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ANALYSIS OF THE DIVERSITY OF INVERTEBRATES EXISTING IN AN INTERVENED AREA AND A SECONDARY FOREST IN THE CANTON OF PASTAZA

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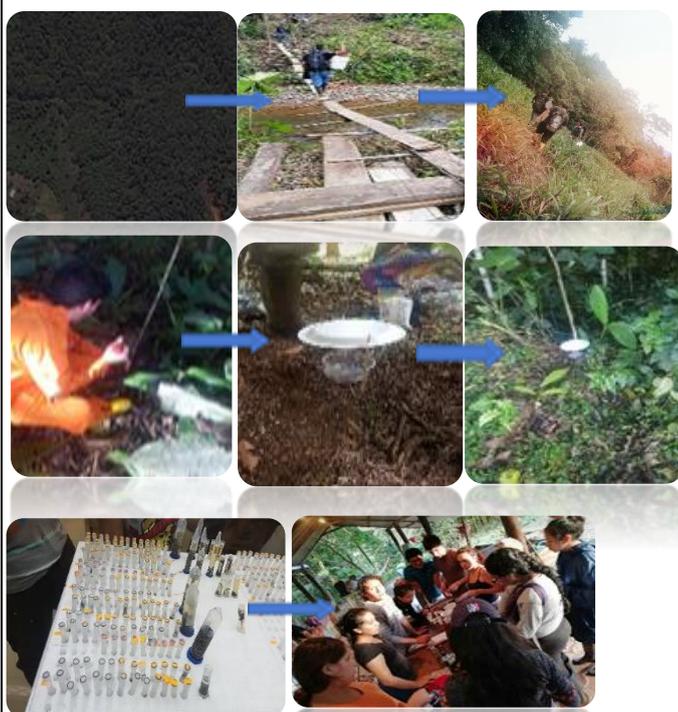
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Graphical Abstracts



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Abstract:

The objective of the research was to capture and identify the diversity of invertebrates that comprise an intervened area and that of a secondary forest. Classifying them into classes and orders, to which each one of the individuals obtained in the transects belongs, comparing each specific place and analyzing the variety that each zone presents. The aggressive manifestation of anthropogenic factors has modified the existing balance in the environment, which is affecting the biodiversity of the living beings that inhabit it. One of the aspects taken into account in this research, is the most diverse group of living beings invertebrates, so we have seen the need to study the degree of disturbance in two particular sites, based on the latent diversity of each territory.

Keywords: Factors anthropic, disturbance, method, area, secondary forest, transect.

Introduction

In our environment we can find a great variety of flora and fauna, which enriches our planet, but as the years go by the anthropic factors have caused a great loss of this biodiversity being necessary for the balance of our earth. The biota of our world is incomparable, there are from the smallest to the largest, for this project we will focus on those who are physically small, but represents more than 90% of the life forms of the planet, invertebrates (insects, etc..) that we can find in any area with just a little more attention, we can also say that this group helps us to verify how affected is a plant area because of human intervention. The study of this project will be based on the Analysis of the diversity of existing invertebrates in an intervened area and in a secondary forest of the Pastaza canton, in order to analyze the current state of these areas based on micro fauna, as research points were chosen two farms one of them about 20 minutes from the city with a high intervention, and the other about 2 hours and a half from the city with less intervened. The Transect method was used for the collection of micro fauna, which helped us to value the variety of invertebrates that inhabit the two sites, obtaining a comparative analysis between them.

Materials and Methods

Materials

The materials used allowed the study to be carried out in a better way, housing the necessary details to carry out and complete the transect technique in each zone, being the tape measure, tweezers, flasks (glass or plastic), petri boxes, containers for the samples, reagents such as drinking alcohol and also equipment (stereoscope), were elementary at the time of giving effect to the transects.

Methods

For this research work, we have chosen to analyze the problems that currently affect the environment because of anthropic factors, which has caused the loss of microfauna in many areas, so we seek to study the diversity of invertebrates that can be housed within an intervened area and in a secondary forest, with the help of transects, to later identify them based on taxonomic keys and visualize them carefully in the biology laboratory of the UEA, obtaining better results.

Transect

In ecology a transect is an observation and data recording technique. Where there is a clear - or assumed - transition of flora and fauna or environmental parameters; it is useful to make a detailed study along a line (real or imaginary, which we will call transect) that crosses through the area. Much attention should be paid to the choice of this line that should cross areas that are different at first sight or supposedly.

In this "Transect" method, we began by choosing the determined area, both the intervened area and the secondary forest, and when we had all the necessary materials that would be used for this technique, we measured with the tape measure a straight line 50m long and 1m thick in a North-South direction followed by the fall traps, then with the help of tweezers or with the hands we began with the collection, and then we inserted each individual found in a transparent bottle (glass or plastic) with drinking alcohol, so as to preserve them properly and identify them in a better way.

When all the work was finished, the samples were taken to the biology laboratory of the Amazonian State University in order to identify them meticulously in a stereoscope, avoiding possible errors that could affect our results.

Results and Discussion

As a result, insects were collected from two different places as well as in Intervened Area and Secondary Forest, therefore, it was classified in Class and order and its respective identification and classification was carried out, resulting in the following aspects.

Transect of the Intervened Area

Table 1. Main types of invertebrates found in the Transect of the intervened Area

| Clase | Total, N de especies | Abundancia total | (1) / (2) | X100 | Abundancia relativa |
|-------------|----------------------|------------------|-----------|------|---------------------|
| Arachnida | 7 | 69 | 0.1 | 100 | 10 |
| Chilopoda | 1 | 69 | 0.01 | 100 | 1 |
| Diplopoda | 9 | 69 | 0.13 | 100 | 13 |
| Gasterópodo | 1 | 69 | 0.01 | 100 | 1 |
| Insecta | 4 | 69 | 0.06 | 100 | 6 |
| Ectognata | 46 | 69 | 0.67 | 100 | 67 |
| Clitella | 1 | 69 | 0.01 | 100 | 1 |
| Total | 69 | | 0.99 | | 99 |

(Yacelga, R. 2019)

Diversidad:

$$\text{Clase: } Dmg = \frac{S-1}{\ln N} \quad Dmg = \frac{7-1}{\ln(69)} = 1.42 \quad < 2: \text{ Baja biodiversidad}$$



Illustration 1 Relative abundance of invertebrate classes in the Transect of the intervened Area

Table 2. Main Invertebrate Orders Found in the Transect of an Intervened Area

| Orden | Total, N de especies | Abundancia total | (1)/(2) | X100 | Abundancia relativa |
|-----------------|----------------------|------------------|---------|------|---------------------|
| Orthoptera | 7 | 48 | 0.15 | 100 | 15 |
| Coleoptera | 4 | 48 | 0.08 | 100 | 8 |
| Aranea | 7 | 48 | 0.15 | 100 | 15 |
| Hemíptera | 17 | 48 | 0.35 | 100 | 35 |
| Lithobiomorpha | 1 | 48 | 0.02 | 100 | 2 |
| Phasmathodea | 1 | 48 | 0.02 | 100 | 2 |
| Haplotaxida | 1 | 48 | 0.02 | 100 | 2 |
| Stylommatophora | 1 | 48 | 0.02 | 100 | 2 |
| Platidesmida | 9 | 48 | 0.19 | 100 | 19 |
| Total | 48 | | 1 | | 100 |

(Escobar, J. 2019)

Diversidad:

Orden: $Dmg = \frac{S-1}{\ln N}$ $Dmg = \frac{9-1}{\ln(48)} = 2.32$ Alta biodiversidad



Illustration 2 Relative abundance of invertebrate orders in the Transect of the intervened Area

Secondary Forest Transect

Table3. Main classes of invertebrates found in the Secondary Forest Transects

| Clase | Total, N de especies | Abundancia total | (1) / (2) | X100 | Abundancia relativa |
|-----------|----------------------|------------------|-----------|------|---------------------|
| Arachnida | 4 | 34 | 0.12 | 100 | 12 |
| Chilopoda | 1 | 34 | 0.03 | 100 | 3 |
| Ectognata | 29 | 34 | 0.85 | 100 | 85 |
| Total | 34 | | 1 | | 100 |

(Mendoza, N. 2019)

Diversidad:

$$Dmg = \frac{S - 1}{\ln N}$$

Clases: $Dmg = \frac{3 - 1}{\ln(34)} = 0.57$

< 2: Baja biodiversidad



Illustration 3 Relative abundance of invertebrate classes in the Secondary Forest Transect

Table 4. Main orders of invertebrates found in the Secondary Forest Transect

| Orden | Total, N de especies | Abundancia total | (1)/(2) | X100 | Abundancia relativa |
|------------------|----------------------|------------------|---------|------|---------------------|
| Orthoptera | 1 | 33 | 0.03 | 100 | 3 |
| Hymenoptera | 16 | 33 | 0.48 | 100 | 48 |
| Blattodea | 4 | 33 | 0.12 | 100 | 12 |
| Diptera | 1 | 33 | 0.03 | 100 | 3 |
| Coleoptera | 3 | 33 | 0.09 | 100 | 9 |
| Aranea | 4 | 33 | 0.12 | 100 | 12 |
| Dermaptera | 1 | 33 | 0.03 | 100 | 3 |
| Phasmida | 1 | 33 | 0.03 | 100 | 3 |
| Mantophasmatodea | 2 | 33 | 0.06 | 100 | 6 |
| Total | 33 | | 0.99 | | 99 |

(Shiguango, H. 2019)

Diversidad:

Orden: $Dmg = \frac{S-1}{\ln(33)} = 2.29$ Alta biodiversidad

$$Dmg = \frac{S-1}{\ln N}$$

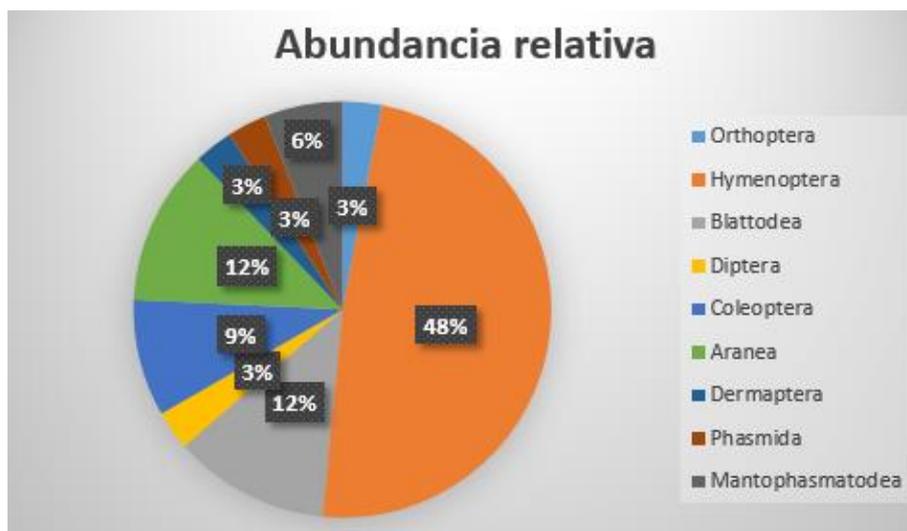


Illustration 1. Relative abundance of invertebrate orders in the Secondary Forest Transect

Discussion

Table 5. Total number of invertebrates collected within the intervened Area

| Transecto Área intervenido | Número de individuos |
|----------------------------|----------------------|
| Clase | 69 |
| Orden | 48 |
| Total | 117 |

(Yacelga, R. 2019)

$$Dmg = \frac{S-1}{\ln N} = \frac{2-1}{\ln(117)} = 0.21 \text{ Baja Biodiversidad}$$

< 2 Baja Biodiversidad

Table 6. Total number of invertebrates collected within the Secondary Forest

| Transecto Bosque secundario | Número de individuos |
|-----------------------------|----------------------|
| Clase | 34 |
| Orden | 33 |
| Total | 67 |

(Yacelga, R. 2019)

$$Dmg = \frac{S-1}{\ln N} = \frac{2-1}{\ln(67)} = 0.24 \text{ Baja Biodiversidad}$$

< 2 Baja Biodiversidad

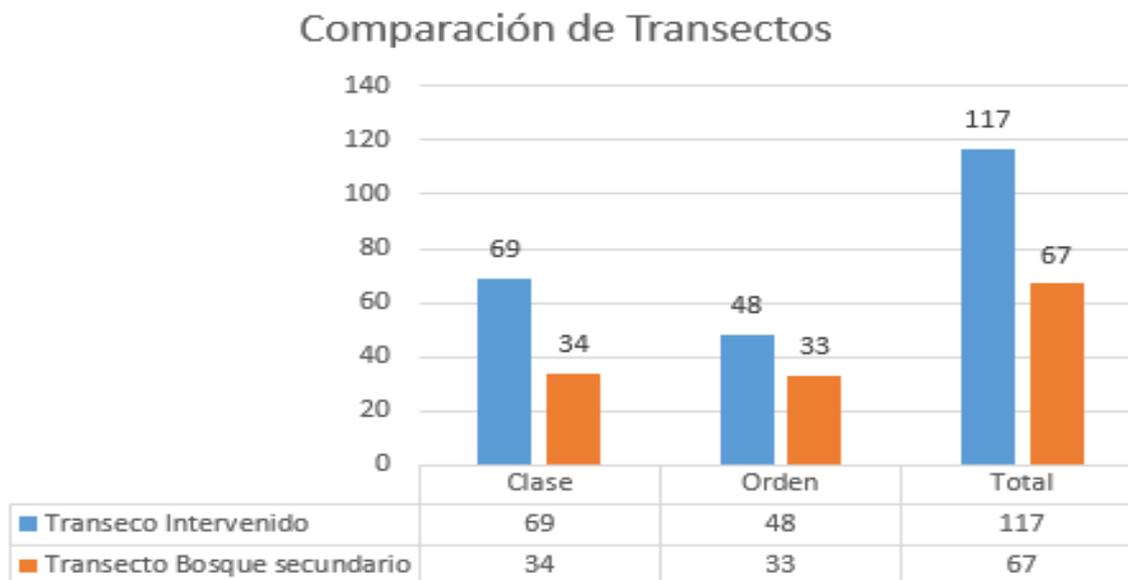


Illustration 2. Comparison of Transects of the Intervened Area and the Secondary Forest

As we can see a table was made to compare the Transect of the intervened area and secondary forest and we realize that there is more abundance in the Transect, the secondary forest is an area that almost uninterrupted man but not constantly influenced, its ecosystem helps it to reproduce without affecting its environment by which, this comparison has been made to verify in which area the insects are more and we see that they do not have any type of affectation since they are in if natural environment nevertheless in the Transect of the intervened area there has been a reduction because the insects are more prone to the attraction of light by which, tends to be electrocuted or are even more likely to be consumed by other animals, however, in illustration 5 of the transect comparison gave a total in the transect intervened of 117 more than the transect of secondary forest which gave a total of 67 , due to the abundance of food found either by food discarded by people.

Conclusions (*optional*),

The transects for the collection of invertebrates is quite accurate for the study where the populations of insects are, these studies are necessary to recognize the change suffered by the species, this method is the most used for the study of abundance and diversity of invertebrates, one of the great advantages is that they can be collected in a period of time. With this system it was possible to collect using the techniques that allow us to preserve invertebrates for a long time.

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Author Contributions

All authors have the same contribution.

Conflicts of Interest

There is no conflict of interest of the authors.

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