The environmental impact of economic activities: the case of the five economic macroregions of the State of Santa Catarina/Brazil

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Abstract: The different developments in each of the five Catarinian macro-regions have led the author to investigate if the regional differences can delay the economic growth of the State of Santa Catarina and how is the actual vegetal covering after this economic exploration. This case study delineates the economic basis and the regional differences through descriptive analysis of diagnosis. The results showed the presence of regional differences that gives foundation to the economy strength. When the European immigrants had arrived in the State, the estimate was that more than 80% of the total area of Santa Catarina was covered by forests. The solo occupation and the uses of the native forests as economic way of development were responsible for a great reduction of this covered area. This paper shows that there is a great environmental impact of the economic activities more concentrated in macro-regions 1 and 2.

Keywords: environmental impact; economic activities; regional development.

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1 Introduction

Within a historical context, Santa Catarina was developed in a different way in its diverse regions. The popular legend insinuates that the regions of the Middle-West and West are eminently agriculturist, but the regions situated in the Middle-East and East are understood as technological centres and that, for years, they have attracted people to the biggest employment possibilities. However, it must be highlighted that such affirmations are empirical or do not have real evidences, mainly statistical, related to the economic questions as the one that we intend to approach in this study. This way, considering what was described above, the present study has as objective to investigate if the regional differences delay the economic growth of Santa Catarina and how is the actual vegetal covering after this economic exploration.

This study contribution is based on the chance of applying the acquired academic knowledge in practice, mainly in the sense of researching a region of Brazil, Santa Catarina in this case, trying to identify the regional inequalities that can, perhaps, impede or promote the economic development.

As a method, it has been used in the case study that is a deep and longitudinal analysis of one determined descriptive case and focuses on a particular situation. Thus, this study deals with the case of the State of Santa Catarina dealing with its economic base and the regional differences, specifically.

Descriptive analysis using diagnoses is used. The data that will guide the present study are the ones made available by the ICEPA – CEPA Institute. The documental analysis allows a better understanding of the collected data. For the techniques of analysis and interpretation of the data, this study bases itself on the theory of the economic base, where one or more products and other in-flows of income are responsible for the development of a region and the analysis tool is given through the specialisation quotient to measure the potential of a region.

## 1.1 Criteria for the division of the State of Santa Catarina

According to Bonatto and Ferasso (2003), the State of Santa Catarina is sufficiently heterogeneous in its economy and these differences can geographically be regionalised. According to this division, it has been adopted as a new cut/division in the regionalisation to facilitate the understanding of this study that, in this case, makes use of the data made available by ICEPA. It was decided that the best way to characterise each one of these macroregions would be using the state division adopted by the Government of the State of Santa Catarina that, in an innovative initiative in Brazil, decentralised the governmental power in the called 'Secretarias de Desenvolvimento Regional' (SDRs) or Regional Development Secretaries, totalling 29 regions (Figure 1).

The authors had grouped the SDRs which were more similar, empirically, according to its economic base so that it was possible to understand better the context of each macroregion. This way, the adopted state division in this study is illustrated in the following Figure 2.

Figure 1   Localisation of the State of Santa Catarina in Brazil (in yellow)
(for colours see online version)

Figure 2   The division of the macroregions of the State of Santa Catarina, based on the proposal
of decentralisation of the State Government (for colours see online version)
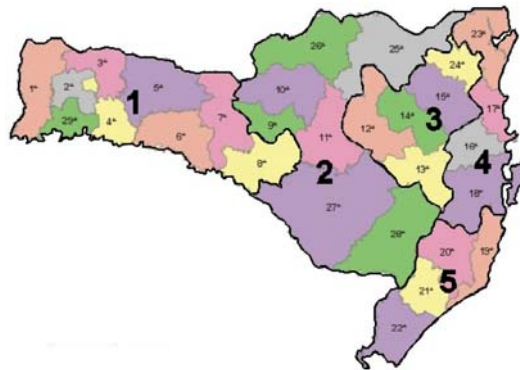
Source: Adapted from Borchardt (2003).

Each one of the macroregions illustrated in the figure above had been called, from left
to right:

1   AGROINDUSTRIAL Macroregion

2   FOREST Macroregion

3   TEXTILE Macroregion

4   Electro-metal-mechanics and technology (METAL-TECH) Macroregion

5   CERAMICS Macroregion (in the South).

2   Theoretical fundamentals

2.1   *The economic growth issue*

According to Sperotto (1997), traditionally, the development has been taken as a linear
one-way process, limited to the difference in the phase and the speed of the economic
growth.

For Sperotto (2003), the theory of the exporting base has been fundamental to explain the dynamism of the regions in their first phases of growth, however, in more advanced phases of regional development the theory of the economic base becomes more adequate for including, beyond the exportations, all external flow of income. The author affirms that in the case of the economic base theory, this relation is more complete, because other variables exist explaining the regional dynamism beyond the exportations. In this case, we are based on the principle that: $B = X + F$, being 'F' an external flow of income (beyond the exportations), as risk loan capitals, factor payment, government transferences, among others.

This Study of the regional growth has demonstrated that there is not only one basic factor explaining the regional growth, as the exportations, or the innovations carried through in the interior of the engine industries, but a set of factors whose importance varies from a region to another one. Souza (1999) explains that there are certain indicators of economic development that define the difference of development between a region and another one. The author clarifies that indicators as potential of specialisation and economic base beyond factors as development indices do not guarantee that a region grows more than another one, but that regional differences exist. So, it is believed that by means of notes on the economic base and on the potential of specialisation it is possible to define the problems of the region in study.

2.2 The sustainable development issue

For Backhouse et al. (2004), when considering environmental issues, it is necessary to reflect about the concept of sustainable development in a holistic approach.

Rassafi et al. (2006), shows that there are many significant common points among viewpoints of the literature in sustainable development: the economic, environmental and social variables are universally believed to be components of sustainable development.

Fiksel (2002) said that on sustainable development there are two important differences in environmental practices:

1   the introduction of the socio-economic dimension, focusing on the beneficial or adverse impacts of industrial growth upon societal well being

2   recognition of the linkages between sustainable development and competitiveness in the market place, which elevates these issues to a strategic level.

For Clarke and Islam (2006), ecological sustainability is dependent on the conditions:

1   the rate of decline of non-renewable resources

2   the excess rate of harvest of renewable resources

3   the assimilative capacity of nature to absorb waste

4   pollution reducing technology and capital.

Klostermann and Cramer (2006) affirm that sustainability aims for an acceptable balance between human society and the natural ecosystem.

The concept of environmentally sustainable economic development, for Bithas and Christofakis (2006), is an action plan that would combat environmental degradation caused by on-going pollution and the constant depletion of natural resources owing to the dominating pattern of economic growth.

According to Cerin (2004), when dealing with environmental and economic problems solely, the dominant definition of eco-efficiency is coined by many authors.

For Plummer (2006), the literature expanded the term sustainable development, emerged as integral to the vocabulary of human-environment relationship. In the environmental perspective, the idea of sustainability has been used to highlight serious environmental changes caused by humans.

According to Kituyi (2004), agricultural products and key natural resources are not efficiently extracted, processed, consumed and disposed of, leading to a wide range of negative ecological implications.

The preoccupation with ecologically conscious consumer behaviour is shown by Brooks and Yusuf (2006). The environment is more limited and fragile than once thought. And, there are preoccupations also with the environmental conditions that may have a negative impact on behavioural intentions as regards to economic progress through information and communication technology industry, to cite one case (Henson, 2006).

The environmental quality and growth studies show that the environmental degradation increases in the early stages of growth, but it eventually decreases as income exceeds a threshold level. In this hypothesis, it is necessary the decomposition of three effects:

1   the scale of economic activity

2   the composition or structure of economic activity

3   the effect of income on the demand and supply of pollution abatement
     effors (Kukla-Cryz, 2006).

Environmental economists talk of the environmental impacts of business such as pollution, damage to biodiversity and loss of attractive landscapes as unpaid costs or externalities. This begs the question of how or to what a company pays these costs. An important key for sustainable development is the integration of different actions and sector, taking a holistic view and overcoming barriers between disciplines (Giddings et al., 2002).

3   The dynamics of Catarinian regional growth

3.1   The genesis of the Catarinian economy: from 1850 to 1990

The genesis of the Catarinian economy, from 1850 to 1950, had great contribution from the immigrants and migrants who had initiated the process of conquest of Catarinian lands, which generated an economy based on agriculture and subsistence cattle raising besides the diversified industrialisation of outstanding form. In synthesis, the technology from the immigrants and migrants, essentially German and Italian, was the great and solid base in which the Catarinian economic model has based itself up to the way it is known today. It was in the period from 1950 to 1960, that there happened a true diversification and an amplification of the Catarinian economic base of the new sectors as paper, cardboard, mechanics, ceramic, metal-mechanic, plastic, electric materials and industries of the transportation sector, and all this was resulting from the metamorphosis of the mercantile capital to the industrial.
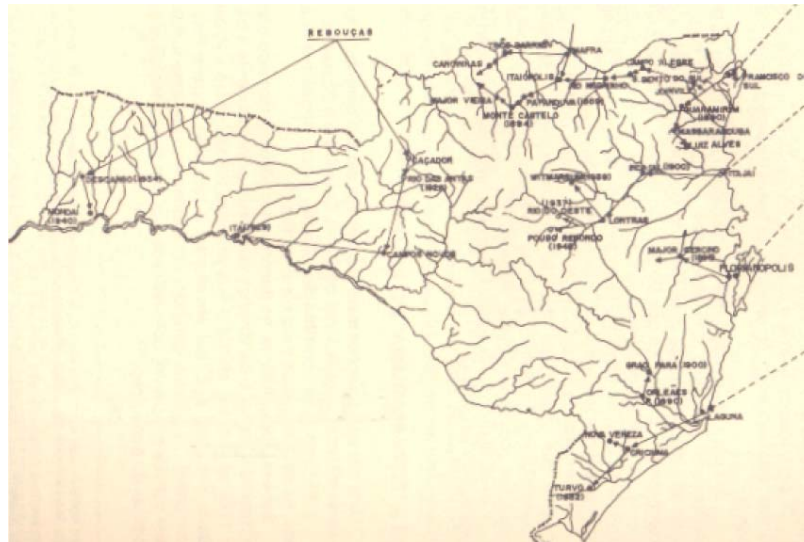
The following maps illustrated this occupation (Figures 3–6).

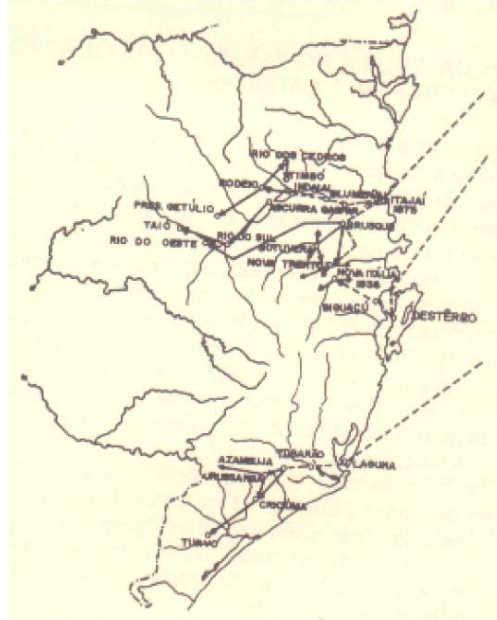**Figure 3**   The beginning of the Santa Catarina's colonisation by German immigrants in 1877
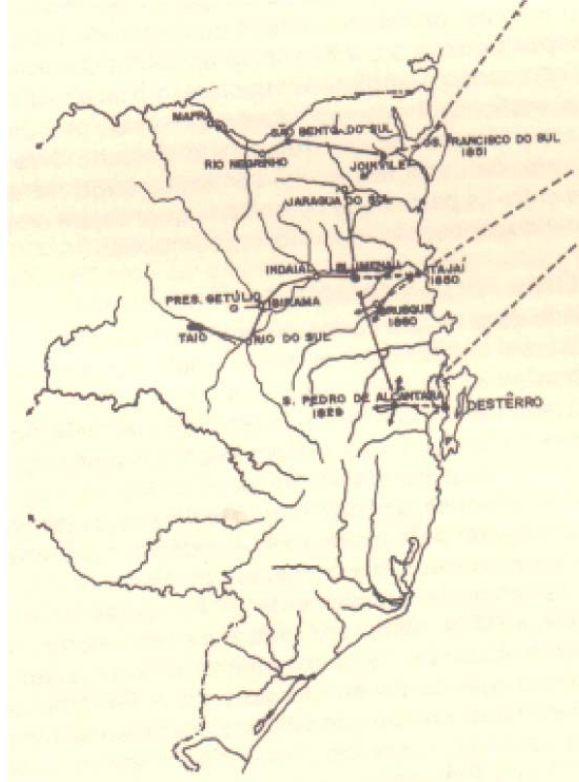
Source: Piazza (1994).

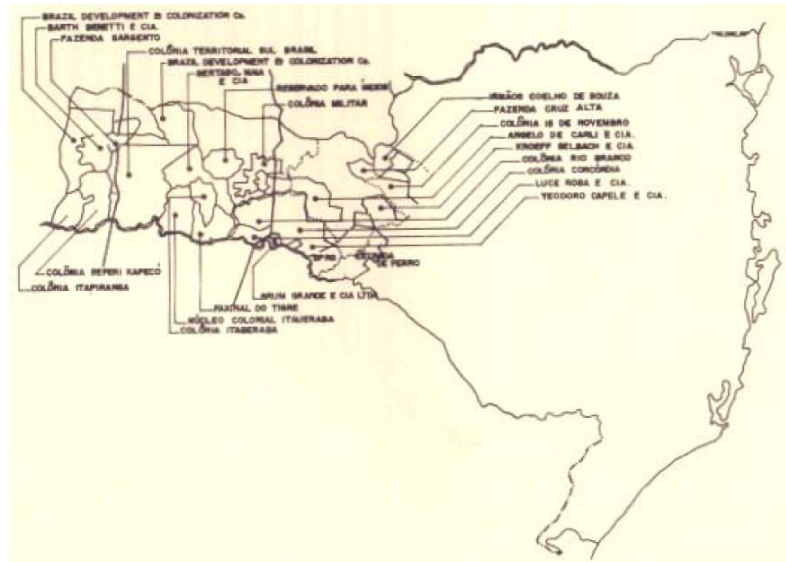**Figure 4**   The Santa Catarina's colonisation by Poland immigrants in 1878

Source: Piazza (1994).

Figure 5   The Santa Catarina's colonisation by Italian immigrants in 1880

Source: Piazza (1994).

Figure 6   The Santa Catarina's west colonisation by development companies in 1882

Source: Piazza (1994).

It was in the context of economic reorganisation – without the presence of the State – that the Catarinian economy started to grow from the decade of 1990. In this direction, the economic base had already been implemented, defined and developed on the capitalist guidance of globalisation. The most preoccupying question ahead of this

conjuncture is that, as the entrepreneurs of this region were culturally accustomed to the government 'aid', this new economic guidance left them stunned, and the multinational oligopolies and oligopsonies had started to take advantage of this administrative inercy leaving the economy of this State dependent on these concentrative and imperialist companies, but that in turn had supported certain determination of an economic base, sustainable.

4 Analysis of Catarinian regional inequalities

4.1 The identification of the regional potential by means of the employment in Catarinian s macroregions

Considering that the relative specialisation of a region is determined by its specialisation degree, it should be identified, which this is supposed to be. Credit is given that through the employability level, it is possible to determine, which specialty is related to each region and with this to determine the relative development potential. To assure a regional analysis relative to the regional potentials, an econometrical formula will be used to determine which specialisation quotient applies to the locational situation. A Locational Quotient tries to confront the relative participation of a determined sector and/or productive segment in the economy of one given region with the relative participation of this sector and/or segment in a reference region (normally, the macroregion that includes the first one) (Paiva, 2004).

Having all the above considerations in mind, the Quociente Indicador de Empregabilidade (QIE) (Employability Indicating Quotient) was used, to determine the degree of specialisation of the regions in study, and with it, having the notion of productive potential of each determined economic base. A simple equation is formed in the following manner (Figure 7).

**Figure 7**   Employability indicating quotient

$$QIE = \frac{\dfrac{\text{Number of } W \text{ in the sector } Y \text{ in region } X}{\text{Total number of } W \text{ in region } X}}{\dfrac{\text{Number of } W \text{ in the sector } Y \text{ in the State}}{\text{Total number of } W \text{ of the State}}}$$

Note: Where *W*=workers.

A more internal analysis of the employability level brings important constatations on the internal behaviour of the regions, chiefly the specificities of each microregion (association of cities).

Example of this is the fact of calling the Extreme-West Catarinian region as agroindustrial region once that in average the sectors of services and commerce employ more than the sectors of farming and industry together. Another constatation on the Extreme-West region is certain homogeneity of the quotients.

The following Figure 8 illustrated the quotient of employability among the five Catarinian economic macroregions.

Figure 8   Quotient of employability among the macroregions of development of the
State of Santa Catarina
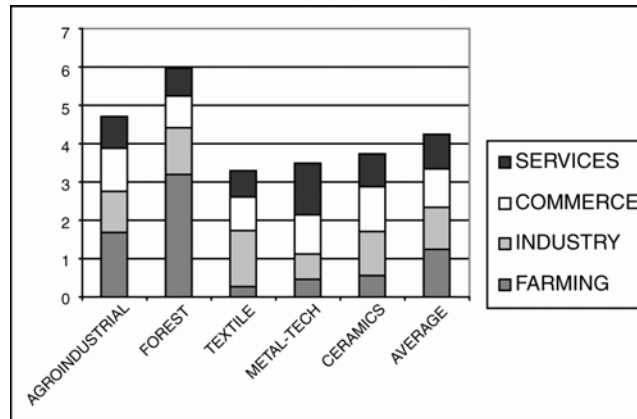
The agroindustrial region is not the one that uses people the most in the agricultural area
(as the politicians and social pseudoscientists of the State affirm empirically), therefore
while the state average of this quotient is of 1.338, the Agroindustrial region has 1.681,
but the Forest region has a quotient of 3.701, or the Forest region employs more than two
times the Agroindustrial region in the agricultural area, although we are aware that this
information comes from calculations effected on the employment level, where in the
research the agriculturists are not considered as employed in the area.

Yet, in the sector of the Industry we observe a certain homogenisation in the
employability quotient, as with exception of the Metal-tech region, the regions had
gotten an average QIE of 1.211. This shows that the industrial sector, indifferent of
where the region is located, has a certain superiority of its importance in the
employability of the Catarinian s.

In the commerce sector a certain disparity among the regions is noticed where we can
highlight the employability in the Agroindustrial (1.120) and Ceramics (1.173) regions,
when the average of the QIE for the State is 1.003. It is curious that in the Textile sector
where, empirically, it is known that the dynamics of sales is frantic for the retailers
(and 'baggers'-people who cross the borders of the state or macroregions to buy with
better prices), where the QIE shows up with an index of only 0.869 (below the average of
the State). Thus, the people who sell directly from the industry are launched as industrial
workers, not as commercial employees.

Analysing the sector of services, it can be evidenced that the Metal-tech sector, which
is basically 'service renderer', is important, once this region, being the most modern
technologically, has the rendering of services as main activity. The Metal-tech region
QIE is 1.330 while the State average (excluding this region) is 0.778. On the other hand,
the region that less employs in this sector is the textile region (0.689), another intriguing
constatation, once it is known, empirically, that in this region the rendering of services
of the type germinated is great (some dressmakers that work as tertiarised for the plants
of greater scale) for the largest industries; fact that perhaps explains the informality of
this activity.

There are mistakes in relation to what it is said and what really is, mainly in the
Extreme-West region of Santa Catarina, related to the Agroindustrial and
Commerce/Services sectors that are, certainly, the first ones that must be investigated in

a primary research about the superior determination of the regional potential. After all, any demand stimulation of the final link of the regional productive chain must reverberate on the links, either forward or backward, stimulating the set of the local economy.

5 The environmental impact of the economic activities

5.1 The historical occupation, economic exploration and vegetal covering of the State

In a historical context, the settlers that had initiated the settling process of Catarinian lands made an economy based on the subsistence agriculture and pecuary (Renk, 1991).

However, the exploration of these natural resources aimed profits, due to the proper culture of settlers. The colonisation had led the competition and search for profits. No more interested that the immigrants and migrants were responsible for the west colonisation, but interests the exploration of the forest resources and to cultivate the solo aggressively (dos Santos, 1998; Radin et al., 2003).

According to dos Santos (1998), the First World War (1914–1918) had created opportunities to the wood commercialisation, specifically the 'pinheiro-do-paraná' tree. The international prices went up very quickly. As a consequence, wood industries had spread for all part. The lands acquired firstly by the government were explored in its forest resources and, later, were sold in lots to the colonists to produce its cultivations.

When the European immigrants had arrived in Brazil, the estimate was that more than 80% of the total area of the State of Santa Catarina was covered by forests. The solo occupation and the uses of the native forests as economic way of development had left scars and today it is knew that this area was reduced more than half of the original area (Junges, 2001).

With the aid of satellite images, the FATMA's (Environment Foundation of Santa Catarina) researchers and municipal environmental agencies, as Fundema, are discovering that the environmental degradation already destroyed at least 60% of the original area of forests in the State (Junges, 2001).

FATMA launched the first vegetal covering atlas of the State, using satellite images supplied by National Institute (Inpe), in 1996, based on a survey made by the US satellite Land-Sat TM-5. The Fundema, used images from Clark University (USA) (Junges, 2001).

The numbers from FATMA consider all vegetal formation above of the solo, not differentiating the types of forest and the phase of regeneration and include the total area of the State. One of the critical points – although still it is a positive number if compared with other Brazilian states – it is about to the atlantic bush and mangrove, that predominate in the original covering and that today meet in advanced process of degradation (Junges, 2001).

In the following image, it is presented the more recent satellite image of the State of Santa Catarina, where it is possible to perceive the environmental degradation due to economic exploration. The white line delimits the area with lesser vegetal covering, whereas the black line delimits the area with bigger covering. After the map, some pictures of some Catarinian areas showing this vegetal covering (Figure 9(a)).

Figure 9   Vegetal covering of the State of Santa Catarina (for colours see online version)
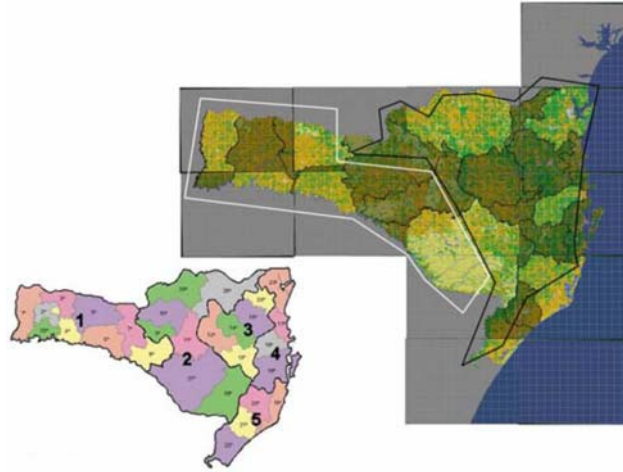
(a)

(b)

(c)

Figure 9   Vegetal covering of the State of Santa Catarina (for colours see online version) (continued)

(d)

(e)

(f)

Source: FATMA (1996).

Among the positive points of the survey made by FATMA, it is the fact of that is a good amount of restituted bushes. About 4% of the State area is recovered by reforestations, mainly pinus and eucalyptus, much even these are not native plants of the region (Junges, 2001).

The economic exploration of the land areas mainly in activities of the primary sector (agriculture), made the great land areas were deforested to give place to the new cultivations (seeds, in its majority). Another exploration of the natural resources came from the native wooden extraction in logs, that were exported to Argentina.

The mapping effected by FATMA pointed that 29.14% of its area as primary and secondary vegetation sized as bushes and 4.14% recovered for reforestations, whose values correspond to the great planted areas with pinus and eucalyptus. The index of 29.14% of vegetal covering is near to the value of 33.4% of the covering in 1982, according to the National Forest Inventory survey. It can thus be seen a decrease on the Catarinian vegetal covering.

The covered areas with medium sized vegetation are be situated near to the coast, regions where there got an index of up to 50% of covering with native vegetation with bushes sized.

The predominance of cyclical cultivations in the use of regional lands that had gotten inferior indices of 10%, due to the use of solo in the Catarinian west region (macroregion 1). And there are also the solo use to cultivate forests to extract wood as raw material for cellulose (macroregion 2).

The inventory had considered field areas, or savannahs, that had been excluded from the research carried through FATMA. The index also is near to the found index by Radam-Brasil project, in 1986. The project evidenced that the areas with bigger conservation of the secondary vegetation are placed in the atlantic source and coincide with the places that, in the FATMA survey, had gotten superior percentage of 50%.

According to Bavaresco (2005), the settlers had experiences in agriculture and soon they had transformed the regional landscape. The rudimentary form as they worked the land provided a production capable to keep the family and to accumulate small part of capital for the production excess. The lands division in small colonial lots and the primitive system of land rotation had caused the fast deforestation and exhaustion of the solo.

Still in accordance with the author, the wood cycle enters in decay due to reduction of the bush that gave place to the plantations, not providing an accumulation of capital, therefore, the low price paid for the wood, compensated with the existing amount, favoured the companies which drained the profits for other centres. With the reduction of wood industries, the agroindustry was the new economic alternative.

Another aggravate problem of the agroindustrial cycle is the environmental pollution generated by the indiscriminate launching of animal residues to the environment, causing solo and water pollution, also for the launching of agrotoxics (Bavaresco, 2005).

As limitations, this study considered the area of vegetal covering made available by FATMA (1996). Comparative results considering other periods of time (e.g. each ten years), would make possible a more deepened analysis.

Following, photos of diverse Catarinian regions are presented, demonstrating the areas covered or not covered with vegetation and the lands occupation by cultivations of seeds and animal rearing (pecuary) (Figure 9(b)–(f)).

6 Final considerations

The research caused the appearance of salient questions where it has identified the structure, the occupation area, the population, the fundiary structure and mainly its degree of employability. The regional differences come from the form the State was colonised and from the specificities that base this economy as 'progressive' in relation to other Brazilian states.

Thus, it is necessary to consider the following facts that aggravate the economic growth: the government does not have money 'to homogenise' the investments in productive sectors until they become auto-sustainable; the 'mistakes' of the social pseudoscientists; the existentialist crisis among Catarinian s because of the polarised politics of investments; the lack of inquiry in this area to assist the Government of the State in the implantation of credible and feasible public policies, besides viable under the financial point of view.

The formulators of development policies in the State of Santa Catarina must think about a development project to the West that comes to disconcentrate the investments to generate a more balanced regional development in the State. The great problem is that it is believed that we can only disconcentrate the industrial growth concentrating the investment in some points of the space, what would imply in one policy of regional polarisation.

For the sustainable development view, it was shown that when the European immigrants had arrived in Brazil, the estimate was that more than 80% of the total area of the State of Santa Catarina was covered by forests. The solo occupation and the uses of the native forests as economic way of development had left scars and today it is knew that this area was reduced more than half of the original area.

Therefore, we conclude that there is really a great disparity among the regions of the State of Santa Catarina, but this is not responsible for the difficulties of leverage in the economic development.

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