



# EVALUATION OF THE BENTHIC MACROINVERTEBRATE COMMUNITY OF A SECTION OF ALTO JEQUITINHONHA (MG/BRAZIL)

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## INTRODUÇÃO

The cerrado covers the largest extent of the state of Minas Gerais and has an important role in the production of water. Its importance gives it the name of water box of the country due to the fact most of the major Brazilian river watersheds, extra Amazon, has their sources located mountains or plateaus of Minas Gerais (Saad, 1997).

The Jequitinhonha river watershed embraces an area of 70,315 km<sup>2</sup> and of this total one, 66.319 km<sup>2</sup> locates in the state of Minas Gerais. Human activities on the river Jequitinhonha and some of its tributaries have caused, according to the years go by, important changes in the hydrobiologic behavior of rivers (Gonçalves, 1997). The multiple human impacts such as mining, building dams, diverting the natural course of rivers; release of industrial effluents and untreated domestic, deforestation and inappropriate use of soil in riparian areas and flood plains, introduction of exotic species, among other have been responsible for deterioration of environmental quality of watersheds extremely important in Brazil (Rebouças *et al.*, 1999, Callisto *et al.*, 2002).

According Galdeano *et al.*, (2000), the study of the diversity of habitats is important in assessing the environmental conditions of aquatic ecosystems, providing the evaluation of human actions, which makes it an important tool in environmental monitoring programs (Callisto *et al.*, 2001; CORGOSINHO *et al.*, 2004).

Currently, the scientific community recommends that the benthic macroinvertebrates are good indicators, due to its characteristics of habitat associated with the sediment and low mobility, so that is always directly exposed to the impacts of changes to the place where they live. Regarding tolerance face to the environmental front, we can classify the benthic macroinvertebrates in three main groups: organisms intolerant, tolerant, and resistant (Goulart, M. & Callisto, M. 2003).

As in Brazil as in the state of Minas Gerais, the widely used

index to measure the degree of tolerance of macroinvertebrates is the Biological Monitoring Working Party (BMWP) adapted to the basin of the river Velhas by Junqueira & Campos (1998). The use BMWP is ideal for the survey of the conservation status of conservation of Brazilian aquatic environments for only demanding identification at the level of family because of a lack of taxonomic keys for specific groups (Corgosinho *et al.*, 2004).

In this context, to concern itself with the issue of quality and availability of water is of particular importance, considering its key role in survival and health of human populations.

## OBJETIVOS

The aim of this study was to characterize the benthic macroinvertebrate community of a portion of the basin of the Alto Jequitinhonha (MG), evaluating the distribution and composition in the sampled points and linking them with the results of the indices of BMWP.

## MATERIAL E MÉTODOS

- Location of the study

The Area of sampling of the study is located in the area of Alto Jequitinhonha between the municipal districts of Bocaiúva - district of Terra Branca - and Cristália, including areas of covering of the Serra of Espinhaço in Minas Gerais. The collections were distributed in four sampling points, being: the Point 01 in the river Jequitinhonha with the geographical coordinations 17th 13 45,9 S and 43rd 2 46,6 W in Earth White district of Bocaiúva, the Point 02 in Ribeirão Noruega (16th 52 15,9 S and 42nd 58 98,8 W), belonging to the municipal district Botumirim, the Point 03 in Ribeirão Corrente (16<sup>o</sup>56 67,2 S and 42nd 44 76,0 W) that cuts town of Mandassaia belonging to the municipal district of Leme

do Prado and the Point 04 in Ribeirão Superbo (16th 16<sup>o</sup>56 67,2 S and 42nd 44 76,0 W), belonging to the municipal district Cristália.

- Methods of collection

Six field collections were accomplished in the drought and rain periods among the months of March of 2006 to May of 2007. The community of the macroinvertebrates was sampled with a type collector Surber (Merritt & Cummins, 1996) with ray of 30 cm and each sample was composed by five sub - samples.

The sediment samples were conditioned in plastic bags and fixed in formol at 10% and properly labeled and taken for analysis. Later washed on sieves with apertures of 1000, 600 and 250 mm, sorted with the help of stereoscopic microscope and the specimens fixed in 70% alcohol. The material was identified to the lowest taxonomic level possible with the help of specialists and keys to identification.

- Analysis of data

To evaluate the community composition of benthic macroinvertebrates were calculated dominance of the occurrence of groups (% of individuals). As to determine the relationship of the community with the habitat, was applied BWMP index, which assigns values to each family based on their tolerance to impact. The values of this index vary between 1 and 10 and are allocated according to the sensitivity of the specimens organic pollutants. (Junqueira & Campos, 1998).

## RESULTADOS

- Inventory of the organisms:

The results of the qualitative analyses of the samples collected in the net of points of the study of the basin of Alto Jequitinhonha in March, April, June and November of 2006 and February, May of 2007 they are presented below.

At Point 01 the most abundant orders were Díptera (45%), being 57% of the Family Chironomidae and Ephemeroptera (23%), whereas Plecoptera represented less than 1% in the samples. In Rio Noruega (P.02) the most abundant orders were Diptera (39%) being 89% of the Family Chironomidae and Ephemeroptera (28%). Megaloptera represented less than 1% of individuals sampled. Point 03 in the order Diptera were more representative (69%) with 38% followed by the Family Chironomidae Ephemeroptera (18%) and the order Hemiptera represented less than 1% of individuals. In Ribeirão Superbo (P.04) the order Díptera obtained 61% being 77% of the Family Chironomidae, but the trichoptera reached 16%. It was noticed therefore that in the Point 01 there was the largest dominance of the larvae of diptera insects with 247 individuals and in the Point 04 the order Trichoptera with 57 individuals was the highest among the sampling points.

In work accomplished by Goulart & Callisto (2003), the family Chironomidae was sampled in waters of terrible quality and in relevant amount in that study. This family in general is resistant to lack of oxygen and has great ability to compete indicating a probable impact degree in this space of the river Jequitinhonha (DI GIOVANNI, 1996). According to Salles (2003) the families Baetidae and Leptophlebiidae

(Ephemeroptera) together represent 60% of Brazilian genres. It reinforces the data in this study, the two families were more abundant within the order Ephemeroptera, the place of study of the basin. According to Buss *et al.*, 2003 Trichoptera are observed in water bodies more preserved.

- Application of the index BWMP adapted

About the index BMWP obtained in the points, it was found that the best quality of water occurred at p.04 in April 2006 (BMWP = 56), corresponding to the "satisfactory" class. In contrast, the worst rating was recorded on p.03 that presented in November 2006 the value of zero BMWP, classifying as "very bad". This is justified by the environmental degradation resulting from traffic on the river chute of heavy vehicles of paving work the next point. This fact confirms the extreme relationship of the macroinvertebrates with the substrate that occupy (CALLISTO, 2001). The P.02 presented itself impacted but in smaller degree than P.01 P.03, presenting medium value of 34 of BWMP (Bad). And during study it was observed the aggravation of deforestation of the banks which led the decline the index over time. The P.03 had at the end of the study the smallest found medium value BWMP = 18,3. But the point was not sampled in May 2007 due to lack of physical access for the heavy rains this month, which probably influenced the outcome. The highest average value of BMWP was 37 classifying the point 04 as satisfactory according to the levels of water quality.

In all sampled points of the highest values of BMWP were found BMWP period of drought in April 2006 and the results were lower in the period of rain (02/2007). The low values obtained in May 2007 can be explained by the proximity to the period of rain, that water was late this year, and it is likely that there was not sufficient time for communities to restructure completely (SILVEIRA, 2004). Comparing the data of the composition of the taxon to the index BMWP noticed that in the collection of May of 2007 there was a medium wealth (that reinforces that the community presented a low amount of the individuals' structuring), and with low BMWP, demonstrating that those individuals are tolerant to the pollution, ie, of low 'score' in the index BMWP. As the family Sphaeriidae (Mollusca) that occurred in P.01 in this period, according to Junqueira & Campos (1998) in the index BMWP is a group of "score"03, ie, individuals resistant to pollution.

## CONCLUSÃO

The diagnosis made with macroinvertebrates as bioindicators that may reflect not only water quality but also the conditions and levels of disturbance of aquatic ecosystems concerning to water pollution due also to changes in the substrate caused by human action.

In a general way the index BMWP classified the values presented by the sampling points "bad" or "satisfactory" and not having any sample with classification "good" or "excellent". It is a warning sign for levels of quality of water. This reflected how impacted are the points sampled. More studies are needed, however, to propose appropriate environmental interventions to reverse the situation diagnosed.

Considering the direct inventory of the communities of the sediments the study answered satisfactorily, then obtained a list of species, not previously reported due to lack of studies of fauna associated to aquatic ecosystem of the basin of the Alto Jequitinhonha.

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