

# Adjusting the Capital Index (ICS), to the Population of Santarém-Pa, It's Capacity for Mobilization and Political Action the Environmental Exposure to Mercury

Enilson da Silva Sousa<sup>1</sup>, Marcelo Augusto Machado Vasconcelos <sup>2</sup>, Denison Lima Correa<sup>3</sup>, Joaquim Carlos Barbosa Queiroz<sup>4</sup>, Dulcidea da Conceição Palheta<sup>5</sup>

<sup>1</sup> University Federal of Para, BRAZIL  
Email: [prof.enilson@gmail.com](mailto:prof.enilson@gmail.com)

<sup>2</sup> University Federal of Para, BRAZIL  
Email: [Vasconcelos@ufpa.br](mailto:Vasconcelos@ufpa.br)

<sup>3</sup> University Federal of Para, BRAZIL  
Email: [denison.lima.correa@gmail.com](mailto:denison.lima.correa@gmail.com)

<sup>4</sup> University Federal of Para, BRAZIL  
Email: [joaquim@ufpa.br](mailto:joaquim@ufpa.br)

<sup>5</sup> University Federal of Para, BRAZIL  
Email: [deiapalheta@hotmail.com](mailto:deiapalheta@hotmail.com)

**Abstract**— Until the mid-1980s, the scientific literature focused on the environmental issue, particularly in the Brazilian Amazon, attributed the mercurial contamination, the anthropic action, especially the mining activities. The region of Santarém, in the state of Pará, was chosen to conduct this research because it is at the center of the discursions of mercury contamination in the Amazon. The objective of this study is to analyze the perception of risk to mercury contamination in the population of Santarém, with the application of Integrated Questionnaires to Measure the Social Capital Index - QI-MCS proposed by the World Bank. The methodological procedures were based on the application of structured questionnaires in open and closed questions, through individual interviews, which addressed several aspects related to groups and networks; trust and solidarity; collective action and cooperation; information and communication; cohesion and social inclusion; authority or capacity building and political action; mercury contamination. In order to determine the ICS, variables that express interpersonal relationships among community members were considered as well as their participation in participatory and cooperative associations. It is concluded that the risk is underestimated by the local population, since it does not have enough information regarding the mercurial

contamination and actions taken by the State to prevent this type of accident.

**Keywords**— Contamination, Amazon, Participation, Economy.

## I. INTRODUCTION

The Social Capital Index (ICS), defined first by Pierre Bourdieu as "the aggregate of actual or potential resources linked to the possession of a durable network of more or less institutionalized relations of knowledge or mutual recognition" (Bourdieu, 1958), apud PORTES (1998)), will be analyzed in this work, where its assessment to the population of Santarém, state of Pará, Amazonia Brazil, was evaluated to measure the mobilization capacity and political action, when exposed to an environmental risk, in the case the mercurial contamination.

For Bourdieu, this idea arises in an attempt to overcome the focus of traditional economic theory that fixes its eyes and attention only on economic and human capital, disregarding other forms of social exchanges, citing (HIGGINS, 2005). FIALHO (2004), affirms that every individual action makes possible the mobilization of the social structure, making possible an individual and collective gain. This would be a resource available only to the privileged classes, while the lower classes would be

deprived of this power within the corporate structure. However this fact can be inferred because of its position in the social pyramid, says Bourdieu.

Capital emphasizes the fact that non-monetary forms and relations can be important sources of power and influence, even when current literature shows that, because the concept is understood and evaluated in different ways, many criticisms have been made about its use (PATTUSSI, 2006). It is difficult to gauge, because it is lodged in the relations between individuals and individual groups. From the ideological point of view, social capital can be the empowerment of citizenship, pluralism and democratization.

Within this perspective, we will adopt the point of view of COLEMAN (1990), where social capital manifests itself through cooperation networks and norms of collective reciprocity, in order to propose public policies aimed at meeting demands of the local population regarding access to information, prevention and control of possible mercury contamination in the research area. This situation is only possible because the individual is immersed in a network of dense social relations, according to this author.

However, most of the time, the concept of social capital is used as an analytical category that seeks to explain how individuals and collectivities have access to differentiated resources in society. More specifically, it seeks to understand how different networks of relationships are articulated, which can bring individual or collective benefits, even though it originates in a network of

relationships, and is an individual attribute that allows access to resources differentiated not only from nature but also those referring to social status - symbolic capital - and cultural goods - cultural capital. (VENEROUS, 2014).

The objective of this research is to test the proposal to measure the social capital index from the Integrated Questionnaire to Measure the Social Capital Index - QI-MCS, proposed by the Working Group on Social Capital of the World Bank in 2008. Applying this methodology may be the tip of the lance and an alternative to measure the social capital of a population, with this, to detect the organizational capacity and mobilization in the face of extreme events that could compromise their corporate organizations, collective welfare, measure their mobilization and action power environmental exposure to mercury.

## II. MATERIAL AND METHOD

The municipality of Santarém, is located in the region of the mouth of the Tapajós river, confluences with the Amazon river, mesoregion of the Lower Amazon and the microregion Santarém in the western portion of the state, coordinates 02° 25' 30" S and 54° 42' 50" W Gr, (IDESP / SEPOF-Pa, 2011) (Fig. 1), in Fl. SA.21, RADAM Project, 1976. According to IBGE, for the year 2010, Santarém has a population of 294,580 inhabitants, an area of 22,887 km<sup>2</sup> and a population density of 12.8 inhabitants per km<sup>2</sup>.

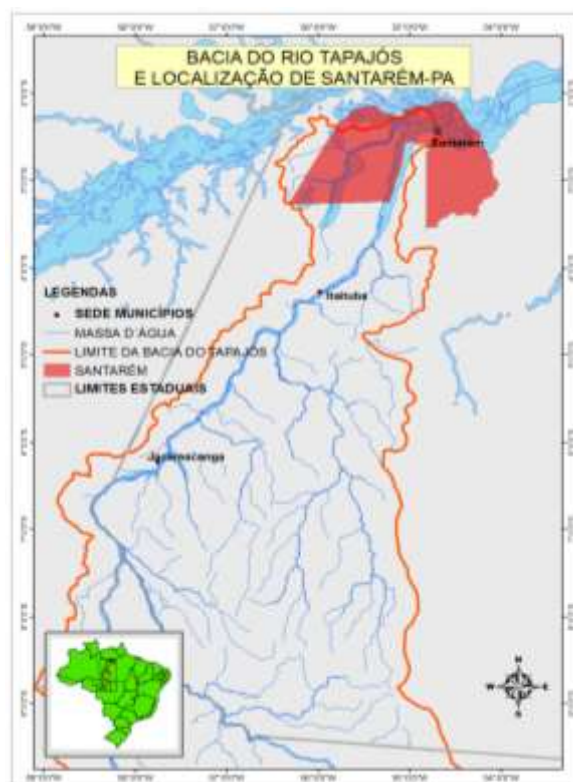


Fig 1. Map of the location of the Tapajós river basin and the area of the municipality of Santarém.

**Methodological approaches**

The following steps describe the methodological procedures that aim to establish a sequence of activities aimed at deepening and analyzing the presence of social capital in the municipality of Santarém-Pa., Which included a bibliographic review; fieldwork and application of Integrated Questionnaires to Measure Social Capital - IQ-MCS, of the World Bank; statistical approaches and data analysis.

**Calculation of the Capital Stock Index (ICS)**

In the calculation of this index, the responses of 139 individuals interviewed in the communities of Cucurunã, São Brás, Alter do Chão, Arapixunas and Santarém urban area from July 18 to 28, 2014 were considered. In order to measure social capital, questionnaires with 34 questions with the following variables: Groups and Networks; Confidence and Solidarity; Collective Action and Cooperation; Information and Communication; Cohesion and Social Inclusion; Empowerment and Policy Action and Hg Research Register.

The Mercury Register was not originally included in the World Bank's IQ-MCS, however, it was added by the authors to try to visualize how the respondents' perception in this regard is. Seven questions were proposed: 1) In your opinion, which environmental problem is most relevant in your city? 2) How did you become aware of mercury contamination? 3) What activity do you consider responsible for the mercury contamination in the area? 4) Do you have confidence in the governing bodies responsible for the management of contaminated areas? 5) Have you ever had a miscarriage during your fertile life? (Applicable to women of childbearing age); 6) What is your main source of protein? 7) How many days of the week do you consume this type of food? All proposed questions were idealized and based on a theoretical framework on the subject of mercury. From that point on, quantitative data were generated on the various faces of the social capital evaluated.

The six dimensions of IQ-MCS (Integrated Questionnaire to Measure Social Capital - WB)

Based on the World Bank's Thematic Group on Social Capital, GROOTAERT (2009), the six dimensions of the World Bank's IQ-MCS were measured and analyzed to measure social capital, which can be summarized as follows:

1) Groups and networks - considers social participation in social organizations, formal and informal networks and

feedback of these relationships. The Network would be the various daily friendship relationships of the individual or organizations, usually known as the network.

2) Trust and solidarity - this item seeks to elicit data on trust in individual relationships between extrafamilial elements, service providers and their variations over time.

3) Collective action and cooperation - this category investigates the working relationships of household members and the community in joint projects and / or joint responses to a crisis and consequences of non-compliance with the expectations generated by such participation. In this case, we will consider environmental contamination by Hg, a central theme in our research.

4) Information and communication - access to information as a central theme to help impoverished communities to have an active voice in matters related to their well-being (World Bank, 2002, apud Grootaert, 2009). Especially information on markets and public services.

5) Cohesion and social inclusion - seeks to identify social relations between co-opted individuals and their everyday relationships within and outside their social niche. Which groups are excluded from essential public services, taking into account their social interactions.

6) Authority or empowerment and political action - here the empowerment, or empowerment of the cooperative and capacity to act together is observed and quantified.

These variables served as indicators to form the ICS in the Tapajós bay environment, all applied in the five communities at random and based on previous surveys of social capital, and contributions of the authors to observations of issues related to this problem.

**Location of IQ-MCS application points**

The choice of places to be applied the IQ-MCS was not by chance, the urban area of Santarém, was chosen because it is the municipality directly associated with contamination by this metal; the Alter do Chão Village, functions as an important tourist pole, in the scenario, state and national, therefore, an area directly impacted with possible dissemination of environmental contamination by Hg; the community of Arapixunas, located in the same hole, has its protein base in fish consumption, besides receiving seasonal influences from the waters of the Amazonas and Tapajós rivers, as well as communities along the Everaldo Martins Highway (Santarém-Alter do Chão), an area known as the *Eixo Forte*.

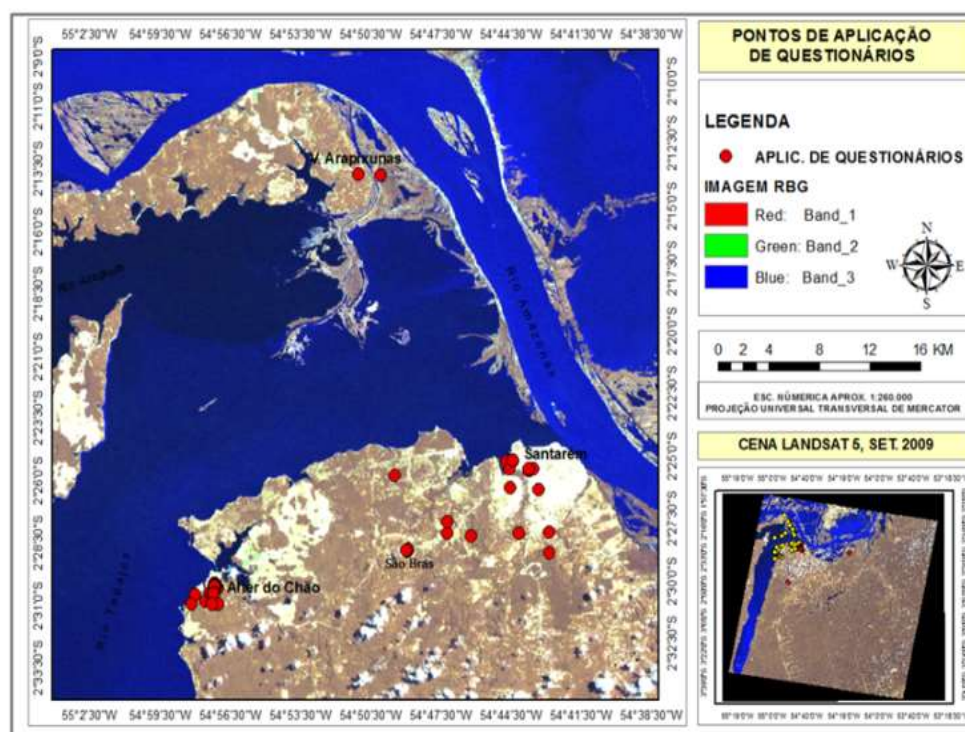


Fig. 2: Location of the points of application of the questionnaires in Santarém.

The Social Capital Index (ICS) considers variables that express interpersonal relationships among members of the locality, as well as their participation in participatory and cooperative associations. The Social Capital Index is mathematically defined as (Pinheiro and Mendonça, 2008) and Moreira, (2009):

$$ICS = \frac{1}{n} \sum_{j=1}^n \left[ \frac{\sum_{i=1}^m E_{ij}}{\sum_{i=1}^m E_{max,i}} \right] \quad (1)$$

The contribution of each variable (or indicator) in ICS is given by,

$$C_i = \frac{\sum_{j=1}^n E_{ij}}{\sum_{i=1}^m \sum_{j=1}^n E_{max,i}} \quad (2)$$

ICS: Capital Stock Index

$E_{ij}$ : score of the  $i$ -th indicator obtained by the  $j$ -th interviewee

$E_{max,i}$ : maximum score of the  $i$ -th indicator

$C_i$ : contribution of the " $i$ " indicator in the Social Capital Index

$i = 1, \dots, m$ : number of indicators

$j = 1, \dots, n$ : number of individuals interviewed

The value of the Capital Stock Index ranges from zero to one, with 1 being the highest level of social capital accumulation, while zero represents the lowest level:

-  $0 < ICS \leq 0,5$  means low level of capital accumulation;

-  $0.5 < ICS \leq 0.8$  means average level of capital accumulation; and

-  $0.8 < ICS \leq 1.0$  means high level of social capital accumulation.

### III. RESULTS OBTAINED

The calculated Capital Stock Index was 0.810 which corresponds to a high level of social capital according to the scale that classifies the level of accumulation and described above. Table 1 shows the participation of the indicators in the constitution of the ICS.

Table.1: Absolute and relative participation of ICS social capital indicators.

QUESTION / INDICATOR		$C_i$	$C_i$ (%)
1.	7. Provision of other people to offer money on loan	0,025543	1,683
2.	9_A. People willing to help	0.032943	1,683
3.	9_B. Chance of someone taking advantage	0,038195	2,783
4.	10_A. Trust in local government members	0,064693	4,644
5.	10_B. Trust in Central Government Members	0,066842	6,568
6.	10_C. Trust in members of the state government	0,068274	8,533
7.	14. Cooperation in water supply problems	0,027333	9,320
8.	17. Differences between the characteristics of people	0,047267	10,68

9.	23.	Feeling about crime and violence	0,035450	11,70
10.	24.	Feeling of happiness	0,029124	12,54
11.	25.	Ability to change life	0,066126	14,44
12.	26.	Number of times people asked for the community	0,341370	15,42
<b>ICS</b>			<b>0.810</b>	<b>100.00</b>

Those responsible for the lowest level of social capital accumulation of the items presented were the willingness of others to lend money, people willing to help, chance of someone taking advantage of third party, and trust in local government members. On the other hand, the indicators that contributed the most to increasing social capital accumulation were the number of times people asked for community, the ability to change lives, feelings of happiness and feelings about crime and violence. This indicates people willing to strive for collective well-being (altruism to be taken into account), great capacity to face changes in their lives, high satisfaction and happiness, and people with a personal capacity and a high degree of sociability of people living in the community in localities.

#### **Descriptive analyzes of IQ-MCS dimensions**

The values not stated in the percentage of each category, then, refer to individuals who did not know or did not answer the questions in each item analyzed. In these results are presented only the most significant categories for conclusion of the research, as we will see next.

In the Groups and Networks category, most respondents reported that they belonged to the same social group, 61, 87% of the community, against 25.17%, who state otherwise. However, in the item religion, only 39.56%, say they belong to the same religious denomination, against 49.64%. Attention was drawn to the responses related to identification by ethnic-racial groups, none, declared of the Black race, according to the IBGE denomination, (2008), while 43% declared themselves Pardos and 35.25%, Indigenous and other 17, 9%, are presented without declaration (Table 2).

*Table.2: Table of the category Groups and Networks, representing the thinking of the members of the groups related to Identification by Race / Ethnicity.*

Thinking about the members of this group, most of them are from the same group			
Identification of responses (ETHNIC GROUP)		N. ABSOLUTE	%
01	White	03	2,15
02	Black	00	0,0
03	Yellow	02	1,43
04	Brown	60	43
05	Indigenous	49	35,25
06	No declaration	26	17,9

Regarding the occupation, the interviewees belong to the same occupational branch, 64.74%, against 24.17%, and the same social class. The schooling presents a significant difference, 40.60%, stating that they do not have the same level of schooling as the other members of the family group. This statement may be related to the increase in social achievements reached by the lower class population, including access to formal education

Among those surveyed they occasionally work outside their communities, being this their main space where they develop their economic activities, 55.39%. This situation corroborates, for the degree of confidence among members, who occasionally declare (33.81%), talk to each other about particular matters or when they need help; another 41.44%, say they often use this habit. They even declare that they have one to five people of confidence in their range of action 51.79% of the ears.

Another 62.58% said that if they needed a small amount of money, these members would be willing to provide them.

In Confidence and Solidarity, when asked about the level of trust among group members, they say they trust themselves, but 79.85% say they can never be too careful. This item questions the degree of relationship and trust between individual members, directly related community and

In this category, participation and trust in local, state and central (federal) government members were also evaluated and in both cases the evaluation was not very receptive. Regarding the local government the trust index, I totally trust or trust very much, they were below 10%, while I trust very little, with 47.48%, almost half of those interviewed

In relation to the members of the state government, the indexes are worse, 0,0% and 5,03% of the respondents declare to totally trust or to trust in the government. On the other hand, 53,95% are very close to the actions of the state government. Representing a high rate of population rejection and approval

The central government evaluations are also not the best, being very close to the rejection rates of the state government, with 0.0% and 7.19%, for I totally trust and trust a lot, respectively 49.64%, I very much trust little

In Collective Action and Cooperation, the response of the communities, their participation in collective activities, aimed at the common good, were evaluated, as if they would be willing to work on solutions to a possible problem of water supply, even if it did not reach it. The responses were very satisfactory, with a rate of 61.14%, two respondents stating that very likely, would help solve the problem.

In Information and Communication, the number of telephone calls received by individuals and the main and most important sources of information about what governments are doing for the common good of the population were considered. Television and radio are still the main means of communication, which socialize the actions of governments to society, with 22.06% and 20.62%, respectively, even when it is opportune to choose more than one vehicle in the total of three sources of information.

Cohesion and Social Inclusion, in this modality the interviewee is given the opportunity to evaluate the differences in characteristics between people living in the same neighborhood or locality. For example, differences in income, social position, ethnic origin, race, caste, or tribe. They were also able to take into account differences in religious beliefs, politics, age and sex. In this respect, significant differences that could generate some disturbance in the collective were not identified by the groups. Among the questions proposed in the questionnaires are: difference in education, land tenure, wealth / material possession, social position, between men and women, generations, new and old residents, political affiliation and religious belief. There is a balance from the point of view of the interviewee.

When asked how they feel about crime and violence when they are alone at home? The results go beyond the standards of large urban centers, as 38.13% of respondents said they felt very safe and 35.25%, Moderately safe, only 7.91% were very insecure. Showing the relationship of trust between members of social groups and their families.

In the category Authority or Capitulation (Empowerment) and Political Action, pointed to a population with high levels of personal satisfaction. When asked: How do you

consider yourself? Part of the population considers themselves Very happy, 40.28% and Moderately happy, 46.76%, while only 0.71, declare Very unhappy. This group also has the power to make decisions that can change the course of their lives, 42.44%, are generally able to change their lives. In the past 12 months they have come together to jointly file a petition to a member of government or political leaders asking for something for the benefit of the community, showing a capacity to mobilize the group when called upon or pressured by events that may affect their relationships.

In the last part of the IQ-MCS, the Hg Research Register was introduced, in order to quantify and evaluate the population's response capacity, to a possible environmental contamination by heavy metals (Hg), assisted by IQ-MCS. Initially the interviewee is asked what their opinion about the most relevant environmental problem in the city under their point of view. The following were suggested: Burned; Extinction of species of flora and fauna; Deforestation; Contamination of soils and water by mercury; and Waste and waste generated. Garbage and human waste generated, deforestation and mercury contamination are the environmental problems that most concern the population, with 30.93%, 28.77% and 25.89%, respectively.

When questioned about how he became aware of the mercury contamination, 46.04% reported, Newspapers, Magazines and / or Television; 36.69%, from different sources. While 0.0% say that they did not have any kind of information coming from the Secretaries of Environment or Health of the governments. The campaigns of education and environmental awareness, total 3.59%, while 13.66%, from informal conversations with friends or acquaintances.

Also in the Hg Search Registry item, when asked: What activity do you consider responsible for the mercury contamination in the area? The majority attributed the activity of Garimpos (41%), Deforestation (15.82%), Mining (9.35%), Agriculture (5.75%), and 28.05%, other sources.

The level of trust in government agencies responsible for the management of contaminated areas was another item disapproved in the survey, with 85.61% of those interviewed who do not trust these bodies, against 11.51% saying they trust.

The questionnaire on spontaneous abortion, applied to women of childbearing age (15 to 65 years old - suggested), was introduced to close the questionnaire, even though it was not intended to investigate the clinical aspects of the interviewees. history, and try to observe possible metabolic changes related to Hg contamination, SANTOS (1999). A question was elaborated with this

theme, they answered if they had some spontaneous abortion during their fertile life, 12.23% said yes, and 58.99%, no, other 28.77% did not know or did not respond. The main source of protein consumed daily in this group are: 52.51% consume beef as protein, 25.89% fish, 19.42%, chicken and 2.15% of other proteins.

#### IV. CONCLUSION

The analysis of the Social Capital Index, referring to the IQ-MCS methodology proposed by the World Bank, applied in the surroundings of the Tapajós river bay, Santarém-Pa., Allowed to recommend it as a valid and reliable instrument for measuring the concept of quality of life and elaboration of public policies in the region surveyed. It is important to emphasize the importance of introducing the quality of life evaluation among the performance indicators in health programs and interventions, thus incorporating the perspective of the subjects targeted by these actions. Therefore, the application of IQ-MCS in Santarém is that the related communities have a high level of social capital, where we can estimate a capacity for mobilization and political action the environmental exposure to mercury in the region of the bay of the Tapajós river, by local communities. Especially when observed a proactivity of the populations involved, related to events that compromise their collective well-being. Although it has demonstrated the presence of social capital, there does not seem to be an effective use of these resources, in many cases, probably due to the lack of leadership or more persuasive means of convincing.

#### REFERENCES

- [1] ALMEIDA, M.G.; Vargas, M.A.M.; Mendes, G.F., Territórios, paisagens e representações: um diálogo em construção. Revista Mercator, Universidade Federal do Ceará - UFC, Fortaleza-Ce, v. 10, n. 22, p.23-35, mai/ago. 2011.
- [2] BANCO MUNDIAL, Questionário Integrado para Medir Capital Social (QI-MCS). Grupo Temático sobre Capital Social, julho 2009.
- [3] BOURDIEU, Pierre. O Poder simbólico. Editora Bertrand Brasil S.A. Rio de Janeiro, 1989.
- [4] BRASIL, Notas técnicas: Histórico da investigação sobre cor ou raça nas pesquisas domiciliares do IBGE, Características Étnico-raciais da População: um estudo das categorias de classificação de cor ou raça 2008. Web: <http://www.ibge.gov.br>, acesso 10/02/2015.
- [5] COLEMAN, J. Foundations of social theory. Cambridge: Harvard University Press, 1990.
- [6] FREITAS, M. G. A., *A teoria do poder simbólico na compreensão das relações sociais contemporâneas*. Congresso Internacional Interdisciplinar em Sociais e Humanidades, Niterói, RJ: ANINTER-SH/PPGSD-UFF, 2012.
- [7] LIMA, j. c., *A teoria do capital social na análise de política públicas*. Revista em Ciências Sociais – Programa de pós-graduação em Sociologia da UFPB, Edição on line <http://www.biblionline.ufpb.br/> (Acesso em 29/01/2015).
- [8] MENEZES, D. B., Oliveira, E. A. A. Q., Carniello, M. F., O Capital Social: uma ferramenta para implantação de planejamento de desenvolvimento regional. The 4th International Congress on University-Industry Cooperation – Taubate, SP – Brazil, 2012.
- [9] MOREIRA, J. C. P., et al. Capital Social como um dos fatores de sucesso das Cooperativas Agroindustriais. Documentos Técnico-científicos, Revista Econômica do Nordeste, Vol. 40, No. 3, 2009.
- [10] MOURA, E. A. F., Práticas socioambientais na Reserva de Desenvolvimento Sustentável Mamirauá Estado do Amazonas, Brasil. 2007. 315p. Tese (Doutorado em Ciências Sociais) – Universidade Federal do Pará – UFPA, Belém-Pa, 2007.
- [11] FIALHO, F. M. “Capital Social: usos e definições do conceito nas Ciências Sociais”. Revista Três Pontos, 1.0, p. 31-35. Bel Horizonte, 2004.
- [12] HIGGINS, S. S. Fundamentos teóricos do capital social. Argos, Chapecó, 2005.
- [13] KIMURA, M; SILVA, J. V. da. Índice de qualidade de vida de Ferrans e Powers. Ver. Esc. Enferm USP, 2009; 43 (Esp.): 1098-104.
- [14] PATTUSSI, M. P.; MOYSÉS, S. J.; Junges, J. R.; Sheiham, A. Capital social e a agenda de pesquisa em epidemiologia. Cad. Saúde Pública, Rio de Janeiro, 22 (8): 1525-1546, Ago., 2006.
- [15] PEREIRA, S. B., Processos Tangíveis e Intangíveis do Desenvolvimento Local. Revista Econômica do Nordeste, Fortaleza, v. 38, nº 2, abr-jun. 2007.
- [16] PRATES, I.; VENEROSO, C. Capital Social e Pobreza: implicações teórico empíricas para estudos de Programas de Renda Mínima. <http://www.sinteseeventos.com.br/bien/pt/papers/ianpratesCapitalsocialepobreza.pdf>. (acesso em 01/07/2014).
- [17] PORTES, A. Capital Social: Origens e aplicações na sociologia contemporânea. Sociologia, Problemas e Práticas, número 33, p. 133-158. Tradução de Frederico Ágoas. Lisboa, 2000.
- QUEIROZ, J. C. B., Utilização da geoestatística na quantificação do risco de contaminação por metais pesados, na área portuária de Santana – Amapá,

Tese de Doutorado Curso de Pós-Graduação em Geociências UNESP, Rio Claro - Sp, 2003.

- [18] SANTOS, E. C. O. et al, Estudo de Saúde e Exposição ao Mercúrio da Comunidade Ribeirinha de Brasília Legal, Estado do Pará, Brasil. Cad. Saúde Colet. 7(2), Fundação José Bonifácio, Rio de Janeiro, 1999.
- [19] SILVA JR., J. D. S., O Capital Social: discussão em torno da construção de um conceito. Revista Espaço Acadêmico – No. 72 – Maio de 2007 – Mensal Ano VI - <http://www.espacoacademico.com.br>. (acesso em 01/03/2015).