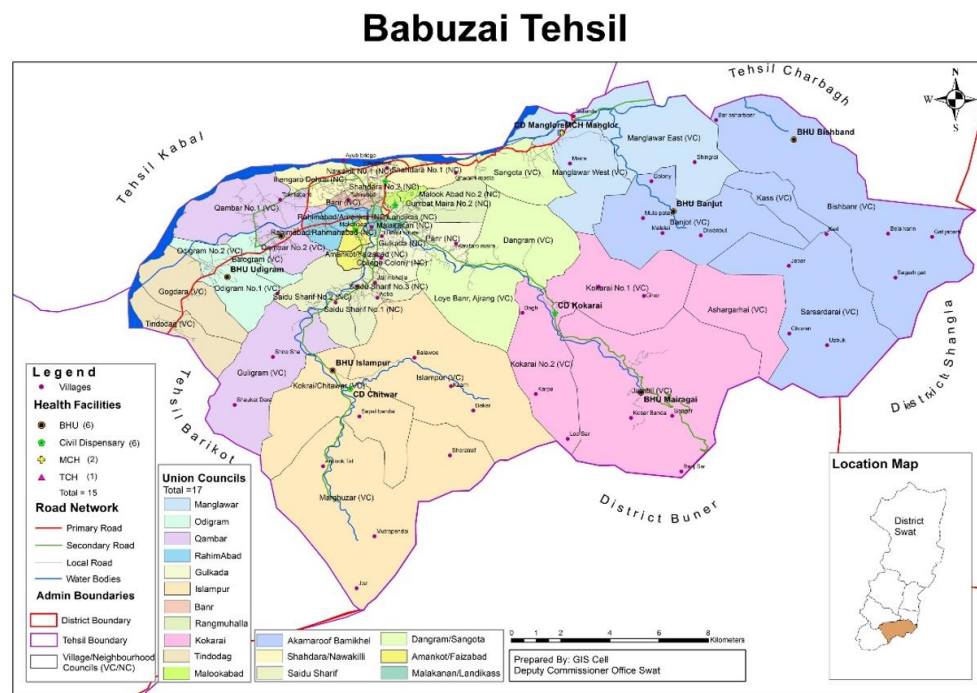
Mingora (Tehsil Babuzai) is the most populous city in the Swat District of Khyber Pakhtunkhwa, Pakistan, and is situated on the banks of the Swat River. Its location makes it the center of social, cultural, and economic activities in the Malakand Division and the primary city in the northern region of Khyber Pakhtunkhwa. Several researchers have worked on the Odonata fauna of Pakistan [2, 3, 9-16]. Regarding Tehsil Babuzai's dragonfly biodiversity, no adequate research has been done. Consequently, the

current study set out to document the dragonfly fauna found in the Tehsil Babuzai's different areas. The purpose of this study is to provide a preliminary assessment of the faunistic makeup of Odonata communities in various environments within Tehsil Babuzai. By recording the presence and quantity of Odonata species, this study helps to a better knowledge of the region's freshwater biodiversity and informs future conservation initiatives.

## MATERIALS AND METHODS

### Study area

Swat is a popular tourist destination in Khyber Pakhtunkhwa (KPK). The district consists of seven Administrative tehsils; Babuzai (Mingora), Kabal, Barikot, Matta, Charbagh, Khwazakheela, and Bahrain. Babuzai is the main Tehsil of District Swat, Khyber Pakhtunkhwa, Pakistan [17]. Biodiversity hotspots in Tehsil Babuzai are Odigram, Qambar, Rahim Abad, Gulkada, Islampur, Banr, Mingora, Kokarai, Tindodag, Manglawar, Bishbanh, Saidu Sharif, Marghuzar, Dangram, Jambil, and Sangar (**Figure 1**).



**Figure 1.** Map of Tehsil Babuzai in district Swat

### Collection and preservation

This study was carried out for fifteen months, from 8:00 a.m. to 12:00 p.m. and 2:00 p.m. to 5:00 p.m. (April 2021 to June 2022). Dragonflies love high light and a warm habitat, hence the samples were collected between midday and nighttime. The collected samples were then killed by placing them in a killing jar with KCN-soaked cotton at the bottom. After killing, they were mounted on a stretching board. The dried specimens were transferred to insect boxes, where each specimen was labeled and tagged with information about the collection date, area, and collector name. Naphthalene balls were added to the insect boxes as a pest repellent. Along with that, Photographic documentation was also made by using a Digital camera (Nikon D7200/ Lens NIKKOR 18-140 mm

f/3.5-5.6G ED) was also carried out by visiting the study area twice a week.

### Identification

The labeled samples were identified with the help of available [2, 3, 9-16]. Their identity was also confirmed by seeking guidance from experts specializing in Odonata taxonomy to assist in accurately identifying dragonfly species. The identified samples were deposited in the Zoology Museum, Govt Post Graduate Jahanzeb College, Swat.

## RESULTS AND DISCUSSION

The present study conducted an explorative investigation on the dragonfly diversity of

Babuzai, Swat over fifteen months spanning from April 2021 to July 2022. A total of 18 species were identified, distributed among two families: Libellulidae and Aeshnidae. Libellulidae emerged as the dominant family, comprising 94% of the species with 17 identified species, while Aeshnidae represented a smaller proportion at 6%, consisting of a single species (**Table 1, Figures 2-4**). The species in the family Libellulidae are *Orthetrum pruinosum*, *O. triangulare*, *O. taeniolatum*, *O. Chrysis*, *O. sabina*, *O. iuzonicum*, *Crocthemis erythraea*, *C. servilia*, *Trithemis festiva*, *T. aurora*, *Sympetrum fonscolombii*, *S. commixtum*, *S. vulgatum*, *Pantala flavescens*, *Palpopleura sexmaculata*, *Acisoma panorpoides*, and *Tramea virginia*. While the family Aeshnidae comprised only one species *Anax immaculifrons*. Four species, *O. iuzonicum*, *S. fonscolombii*, *S. commixtum*, and *P. sexmaculata*, were reported for the first time in District Swat, Pakistan, adding to our understanding of the region's odonate biodiversity. This finding emphasizes the significance of ongoing biodiversity surveys and monitoring activities in District Swat to fully document and maintain the area's rich natural history.

Different scientists have worked on the odonata fauna in Pakistan. A study was conducted on dragonflies' fauna in Sindh in 2018 from March to October. They collected a total of 215 samples and documented 2 families, 5 genera, and 9 species [12], similarly, a preliminary study on dragonflies' fauna in district Sialkot was conducted in 2019. A total of 185 dragonfly specimens were collected, and 10 species of dragonflies were recorded, divided into 7 genera and 2 families. Those species were *O. pruinosum*, *O. sabina*, *P. flavescens*, *Crocthemis erythraea*, *C. servilia*, *A. panorpoids*, *Anax indicus*, *Hemianax ephippiger*, *Neurothemis fluctuans*, and *A. variegatum*. The first six species show a resemblance to the species identified in our current data [11]. Several researchers had worked on Several individuals have worked on odonata distribution and documentation in KPK, Pakistan. The Odonata survey was done in Swabi, Khyber Pakhtunkhwa, Pakistan, between 2015 and 2016. The investigation discovered 23 species across 15 genera and 3 families. During the current study, comparable species of dragonflies were identified in Tehsil Babuzai, demonstrating a strong connection between the

two studies [2]. Similarly, another study determined the diversity of dragonflies in Tehsil Tangai of district Charsadda Khyber Pakhtunkhwa and found 02 families, 07 genera, and 11 species of the family Libellulidae and the family Gomphidae [13]. In our study, 18 species were reported from two families and showed great resemblance with their study. Similarly, several studies have been carried out on the odonata fauna of District Swat In a study on the dragonfly fauna of Manglawar, Swat, researchers reported 11 species belonging to the libellulidae family [3]. In our current study, we recorded 17 species of the family Libellulidae, with the first 8 species showing a resemblance to our study. Another exploratory study was done in Swat from March to October with 200 specimens gathered from various habitats and belonged to five families [15]. In this investigation, the Libellulidae family emerged as the leading group. Similarly, in our latest investigation, the family Libellulidae emerged as the leading family, indicating similarities with the previous study. Furthermore, a study on the dragonfly fauna of Upper Swat, Khyber Pakhtunkhwa, identified 15 species belonging to 11 taxa [18]. However, they had not previously reported the following species: *Hydrobasileus croceus*, *O. anceps*, *S. meridionale*, *Potamarcha obscura*, *Tholymis tillarga*, *Zygonyx torridus*, and *S. orientale*.



**Figure 2.** Anisoptera families, genera, and Species reported from the Babuzai, Swat

**Table 1** shows a checklist of species from the study area.

**Table 1.** A checklist of species from the study area

Order	Family	Species
Odonata	Libellulidae	<i>O. sabina</i>
		<i>O. triangulare</i>
		<i>O. taeniolatum</i>

<i>O. pruinosum</i>
<i>O. chrysis</i>
<i>O. iuzonicum</i>
<i>C. erythraea</i>
<i>C. servilia</i>
<i>T. festiva</i>
<i>T. aurora</i>
<i>S. fonscolombii</i>
<i>S. commixtum</i>
<i>S. vulgatum</i>
<i>P. flavescens</i>
<i>P. sexmaculata</i>
<i>A. panorpoides</i>
<i>T. virginia</i>
Aeshnidae
<i>A. immaculifrons</i>

### Order odonata

#### Family libellulidae

##### 1. *O. sabina* (Drury, 1773)

*Common name:* Slender Skimmer

*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Mingora; 10-vii-2021; Police line Mingora; 27-ix-2021, Coll.Sanan | Gugdara; 10-x-2021, Coll.Bakhtawar | Saidu Sharif; 5-viii-2021, Coll.Malala.

##### 2. *O. triangulare* (Selys, 1878)

*Common name:* Blue-tailed Forest Hawk

*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Mingora; 15-iv-2021, Coll.Sanan | Police line Mingora; 03-x-2021, Coll.Malala | Marghuzar; 17-vii-2021, Coll.Bakhtawar.

##### 3. *O. taeniolatum* (Schneider, 1845)

*Common name:* Small Skimmer

*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Mingora; 19-v-2021, 07-vii-2021, Coll.Malala | Police line; 11-vi-2021, Amankot; 22-iv-2021, Coll.Sanan | Manglawar; 22-ix-2021, Coll.Bakhtawar.

##### 4. *O. pruinosum* (Burmeister, 1839)

*Common name:* Crimson-Tailed Marsh Hawk

*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Saidu Sharif; 15-v-2021, Coll.A.Rehman | Odigram; 24-viii-2021, Coll.Bakhtawar | Kokari; 14-vi-2022, Coll.Waqas.

##### 5. *O. chrysis* (Selys, 1891)

*Common name:* Spine-tufted Skimmer

*Material examined:* Pakistan; Khyber

Pakhtunkhwa; Swat; Babuzai; Police line Mingora; 19-iv-2021, Sangar; 27-vii-2021, Coll.Sanan | Odigram; 25-vi-2021, Gugdara; 11-x-2021, Coll.Bakhtawar.

##### 6. *O. iuzonicum* (Brauer, 1868)

*Common name:* Tricolored Marsh Hawk

*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Mingora; 17-vi-2021, Police line Mingora; 29-vii-2021, Coll.Sanan | Saidu Sharif; 21-v-2021, Coll.Malal.

##### 7. *C. erythraea* (Brulle, 1832)

*Common name:* Broad Scarlet

*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Mingora; 07-iv-2021, Police line Mingora; 17-v-2021, Coll.Sanan | Saidu Sharif; 29-vi-2021, Coll.Bakhtawar | Manglawar; 12-viii-2021, Coll.Malala

##### 8. *C. servilia* (Drury, 1770)

*Common name:* Scarlet Skimmer

*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Mingora; 17-v-2021, Police line Mingora; 5-vii-2021, Coll.Sanan | Marghuzar; 11-vi-2021, Amankot; 13-viii-2021, Coll.Malala | Odigram; 09-ix-2021, Coll.Bakhtawar.

##### 9. *T. festiva* (Rambur, 1842)

*Common name:* Black Stream Glider

*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Mingora; 19-vi-2021, Marghuzar; 25-viii-2021, Coll.Sanan | Saidu Sharif; 11-iv-2021, Coll.Malala | Odigram; 12-ix-2021, Coll.Bakhtawar.

##### 10. *T. aurora* (Burmeister, 1839)

*Common name:* Crimson Marsh Glider

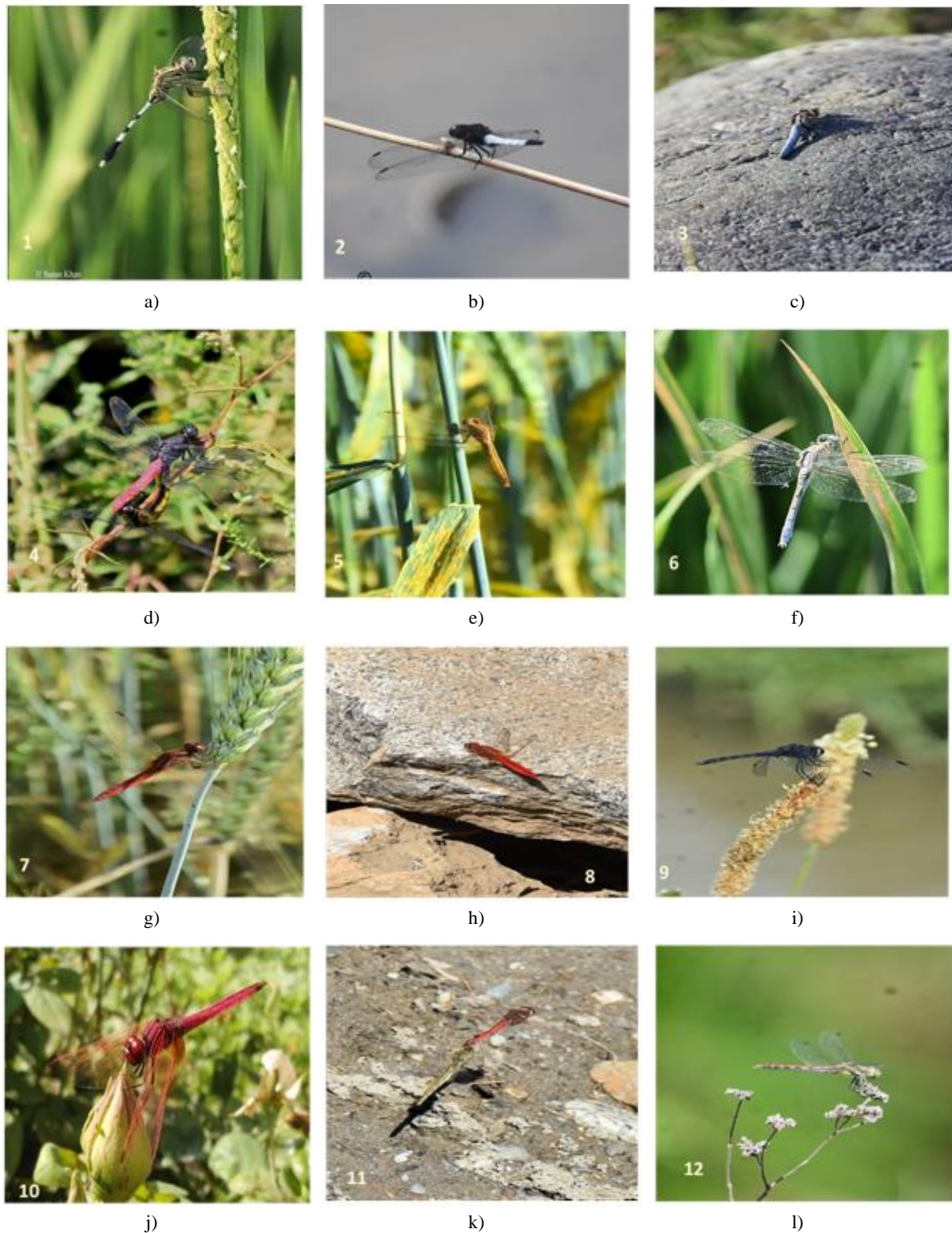
*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Police line Mingora; 11-iv-2021, Sangar; 18-vi-2021, Coll.Sanan | Saidu Sharif; 13-v-2021, Coll.Malala | Odigram; 25-vii-2021, Coll.Waqas.

##### 11. *S. fonscolombii* (Selys, 1840)

*Common name:* Red-veined Darter

*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Police line Mingora; 27-vi-2021, Manglawar; 11-iii-2022, Coll.Sanan | Amankot; 10-v-2022, Coll.Bakhtawar | Kokari; 15-vi-2022, Coll.Waqas.





**Figure 3.** a) *O. sabinac*, b) *O. triangulare*, c) *O. taeniolatumc*, d) *O. pruinosumc*, e) *O. chrysic*, f) *O. iuzonicumc*, g) *C. erythraea*, h) *C. servilia*, i) *T. festiva*, j) *T. aurora*, k) *S. fonscolombii*, l) *S. commixtum*

*12. S. commixtum (Selys, 1884)*

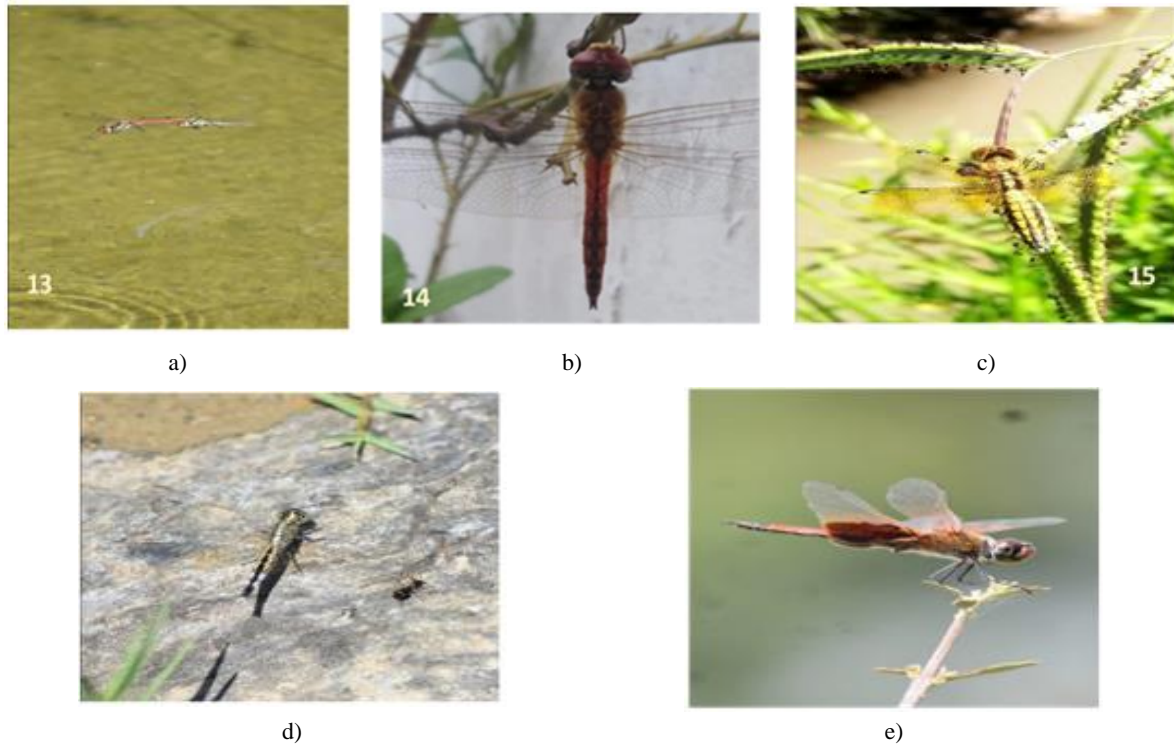
*Common name: Mountain Meadow Hawk*

*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Marghuzar; 11-vi-2022, Coll.Sanan | Mingora; 15-vi-2021 | Saidu sharif; 11-iii-2022, Coll.Waqas.

*13. S. vulgatum (Linnaeus, 1758)*

*Common name: Vagrant Darter*

*Material examined:* Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Marghuzar; 22iv-2021, Sangar; 18-vi-2021, Coll.Sanan | Saidu sharif; 09-ix-2021, Coll.Nazir.



**Figure 4.** a) *S. vulgatum*, b) *P. flavescens*, c) *Palpopleura sexmaculata*, d) *A. panorpoides*, e) *T. Virginia*

14. *P. flavescens* (Fabricius, 1798)

Common name: Wandering Glider

**Material examined:** Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Marghuzar; 02-v-2021, Amankot; 13-vii-2021, Coll.Sanan | Manglawar; 29-ix-2021, Coll.A.Rehman.

15. *Palpopleura sexmaculata* (Fabricius, 1787)

Common name: Blue-tailed Yellow Skimmer

**Material examined:** Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Police line Mingora; 19-iv-2022, Marghuzar; 11-vi-2021, Mingora; 17-ix-2021, Coll.Sanan | Saidu sharif; 15-vii-2021, Coll.Malala.

16. *A. panorpoides* (Rambur, 1842)

Common name: Grizzled Pintail

**Material examined:** Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Police line Mingora; 15-iv-2022, Manglawar; 07-viii-2021, Coll.Sanan.

17. *T. virginia* (Rambur, 1842)

Common name: Saddlebag Glider

**Material examined:** Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Odigram; 19iv-2021, Sangar; 09-ix-2021, Coll.Sanan | Marghuzar; 15-vii-2021, Coll.Malala.

Family Ashenidae

18. *A. immaculifrons*: (Rambur, 1842)

Common name: Blue Darner

**Material examined:** Pakistan; Khyber Pakhtunkhwa; Swat; Babuzai; Amankot; 19v-2021, Coll.Bakhtawar | Police line Mingora; 10-viii-2021, Manglawar; 29-iii-2022, Coll.Sanan.

### CONCLUSION

This study contributes to our understanding of the Odonata communities in Tehsil Babuzai. The presence of diverse species highlights the ecological significance of freshwater habitats in the region. Documenting species richness and habitat preferences lays the groundwork for future research. Conservation efforts must prioritize the protection of critical habitats. Collaboration among researchers, conservationists, and local communities is essential for effective ecosystem management. This study emphasizes the importance of sustaining Odonata populations in Tehsil Babuzai and beyond.

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**CONFLICT OF INTEREST:** None.

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**ETHICS STATEMENT:** The research was conducted in compliance with ethical standards.

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