SOCIAL DEVELOPMENT INDEX OF LOCALITIES OF MAMIRAUÁ SUSTAINABLE DEVELOPMENT RESERVE, MSDR, AMAZONAS, BRAZIL.

ÍNDICE DE DESENVOLVIMENTO SOCIAL DAS LOCALIDADES DA RESERVA DE DESENVOLVIMENTO SUSTENTÁVEL MAMIRAUÁ, RDSM, AMAZONAS.

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KEY WORDS:

Social Development;

Rural population;

Amazon;

Sociodemography;

Social policies.

ABSTRACT

This study shows the Social Development Index – SDI of localities in Mamirauá Sustainable Development Reserve - MSDR, constructed similar to the Human Development Index – HDI, in order to assess quantitatively the social diversities of small rural population in the Amazon living in a unit of conservation. This index was constructed based on the economic, educational and social organization dimensions of these population groups. The study presents data from 61 localities inside this Amazon conservation unit, being 33 in the várzea (floodplains) and 28 in terra firme (uplands). The indexes were grouped in categories from 1 (better) to 5 (worse). The data refer to 2006 as the outcome of a specific socio demographic survey. The study contributes to assessments of public policies directed toward small Amazon populations in a historical perspective and in especial, to evaluate the results from environmental conservation policies.

PALAVRAS-CHAVE:

Desenvolvimento social;

Populações rurais;

Amazônia;

Sociodemografia;

Políticas sociais.

RESUMO

Este artigo apresenta o Índice de Desenvolvimento Social – IDS das localidades da Reserva de Desenvolvimento Sustentável Mamirauá- RDSM, Amazonas, Brasil, construído de forma semelhante ao Índice de Desenvolvimento Humano - IDH, com o objetivo de registrar quantitativamente as diversidades sociais de pequenas populações rurais amazônicas localizadas em uma unidade de conservação. Este índice foi construído com base nos indicadores que correspondem às dimensões econômica, educacional e de organização social desses grupos populacionais. O estudo apresenta dados relativos a 61 localidades dessa unidade de conservação amazônica, sendo 33 situadas em área de várzea e 28 em área de terra firme. Foram calculados os índices para cada dimensão e a média desses índices corresponde ao Índice de Desenvolvimento Social de cada localidade. Esses índices foram agrupados em categorias de 1 (melhor) a 5 (pior). Os dados referem-se ao ano de 2006 e resultam de um levantamento sociodemográfico específico. O estudo contribui para a avaliação das políticas públicas direcionadas às pequenas populações amazônicas numa perspectiva histórica e em especial, para avaliar os resultados das políticas de conservação ambiental.

INTRODUCTION

Social and demographic indices are important instruments for analyses of social change processes and systematic analysis of public policies. These indices, associated with the construction of specific indices have been increasingly used in technical and scientific analysis concerning socioeconomic differentiation among diverse population regarding the performance of social development models and forms of access by different populations to great advances in science and technology in modern society. For academic research, social and demographic indices are important analysis tools to deal with social theory explanatory models and with several aspects of empirical evidences identifying new issues to be explored on social investigation, both from the conceptual perspective and the formulation of new processes of observation on social phenomena.

An increasing number of index constructions, with methodological improvements and indicator comparisons of different dimensions, have surged as result of the creation of the Human Development Index – HDI. This index was inspired on the work of Amartya Sen (1993), an Indian economist, best known for his work on social policies focusing more on human than economic development. According to Professor Sen, the basis for human development are conditioned to expansion of human capabilities while performing their basic needs. According to this interpretation, economic prosperity must be one of the means to promote human satisfaction and not its priority. In 1990, the United Nations Program – UNDP published the Human Development Report presenting a methodological construction which permits to measure the levels of that development among the countries of the world. The aim was to make use of that index to record, throughout the years, changes in the levels of human development among the countries. Since then, a new yearly world report is presented ranking countries by levels of development confronting divergent possibilities of access to adequate condition of life provided by the knowledge of new technological advances.

The construction of this index proposes the combination of indicators with three dimensions: longevity, income and education. Each one of these dimensions contains between one and two synthetic indicators, measured with units of measurement and differentiated variation intervals. To unify the measure, the indicators are transformed into adimensional measures of magnitude 0 to 1, based on extreme normative values (JANNUZZI, 2001). The final HDI – is an index mean obtained for each one of the dimensions explored. The methodology has been improved throughout the years changing some indicators, but maintaining the same three dimensions and the same weight for each dimension in the final index accounting.

The great relevance of this index consists in the fact that the HDI made it possible to confront indexes of reduced longevity, high illiteracy rates and consumption patterns below the survival rate in population from several parts of the world in spite of great advances of science and technology in the medical field, production of knowledge and food. The recurrences of indices which identify the social differences, in its various magnitudes are very relevant for public debate and assessment of public actions. HDI-M – is the index used at

the municipal political level; privation indices – focuses more on the precarious observance of social rights; indices by gender and ethnic groups – identifies the variation of opportunities of access to social rights. These indices are just a few examples of information production expansion when monitoring processes involving civil society's demands.

By redefining the size of the development issue related to environmental conditions and concern with future generations, expressed in contributions for a sustainable development model, mutual efforts have been done to compose indices to measure indicators of economic and social development related to environmental protection and conservation. These indices have a special meaning in relation to areas to be designated as units of conservation. In that case, the indices contribute to public debate when discussing the results of actions directed toward new socio environmental practices. These practices include innovations in environmental code of conduct and experiments of natural resource management with new relations with the market, among others.

We present here a contribution to this debate using as main reference almost 20 years of experience with socio demographic studies to devise indictors with small population groups located inside Mamirauá Sustainable Development Reserve - MSDR in the Mid-Solimões region in the state of Amazonas.

MSDR is the first conservation unit considered a sustainable development reserve created in Brazil. It covers an area of 1,140,000 metric hectares with 181 localities and a population of 3.962 people (MOURA et al., 2012). The conservation unit, created in 1990, currently managed by Mamirauá Sustainable Development Institute, has undergone a set of social investments aimed to promote the sustainable development and better quality of life of the local population.

The study presents our proposal of construction of a Social Development Index - SDI created to identify the existing social diversity among the population groups living inside and around MSDR, serving as instrument to compare every five years the processes of social and environmental changes. Its methodology was based on the HDI, with changes to prioritize indicators of structural nature. The article shows the data analysis for 2006 in 61 MSDR localities. With this proposal, we hope to contribute with socio environmental studies and analysis of social investments directed to environmental analysis.

MATERIAL AND METHODS

According to Jannuzzi (2001) it is important that the construction of indicators used for academic research and assessment of public policies have some characteristics, in addition to the confiability of the data presented. These characteristics are: presentation of degree of population coverage, sensibility toward public policies being implemented; understood by agents and target public of public policies, updated periodically at feasible costs, be widely separable in geographic, socio demographic and socio economic terms, and have some historicity to enable comparisons in terms of time. In other words, indicators and indices with far-reaching measures, distinguish themselves for their intelligibility, accessibility, and specially for assuring the continuity of

registers in order to enable analysis of tendencies and variations for a number of years.

In this case, the indicators refer to social conditions of small rural population groups that we call "localities". Among the local population, these small localities are known as "sítios" (a small territorial unit) or communities. The population lives very scattered along the river banks and channels inside the Amazon forest and, most of them, have a recent history of social organization in a continuous relation with public sectors especially in areas such as education, environmental conservation and participation of families in income redistribution programs. The main characteristics of these population groups are: predominance of labor as family organization, an economy strongly influenced by environmental conditions, and use of rudimentary technologies, lack of basic sanitation and treated water use, lack of permanent electric power, and great dependency on large urban centers aggravated by limited access to health care centers located too far from the communities, poor communication, and very few mobility options.

Considering that the construction of these indicators is directed mainly to monitoring issues of social changes, among them, the most recent policies of environmental conservation for the region, the study consists of the presentation of information concerning the localities located inside the conservation unit, as well as those localities surrounding the reserve also affected by environmental issues and public policies.

For this study, the localities considered were those in the experimental area of installation of the conservation unit, which corresponds to 260,000 metric hectares. In 2006, the year considered as reference for this study, 61 localities with a population of 4,316 were registered. In this study, those localities are differentiated as localities of residents, corresponding to 33 population groups located within MSDR boundaries and its surroundings whose residents traditionally use the natural resources available in the MSDR territory, corresponding to 28 population groups.

The construction of the Social Development Index – SDI was done mainly to measure the characteristics of each locality in order to identify their social diversities and enable a five-year monitoring to check on social changes occurred since 2006. The data used for the index construction were obtained during the socio demographic census made with financial support from Mamirauá Sustainable Development Institute – MSDI[1].

The index consists of three dimensions, chosen for their implication with the necessary conditions to promotion of social development, considering the characteristics of the population being discussed. The dimensions are economic, schooling and social organization dimensions. The health dimension is not directly contemplated in the index due to difficulties in obtaining reliable data on the population's health conditions, at the local level, in order to consider them as indicators of this situation. Each dimension aggregates the respective indicators converted into indices. The SDI corresponds to the arithmetic mean of these indices.

[1]MSDI demographic census has been done since 1991. An institutional decision in 2001 established it every five years. However, only in 2006 the items collected were increased making it possible the construction of these indictors which will be monitored every 5 years.

The choice of the indicators resulted from a critical analytical methodology with the participation of MSDI professionals who have worked on the census at these localities for more than twenty years. That experience contributed to attain a good degree of adherence of the indicator to the situations studied. However, it is expected that this methodology undergoes revision and improvement while the data collection and investigation is being held.

We describe below the characteristics for each dimension with their respective indicators.

The economic dimension

In general, the main indicator of the families' economic situation is the per capita or the family income. However, it is difficult to record family income under economic conditions where, in most cases, the group survival depends on non-monetary income and where economic relations are not recorded reflecting the informality of a domestic economy accounting. In view of these limitations, we opted for a proxy resource that could translate the spending pattern of these domestic groups using durable goods expenditures as an economic indicator showing investment priorities in domestic and/or labor equipment as differentiations in their relation with the consumption market.

The methodology was defined using the following findings which resulted from observations of economic behavior in all localities under study throughout the years: a) Most non-monetary family income is the result of a free access to natural resources that guarantees basic food for the family; b) annual income oscillates throughout the year, due to the high seasonality of production for the market. These oscillations are sometime as high as 75%, making it very difficult to record average annual family income as a data resource of transversal nature, as is the case of the socio-demographic survey. As expected, the respondents of the study had difficulties to inform their average annual incomes; c) in all localities the amount of money supply in circulation has increased as a result of government rural retirement pensions and other income transfer programs, combined with an increase in the relations with the local market and the inclusion of *sustainable products* in the national market, among others. This increase in money circulation has boosted consumer spending of durable goods related to labor, leisure, domestic comfort and cooking. When we opt for the identification of *proxies* which show access to income without clearly identifying its origin, we are betting on the possibility of assessing social differentiations related to alternative methods of obtaining family income.

The unit of analysis in this case is the household itself. To construct the economic index the following consumption indicators related by items were selected: a) work equipment: two-stroke outboard engines, chain saws, manioc flour furnaces, sewing machine; b) leisure: TV set, DVD player, radio; c) domestic comfort: bed, table and chairs, sofa, refrigerator; d) cooking: gas stove. These indicators have been selected based on our empirical observation while monitoring the consumer spending priorities of the families as their domestic income increases. It is important to stress that housing improvement is a relevant indicator; however, due to difficulties in operationalizing this indicator objectively we excluded it from the

analysis. The index is related to the mean of the household per locality that owned a combination of these possessions. Thus, those localities with an index equal or near 0 are those whose households, as an average, had the fewest equipments. And, those whose average household indices are near or equal 1 own most of these consumer items.

To construct the index we used the Multivariate Statistical Technique, called Factor Analysis, using the principal component method to extract the factors through Varimax Orthogonal Rotation to obtain better combinations and using Latent Root Criterion to choose the number of factors to be extracted, which made it possible the construction of a specific index for each locality (REIS, 2001; BARROSO; ARTES, 2003; HAIR et al.,2005; SANTANA, 2005; MINGOTI, 2005; DILLON; GOLDSTEIN, 1984).

The construction of the index was done in three stages. During the first stage it was used the factorial analysis technique to extract factors and estimate the factorial scores to be used in the index calculus, which aims to rank the population groups or localities. The second stage consisted in using the explained proportion variance for each factor in relation to the total variance explained by the set of common factors, such as weight, associated to factor scores. The last stage consisted in ranking the index highest to lowest, and identifying the level of performance for each locality being assessed.

To facilitate comparison of the indices of a locality in the various groups the index base was transformed, that is, the factorial score was standardized (PF) to obtain positive values from the original scores and permit to rank the localities, so that the values of the estimated index fall between 0 and 1.

The following formula was used: $PF = \left(\frac{F_i - F_{\min}}{F_{\max} - F_{\min}} \right)$ where $F_{\min}$ and $F_{\max}$ are maximum and minimum values observed for the factor scores in all localities.

The dimension of schooling

The right to access to knowledge and information is one of the main conquests of democratic society, as long as it is the main route to exercise human capacity to make decisions and express the many possible ways to solve its problems. People education, including development of reading and writing skills is the fundamental stage to guarantee this right and essential condition to human and social development promotion. In general, that process occurs at school and is ruled by a set of public policy measures that, unfortunately, still have a limited presence in small rural populations in the Amazon region.

Usually, dimension indicators of schooling are related to illiteracy rates and gross and net rates of schooling that measure the capacity to absorb the school age population by the local school system considering variations by age in relation to the classes the students are attending. These indicators are constructed based on school information provided by the state school systems at rural and urban levels. In those systems, data related to small rural population groups are included within a general rural group, thus hindering an analysis at this level.

During our contacts with the MSDR localities we observed precarious and irregular information on population's schooling, both at the local and the municipal level. On the other hand, most

respondents informed that their *children were going to school, but could not read at all,* indicating that, in this case, the gross rates of schooling were imprecise. In view of these findings, we opted as indicators to construct the schooling dimension rate the reading ability of the population above 10 years of age and, specifically the indicator for the 10 to 14 age bracket. Thus, we took into account reading tests taken voluntarily by the population present during the home visits to record the socio demographic data in 2006. Based on the data collected, the percentages were calculated by age group and the index constructed, as specified below.

During the index construction we decided to give more weight on the schooling condition of the young population. First, because the youngsters' schooling level is that has reflected more precisely the general situation of the educational system during the past years. Second, these data show changes in the education and training of the future adult population, and their possibilities when entering other labor activities considering that new opportunities today have been increasingly selective concerning people education level.

Reading skill index of young people aged 10 -14 years

(Percentage (%) of those who can read at that age bracket) – 0% (lowest value) / 100% (highest value) – 0% (lowest value)

Reading skill index of the population above 15 years of age

(% of those who can read at that age bracket) – 0% (lowest value) / 100% (highest value) – 0% (lowest value)

Schooling index:

2/3 (Reading skill index of young people aged 10 – 14 years) + 1/3 (Reading skill index of the population above 15 years of age)

In this case, the unit of analysis used for the study was those individuals above 10 years of age.

The social organization dimension

One of the main characteristics of the processes of social development concerns the population's ability to organize socially which means a set of individual efforts to achieve the collective well-being. In small population groups those efforts gain a specific dimension where generally, for reasons of demographic nature, few people assume a large share of responsibility on problems solving of the population. Another important factor that should be stressed is the growing dependence on the adequacy of these populations to formulation of regional and national public policies to continuous access to government and financial resources to meet educational, health care, political representation demands and participation in the commercialization market of products originating from a conservation unit. Those demands gain special attention when associated to forms of participation in projects related to sustainable development.

In general, what is strongly associated to the construction of an ideal organized population is its recognition as a legal entity, which is done with the creation of an association with well-defined rules, statutes and forms of representation and exercise of this representation, also meaning its recognition in relation to the municipal jurisdiction, being that the base unit of its legal entity. It is from that condition, in the configuration of constitutional

rights, that the demands for education, health care, social security, poverty reduction among others are dimensioned.

When defining the social organization dimension of the small population groups, as one of the elements to construct the social development index, we considered social differences in relation to this social condition.

We selected as indicators of social organization for each locality have community association, school, community center and health agent. This choice is justified by the following findings: a) a community association which is a condition to have the population legally recognized, so that it may claim the construction and maintenance of a school, installation and maintenance of a local electric power plant, participation in commercial transactions, among others; b) a public elementary school, as a result of a set of negotiations with the municipal authorities to guarantee its construction and maintenance that may also offer courses for adults and young people; c) a community center, as a result from a collective effort, where cultural and political expressions may occur; d) a health agent, meaning that the locality is formally included in the network of social programs and health care provided by the local municipal secretariats of health.

Under this dimension the unit of analysis is the locality. The index construction was formed by giving the same weight for each indicator, and the scoring were distributed with values 0 to 1, for each locality, to keep the comparability with the other indices.

Social organization index:

The presence of a community association = 0,25 + a community center = 0,25 + a school = 0,25 + a health agent = 0,25; Total = 1

The Social Development Index

The composition of the Social Development Index has the following format:

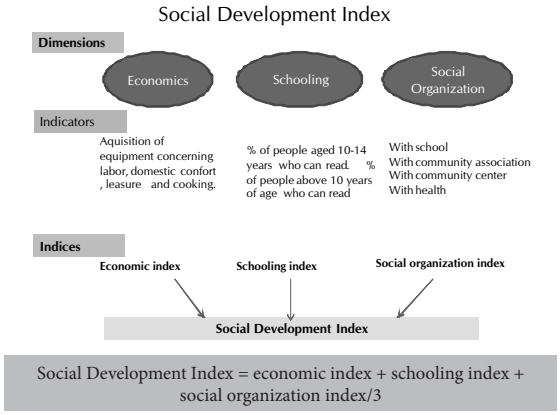


Figure 1 - Composition of Social Development Index

RESULTS

The composition of specific indices and the general index was done with the differentiation of the data by community localities, ***várzea*** (floodplain) environment, and Mamirauá users' localities predominantly in ***terra firme*** (uplands). This differentiation is necessary because they have strong influences on the socio environmental conditions of these localities and consequently, in the life of these populations.

As expected, the data show a difference in ranking for the localities according to their economic dimension, schooling and social organization. Those localities with better economic situation do not show the same situation in relation to schooling, even though they have the same level of social organization

Based on the distribution of specific indices and Social Development Index - SDI, it is possible to make a difference by categories with the lowest and highest index, making it possible better comparative measures. Thus, we set the following categories according to the respective scores, being level 1 the highest and level 5 the lowest:

Figures 2 to 4 below show the % distribution of localities for each dimension explored and the Social Development Index / SDI. Figures 7 and 8 show the rankings for each locality, residents and users, concerning their performance for each index in relation to SDI.

Level 1 = score from 0,801 to 1,000
Level 2 = score from 0,601 to 0,800
Level 3 = score from 0,401 to 0,600
Level 4 = score from 0,201 to 0,400
Level 5 = score from 0 to 0,200

Figure 2 - Score distribution by levels 1 to 5

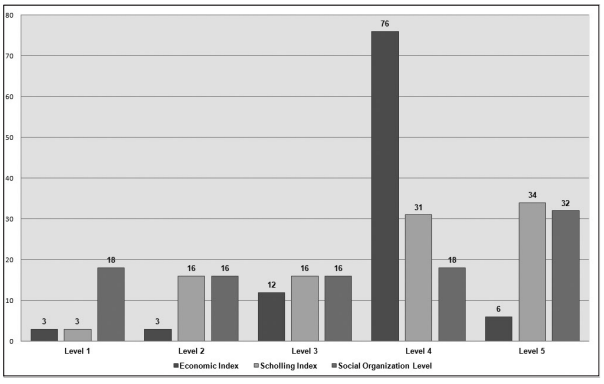


Figure 3 - Percentage distribution of localities relative to economic, schooling and social organization levels, according to groupings, being 1 = the highest level and 5 = the lowest level among MSDR residents' localities, 2006.

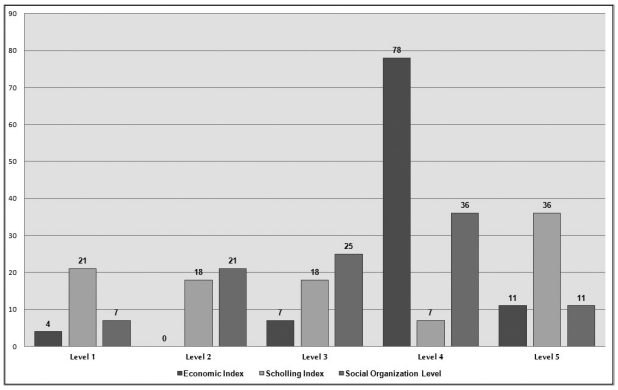


Figure 4 - Percentage distribution of localities relative to economic, schooling and social organization levels, according to groupings, being 1 = the highest level and 5 = the lowest level among MSDR users' localities, 2006.

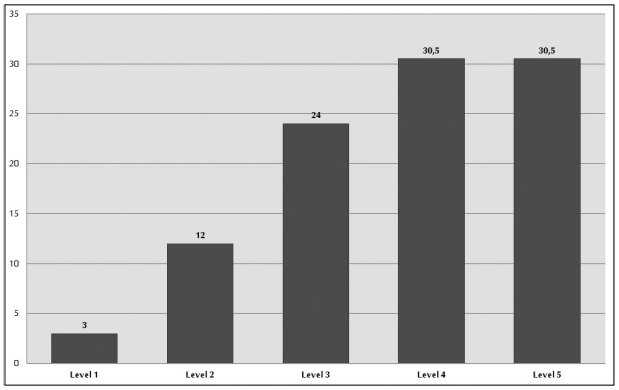


Figure 5 - Percentage distribution of localities relative to social development level, considering 1 as the highest level and 5 the lowest. N = 33 MSDR residents' localities, 2006.

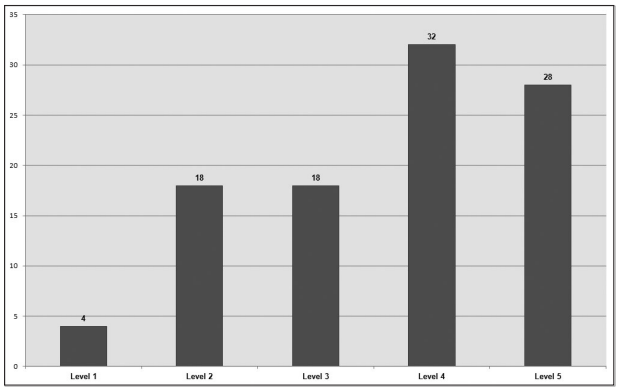
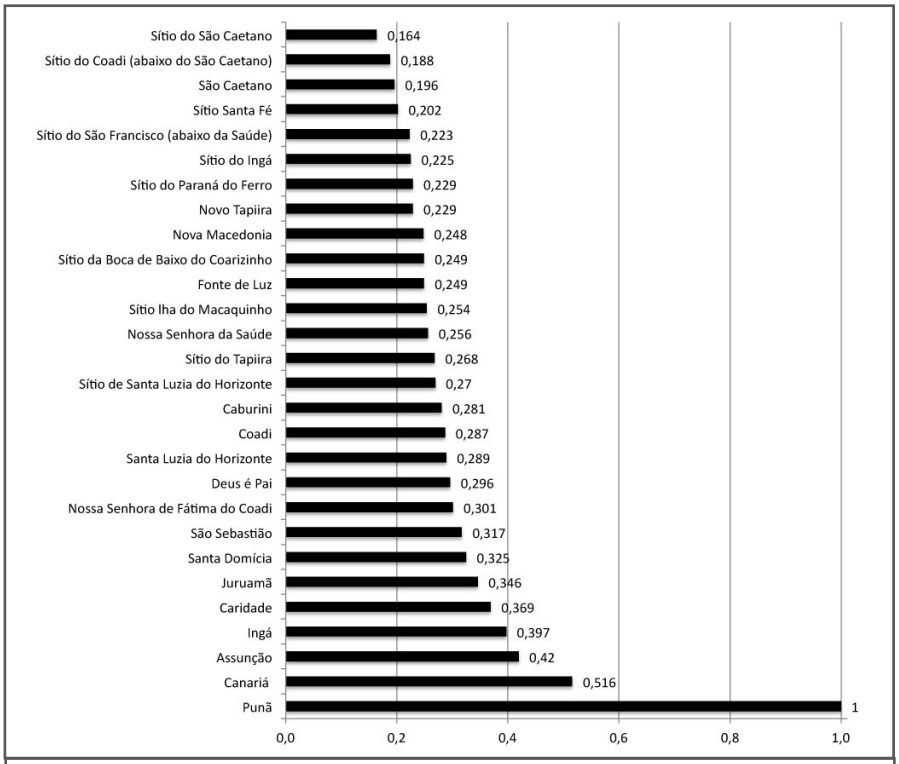


Figure 6 - Percentage distribution of the localities relative to social development level, considering 1 as the highest level and 5 the lowest. N = 28 MSDR users' localities, 2006.



Economic Index, MSDR residents' localities, 2006

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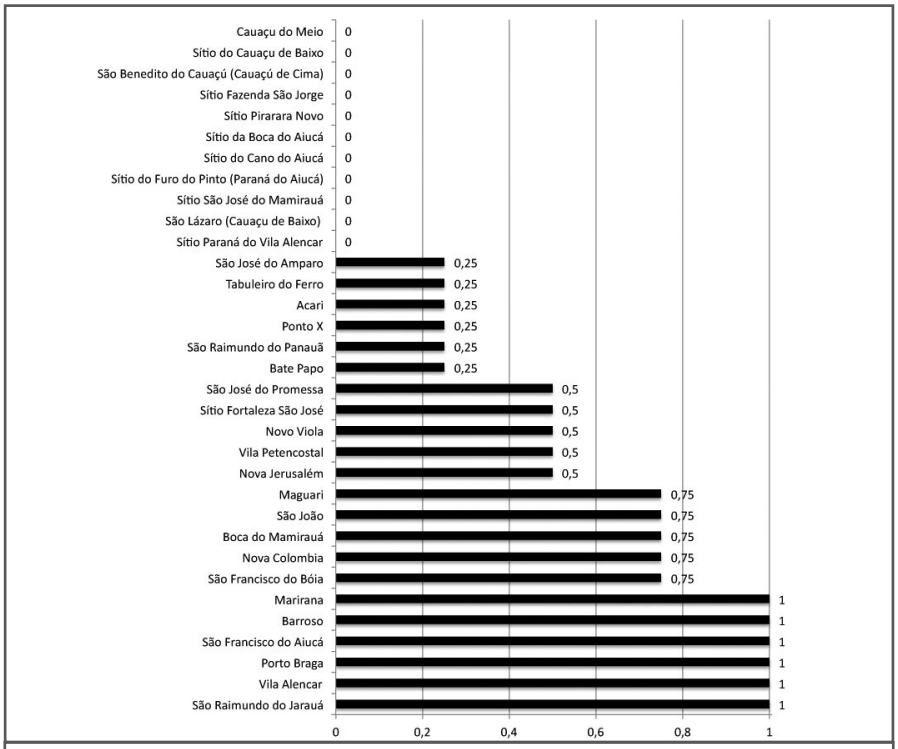

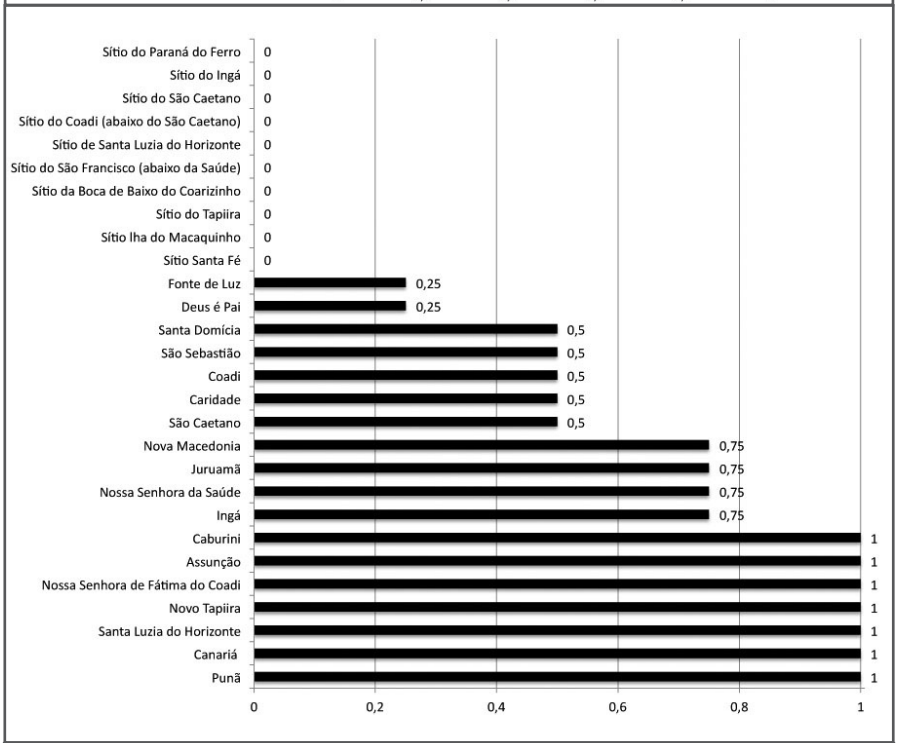

Social Organization Index, MSDR residents' localities, 2006

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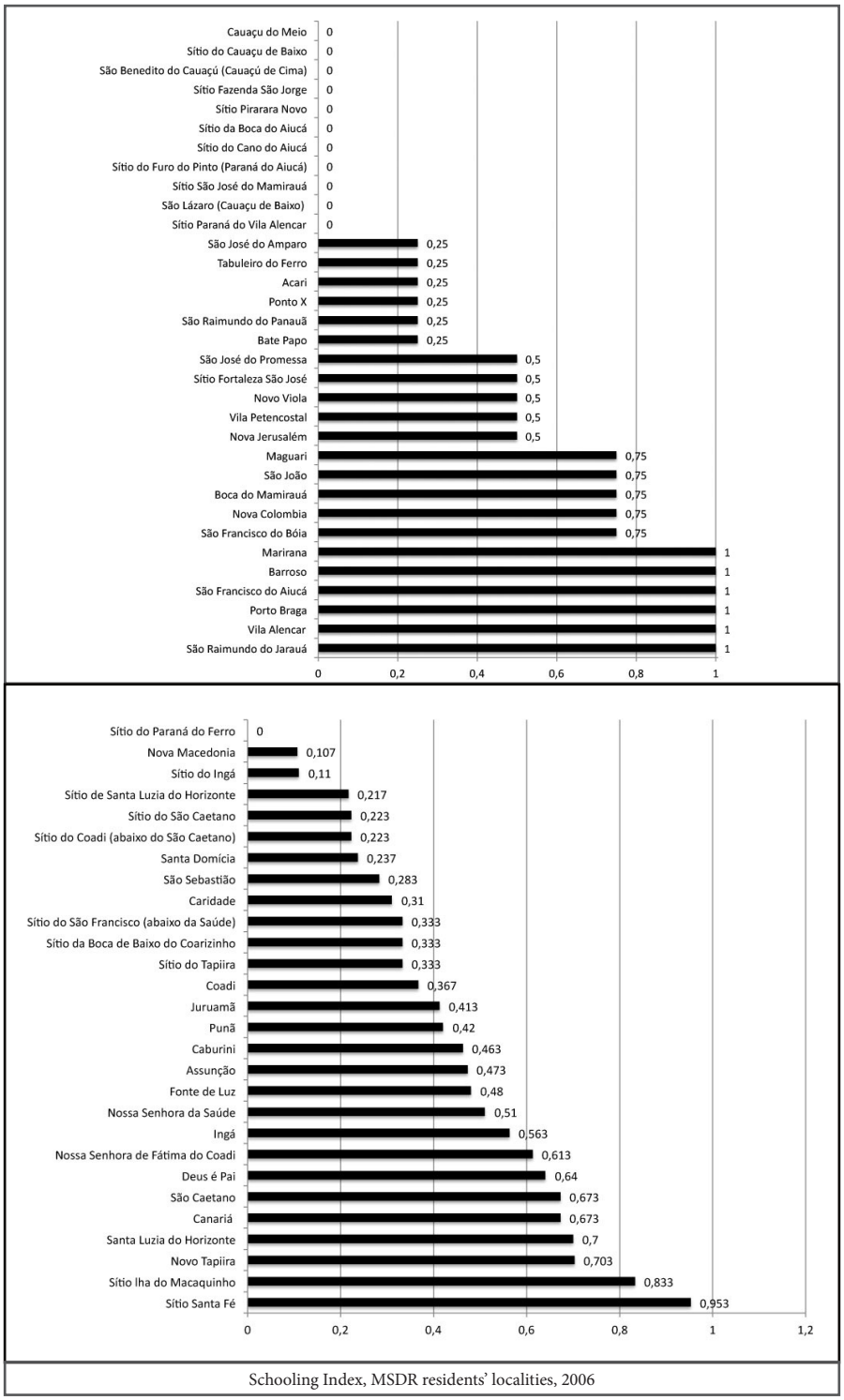

Figure 7 - Distribution of economic, schooling and social organization indices, by MSDR resident's localities, 2006 (n = 33) and MSDR users' localities (n = 28) 2006.

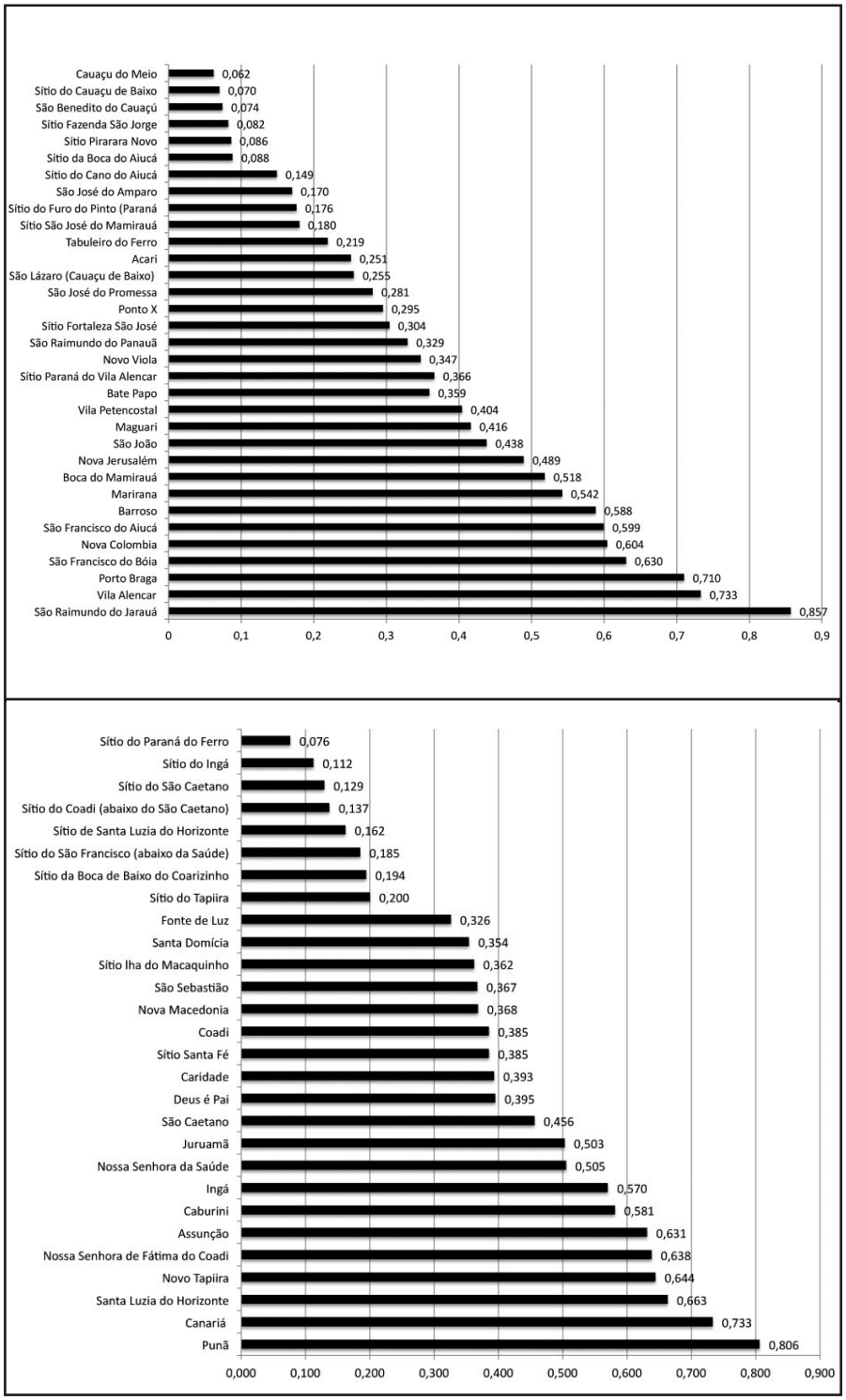

Figure 8 . Distribution of Social Development Index for MSDR residents' localities (n = 33) and MSDR user's localities (n = 28). 2006.

DISCUSSION

The economic index revealed a large concentration of population groups at levels 4 and 5 relative to the worst economic conditions, being 82% for MSDR residents and 89% for its users. The best situations (levels 1 and 2) occurred only in 6% of the *"varzea"* localities and in 4% of *"terra firme"* population showing equivalence between the former and the later concerning the best economic conditions among the population groups. At level 3, it applies to 12% of the *várzea* localities and only 7% of *terra firme* localities. Considering distribution at level 5, with the most critical economic situation, the *várzea* population correspond to 6% while the *terra firme* population consist of 11% of the total localities.

The fact that the localities inside the *várzea* show a smaller proportion in the lower indices of economic dimension in relation to those in *terra firme* surprised us due to recurrent references to the precarious economic conditions of the *várzea* residents in relation to *terra firme* inhabitants. Such precarious situations are always associated to continuous losses of labor equipment, animals, crops and other sources of income during long period of river floods which directly affect the *várzea* residents. These localities are also economically damaging during dry seasons due to increasing difficulties and costs to move production to the market (MOURA, 2007; PERALTA et al.,2009). Apparently, the relative better condition of the families in the *várzea* owes to social insertion programs into the ecological market developed in some MSDR localities which resulted in income increase for these families (MOURA, 2009), and to several governmental programs of income redistribution and social assistance. After analyzing the distribution of this index among the various MSDR resident localities it becomes evident that the best scores correspond to localities with the best indices of social organization with continuous and significant social investments from sustained management of natural resources which favor them in relation to a continuous participation in the market for ecological products (MOURA, 2007; 2009).

In relation to conditions of lesser economic performance among the various localities, these differences seem to be strongly associated to the number of years of existence of the locality, its demographic characteristics with smaller population concentration, its reduced social organization (predominantly "sitios"). The studies on demographic dynamics in the *várzea* stress the occurrence of one or more movings by these population groups in a period of two generations, caused by geomorphological changes (ALENCAR, 2011; ALENCAR, 2007; LIMA; ALENCAR, 2001).

The schooling index presented better distribution among the best levels (1 and 2) when comparing with the economic index. The data indicates that 19% of *várzea* localities and 39% in *terra firme* showed better performances for this index, at levels 1 and 2 of this distribution, showing here a better schooling condition of residents in the *terra firme*. However, the fact that 65% of *várzea* localities and 54% in *terra firme* showed low schooling level (4 e 5) indices is an indicator of the poor presence of public policies concerning education for these rural populations.

The social organization level also presented a greater concentration among the levels of lesser performance (4 e 5), corresponding to 50% of

MSDR várzea localities and 47% among *terra firme* residents. Those with the best performances, at levels 1 and 2 correspond to 34% of várzea localities and 28% among MSDR users. This index, when distributed by locality (Figure 7) stresses the direct relation between the best indices and the identification of the locality as community and the lowest indices are related to localities such "sitios" where the concentration of houses is smaller.

The Social Development Index summarizes this distribution. Figure 8, shows clearly that only 15% of MSDR residents and 22 % of reserve user localities are included at levels 1 and 2 of this classification. At the lower levels of social development are localities with similar situation, 61% of them among Reserve residents and 60% among localities using the Reserve. The reserve users localities scored better because they have better access to schooling conditions promoted by municipal policies of education.

CONCLUSION

It is intrinsic characteristic to the use of social indicators to provoke new questionings and incite new theoretical reflections. We have presented in this study indices and indicators based on experiences registering socio demographic data regarding small population groups in order to establish comparative measurements in relation to social responses to various local interferences from public policies and management of a conservation unit throughout the years. We hope that the continuation of new data records and qualitative analytical studies concerning themes derived from these provocations bring important contributions for revision and formulation of public policies that meet the social development of small populations in the Amazon.

ACKNOWLEDGMENT

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