

# The Preservation of Pau Brazil in the Late XVIII Century in an Economical Perspective

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**Abstract** This paper's subject is the deforestation of Pau-Brazil in late XVIII century Brazil which can be integrated in the academic inquiry into the question of the natural and cultural heritage. In this subject the author has written this paper not only in a statistic data, but in connection with the history of environmental ideas. The author has obtained some percentage values that allowed him to provide some realistic dimension to the lack of the woods in this area, and connecting the same data with the ecological and economical thought dimension. About the subject in the end of the XVIII century (1796 – 1798), there is a shortage of Pau-Brazil timber in Pernambuco, that takes an effort both of searching for new forests and a strong effort also of developing preservation measures in that period. The trade of Pau-Brazil in the late XVIII century could reach as profit the percentage values of (778, 71%) in the European markets of the end of the XVIII Century. In this case, the author's argumentation concerns – in this historical context – how an economical interest paradox has triggered an interest about environmental protection to save an important accent. This involves at the beginning to identify the species of Pau-Brazil that were in use at the time in the same region to, in a second stage, integrate the same in the economic importance in Portuguese trade economy. The third step is to understand the correlation between economy and environment in the search of new forests and preservation of the already known ones. In this part, it is important to remember that early modern economies were natural commodity based and thus very dependent on the environment. That (should have) urged them to insure that they had a continuity on the access, and to ensure the existence of the same resources. This enters in Richard Groove's theories about environmental history in connecting them with economy. And also Wades' theories, that cross ecology with other sciences. Being a work in history, the main propose here is not to give a solution of mine, but rather to present the question in which the context were occurred and how and what solutions were found in the same period, and to what degree.

**Keywords** Pau-Brazil, Deforestation in XVIII Century, Economy and Ecology, Preservation of Pau Brazil

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## 1. Introduction

In the late XVIII century, there were reports sent to the Portuguese crown about the reduction, and nearly total extinction, of Pau-Brazil woods in *Pernambuco*. The same danger of extinction occurred in a period that Portuguese economy was passing by an unquestionable prosperity, based on the re-exportation of goods from Brazil. Most of them were from agriculture and natural commodities, but neither all of them were; from the total of 125 products re-exported from Brazil and 80% where form de *sertão*. One of those goods was Pau-Brazil, that growth in the *sertão* of the *capitania de Pernambuco*, and its timber was used in clothing manufactures, the red color extracted from its boiling was used to painting clothes, and naval constructions. In a general view the absence of any good could unbalance Portuguese re-exports to a deficient trade balance, which was against the notion of wealth of mercantilism (the dominant economical paradigm in Portugal). Under the practices of the same economical field, wealth was achieved by a favorable trade balance, which would reverse the logic of that payment that should be done to Portugal in gold. The loss of a good or its decrease in exports could seriously unbalance the trade making it unfavorable against Portugal. In a context where Portuguese trade was experiencing an increasing prosperity, the most of the goods available to re-exportation made the same goal possible to be reached. In this context a natural good, with some weight in the economy could, with its disappearing, in a moment of economical wealth, trigger the necessity to proceed to its conservation. To study this devastation, of the treadable resource, and the measures taken to stop and reverse that process, it's required an approach it's required between economic and ecological history. The major purpose in

the connection of those subjects is not to create a major theoretical interpretation, but to see what real measures were taken to conserve this good and what ecological principles were established, with all the limitation in the use of that concept. Nevertheless, to do so, it's required to understand the theoretical field of both currents to approach a point of contact. But prior to that, it is required to understand the XVIII century relation with the natural world. The concept of Nature was withering then the mere significance of natural world itself. It could mean also the natural propositions of society, faith, science and men. The XVIII century presents itself as a century of great transformations. Philosophically, the major debate upon nature was between two distinctive currents: the static view of a nature that never changes, and the dynamical better known as transformism. When we use the concept of nature, we are using a diversity of meanings and usage in the early modern period. In a scientific matter it is a period where geometry – as the basis to understand the natural world – was diminishing in influence, giving space to subjects as mathematics and physics as the core explanation how did the world work. Diderot (in an article in the Encyclopedia) divides the concept of nature in the following fields: Natural History composed by chemistry, experimental physics, in opposition to the nature of spirit and the nature of society. The same laws could be understood by experience, and observation. The concept itself, could mean and be used in: Natural History, nature of men, nature of the universe, and natural world. In this paper however, the concept will be used only in relation to the significance of the natural world.

The philosophical field of Natural History (founded by Plínio the elder) is older than the beginning of the overseas European expansion in the XVI century, but was reaching new reflection subjects in the XVIII century. As part of the same transformation, in the second half of the same century, a network was created based on botanic gardens and in the plant transfers where one the major objective was economic and agricultural potentialization and the profit they could provide in XVIII century trade [1]. This change it's also related to the development of natural history in the enlightenment period. One of the bases of natural history was the potential of natural goods, in connection with their usefulness to humankind, Influenced by the transformation in the core of scientific thinking. The discourse about nature was not a topic which emerged in the XX century as well her study. Influenced by natural history in which experimentalism was affirmed as the most important method to know nature, many scholars were sent aboard, to study nature of the world [2]. From the different parts of the world, they brought several species of plants to Europe to the botanical gardens as part of the study of nature. It is within that context, that the practices of preservation started to flourish because, besides this proposal, they gained a social part to create conscience about the

deforestation and the need for preservation of the species. Preserving them, they could be exported, and be of interest to the wealth of a nation. As part of the new perspective according to Richard H. Groove, who gives examples of attempts of preservation in the Island of Saint Helena, some botanical gardens were created to preserve natural flora, In contrast to North America. In most to the temperate countries deforestation was seen as a damage that could affect the economy as well [1]. Botanic gardens, more than mere places for the delight of visitors, were a place where the use, properties, characterization of the plants and economical potentiality were evaluated. In the XVIII century there were three types of gardens in terms of their focus: pharmacies and scientific ones and economic ones [2]. On the other hand, one of the major goals was the study of all elements (biological, chemical, as well as planetary, i.e. astronomy) of all the elements that can be used by humanity or can affect human in habitation of earth. It's in this logic that the botanical gardens were created. The first type of gardens was dedicated to the study of the potentiality of the plants for medicinal use. The second type was dedicated to the study of the plants, with a scientific propose. The third type of botanical garden sponsored by state funding had as its main objective the economical potentialization of the plants. The botanical gardens, in their many definitions, albeit not as a main objective, did have a part on ecological preservation without intent to do so. The sheer act of exporting plants form different parts of the world to Europe or to the colonies around the world had as consequence the preservation of them, although not in their native habitat. The existence of economical Botanic Gardens implies that, despite that preservation of nature was based on the potentiality of natural goods, the creation of these same gardens follow the experimentalism practice. This meant that naturalists could study, understand, and define the properties of plants, and their better use. It is that transformation in science, and the better understanding, that brought the ideas of preservation to its main core or at least within the acknowledged context, that will be explored here for Pau-Brazil.

### 1.1. Problem Staten

In this context, where in the economic boom there was a non-agricultural product used in the re-exportation, what was the Portuguese crown's and local authority's solution to stop the deforestation and insure the endurance of the Pau-Brazil Woods?

### 1.2 Questions Rose

For the overall research question to be answered, there are several questions that should be answered. Why an economic matter did triggered an ecological concern, and

who was behind this? In which points where in this case both of them in symbiosis? What were the appointed causes and how were they operative in the solving of the situation? How did economic concerns, and for what reasons, bring ecological questions? How can we define ecological history and measures in the XVIII century? What measures were taken by the Portuguese crown to address that situation?

### 1.3. General Objectives

Having stated the research problem and research questions, it is important to define the objectives of this work. The main objective is to determine how the scarce of an economic asset forced the crown to undertake some measures of preservation.

## 2. Materials and Methods

### 2.1. Documents and Archives

To undergo the present study I've made most of the research in A.H.U (a.k.a *Arquivo Histórico Ultramarino*), in the context of my M.A thesis research. There while consulting some historical sources about XVIII century Brazil, in the *Avulso Documents* of the *Conselho Ultramarino*, while reading the documents about the slave trade to *Pernambuco*, I've come across some sources about the shortage of *Pau-Brazil*. Those documents allow much work in a quantitative amount, but also a great deal of information about the deforestation and a situation of near extinction of the its near extinction, as well of the major preoccupations about the same question. The documents that provide more solid information about the phenomenon that danger that wood, and permit is work in an ecological perspective, are the correspondence between the Governador of *Pernambuco*, and the *Conselho Ultramarino*. That official correspondence between both organisms provides us non-quantitative sources that supplies facts so we can build the ecological perspective. In those official letters we find a great deal of concern about the possibility of extinction of the same wood, which lead them to establish causes and solutions about what could be the causes to the disappearance and what could be done towards its preservation.

Other documents, the *Mapas de Carga* (documents who show accurate quantitative information about the wood that was brought by ship from *Pernambuco* to *Lisboa*), had a great deal of quantitative data about how much of the wood in question was sent to Portugal. About the quantitative data it allowed me to do build graphics and tables using a great deal of different sources. Nevertheless it was not the only archive and sources, from where I collected and processed raw information.

Other archive in which I was able to access to a great

deal of information was the I.N.E (*Instituto Nacional de Estatística*), where I could complement the data of the quantities of *Pau Brazil* sent to Lisbon, with information of the re-exportation of the same product to Europe, allowing me to understand the its commercial weight in late XVIII century exportation's. That raw material granted me also, to have some complementary statistical data to cross information with that I've found in A.H.U.

Other archive that allowed me to collected raw quantitative data about this period was the *ANTT/Torre do Tombo*. There, after consulting the information about the *Casa da Índia* from the *Alfândega de Lisboa*, I collected other statistic information to establish the already mentioned comparative process.

This archival recoil allowed me to have the basis of this work. Beside the quantitative information, it allowed me to cross with a great deal of factors beyond the economical. Other questions are related with the writing of this paper. A great deal of information it's in Portuguese, so and due that some of it are offices, and some are name of regions I've chose not to translated them but put it in italic.

### 2.2. Literature Revision Economical and Ecological History Coexistence and Connections

Taken an account on the material used to formulate this paper, let's consider about the methodological basis of its elaboration. When the conceptual field about the composition of an article evolves two methods it's required to consider the scientifically revolution as theorized by Thomas Kuhn. According to the mentioned author when a paradigm can't provide response to the questions made, sciences entrails in a process of epistemological rupture; being the time where another paradigm emerges to provide new solutions. This methodological question can be connected with this paper because he links two academicals fields, economic and ecological history. This paper starts with an economical question, but the resolution doesn't pass by economy but instead by ecological solutions. There for, as a starting point, it should be defined the actual principles and problems that guides the debates in economic history; that matches with the notions of utilization by men, related to Natural History and Nature, that were part of the concept in the XVIII Century. That ambiguous significance makes it important to perspective the interaction of economy and environment and its historiography.

Most of economic historians wrote very few lines about nature, keeping their academical production over agriculture and industry. About the resources, when speaking of land, its referred arable land as well as the mines both considered sources of prosperity. In this context we should quote Cipolla that distinguishes between mono-productive resources, which are those that nature has no ability or difficulty to reproduce, and other

nature resources [2]. The resources from the mines can be included in the category stated by the mentioned historian.

Economy however, can't be reduced to its mere disciple, being studied also in the History of Economical Thought. Even in that sub-theme, very little attention is given to nature. Mercantilism currents in relation to natural resources, with the exception of gold, did not have great expression in XVIII century economical thinkers and their writing [3]. Even the classical economists valued the products of nature only to the extent that they were free and soon did not present any expense, but did no great reflection about their importance. Even the questioning in relation to the soil, it's more related to an opposition to Malthus's theory and that of Adam Smith, where these would be niches of fertile land to be explored in the possibility of scarce productivity of land and agricultural land. This concept was still a differentiating factor as far as Malthus was concerned, being considered a non-sustainable good. However, the notion of this natural economy includes: soil, mines, and fisheries [4]. The operability of this concept is, whoever, in turn, reduced since the trees - even those of the forest - were common throughout the 10<sup>th</sup> century, were often planted.

In the modern age, in the European context, a deforestation process began in certain kingdoms, with the function of the collected wood supplementing energy and shipbuilding. On the issue of the forest, the theme has been more debated by ecological historians. This can be explained because of the methodology used by the economic history, and the sources that provide the data for their interpretation. Those series allow the creation of series, established by raw numerical data that allows establishing economical trends. In most cases, the goods extracted from the natural world, aren't accounted in statistic sources and when they are, it's not in an amount of data to create a long duration trend. This general lack of information makes it difficult to establish statistics that can provide both an economic and ecological interpretation.

The panorama of serial and statistical economic history is involved in the methodological dispute between serial history and econometric history. The debate between the two economic models is whether this historical current should be (Econometric History), with series established through mathematical models, or through a more ideological interpretation where Neo-liberalism serves more than a purely academic model. The same, beside a counterfactual history, presented not according to the parameters and data of the historical period itself, but rather as what might have been. The trap of counterfactual, it is held that by the absence of documents their logic can be manipulated and manipulative. With regard to micro economic standards, they fail to create efficient analytical models based on Neo-liberal models, since they do not allow us to perceive the specificity of the systems in question. These models, and the surrounding debate, have

been more concerned with mathematical models. In this field, where the calculator and graphics synthesize, and create both models and instruments of analysis on the basis of interpretation, the understanding of the models as theoretical basis in the Neo-liberalism thinking [5]. However while serial history is based on mathematical models, it can only be applied to the ecological history if there are serial data from the collection of the forests, to have an accounting establishing either long, middle, or short duration cycles. In both currents the models are constructed based in sources with quantitative material that allows establishment of trends. Nevertheless serial history establishes the integration of this data in its historical context.

Seen some of the major issues of the economical history, it's time to establish the parameters of ecological history that can be connected with economic history/ history of economic thought. The environmental economy operates on the antipodes parameters of the neo-classical economy: consumption choice theory; perfect information and marginal distribution of production. This implicates, that the data worked quantitative, and serial data, must be interpreted beside the parameters and major subjects of the economy in correlation with ecology. In the case I'm studying the *Paul-Brazil* it enters between those fields of study. In spite of a apparently contradiction, some scholars begin working between those academical matters. The ecological economy, born of the intellectual boiling of ideas, challenges some of these assumptions and the economic system studying it as a subsystem of the ecosphere distributing energy, goods and raw materials in a social sphere [6]. It should be noted that, although most of the theories, whether economic or religious, of the period in question, do not have such a practical side, the same is not true of the natural sciences which were moved with a more practical approach [7]. In the context of the XVIII century those theories can act from the more pragmatic view of natural history whose main field of study was usefulness of the elements collected in nature for man's daily life [8]. This XVIII concept, in the ways it was developed in the period in study, allows a bridge to fully study both subjects as the base of the knowledge of nature.

Given account of the possible connections to the XVIII century, let us consider the themes were ecology and economy connects. The concept, as it begins to be academically operative in 1886, refers to a system of interactive relation of nature with the whole which is called ecological economy [9]. In the 1970s aligned with the greatest interest for the American public as one of the most important subjects, it begun to focus on forestry goods [4]. One of the main objectives of History of Ecology it's the study and understanding in a time continues perspective, off the interaction of man and nature through the duration of Human history [10]. A more traditional historical approach is to analyze the

transformation of the globe's ecology through themes like the separation of man from nature during the Neolithic revolution, imperialism and colonial expansion, exploration, agricultural change, the effects of the industrial technological revolution and urban expansion. More environmental topics include human impact through influences on forestry, fire, climate change, and sustainability and so on. According to Paul Warden, "the increasingly sophisticated history of colonization and migration can take on an environmental aspect, tracing the pathways of ideas and species around the globe and indeed is bringing about an increased use of such analogies and 'colonial' understandings of processes within European history [11]. In this line the main discourse, and study, is about the effects of the same socioeconomic current on the environment in the extraction of resources as a cause of their shortage.

The topics in question are related to the dilemmas themselves about the history of the environment in which they will integrate their narrative, if into a more traditional historical fields or into emerging historical narratives. In current methodology when crossing economic thought or economy with ecology, it was always perceived to be a paradox since it is believed that one is at the basis of the problems of the other [12]. However neither all theories take that premise as the only theory, as a practical example, when speaking of overseas history, we speak of plants and natural landscape where there humanity was one of the factors of transformation. This question and the degree of change of nature by the action of man and the role of nature in this dialectic, is one of the most frequent topics of approach establishing a dialectical relationship. In this field historiography leaves slowly the subject of the predominance of the role of man as agent of change, where the nature has a passive dimension, face to the active role of humanity on the environment that surrounds it. From the moment when we talk about interaction with the economy, we talk about the interaction between a natural non-agricultural vegetative space, and another shaped by man's action and hand. In this context we can consider the studies of several researchers like Marsh that emphasizes, in spite of this interaction, the consequences of the unfolding of the ecosystem and the social costs of the same manipulation made by man. In another scale Turner emphasizes the triumphalism of the domestication of the wild world by human action [13]. In this work I will use economical history just to evaluate the relational field that Portugal had with his exportation, and to establish the motives of its safeguard. I will then start to make the economical valorization of this good, and then try to establish based on that measures that were taken for its safe keep.

### 2.3. Literature Revision *Pau-Brazil* as an Economic Asset in Portuguese Economy

For this academic field it's necessary to intercourse the

matters of Environmental History, with the bases of the economy of early modern world, perceiving its major characteristic. The most preeminent feature of Early Modern Economy was its dependence of natural conditions. Nevertheless, to aboard this issue, we can't be too much an Economist, neither an Environmentalist but something in between.

One of the conditions to establish intercourse between both academics worlds, it's related with the approach. The economy cannot be restricted to the agriculture products, but also to activities and the resources of the forest. The same natural resources were of major importance in the Early Modern age. The forest, in general was a way to complement the recourses of subsistence as a great source of fuel.

Nevertheless all the studies until now worked the matter off *Pau-Brazil* in an economical basis. To understand this asset, it's necessary to establish its importance like an economical commodity. One of the mains points, as stated in the Environmental history, it's the action and interaction of man with the ecological resources. In an economic term, the product in debate, it's considered the first economic cycle in Brazil being the first good exported from *Vera Cruz* after it *Brazil*, too Europe by Portuguese contractors. Not only because of the quality of its timber, quite resistant, but also because of the red that could be extracted from here to paint in the clothes, which was much appreciated by Italian city states, who were manufactured, that explains its importance [14]. And its trade, in spite of not being the major trade good from *Brazil*, was still very important in the XIX century [15]. In the XVII century according with Brandão, it was still the second most exported product after the white gold the sugar export [16]. But, that it's not the only question rose related to the trade of this study object. According to Frederic Mauro, the *Pau-Brazil* trees had the following size: about 20 to 30 meters and very hard logs; once chopped them had 1, 5 meter and weight about 30 kg which.

In the ends of the XVI century, and in the beginning of the XVII century the main trade of *Pau-Brazil* was sent to the Netherlands. According to Frederic Mauro, it was exported in 1670 about 1000 *toros* of the same timber to the northern Europe, where the Dutch acted as resellers in the same region [17]. But the root of northern Europe doesn't imply a full stop in the Mediterranean trade. In the same year, according to the quoted document, it was sent to Livorno Italy about 1000 *toros*, to be traded by indigo in India [17]. Prior to that, to the end of the XVI century, we have some data of a Dutch trading house that provides us the following numbers of 814 932 pounds, in the years 1578 – 1579, sent to Arnemuïden. In the XVIII century, records of this trade are more rare because it starts to loose its importance in the Portuguese re-exportation. Historians, with exception of some notes of Frederic Mauro, don't study its trade. Even the master piece study in this tree – from Bernardino José de Sousa - has wide

information to the period of 1803 – 1822, but does none mention to the chronological segment in debate. Due to its importance in Brazil Economic History I wonder, why such an absence of study?

### 3. Results Pau-Brazil and Portuguese Trade in the End of XVIII Century

Has it been showed this was an important asset that felt of importance in the XVII century, but in the XVIII century how was it?

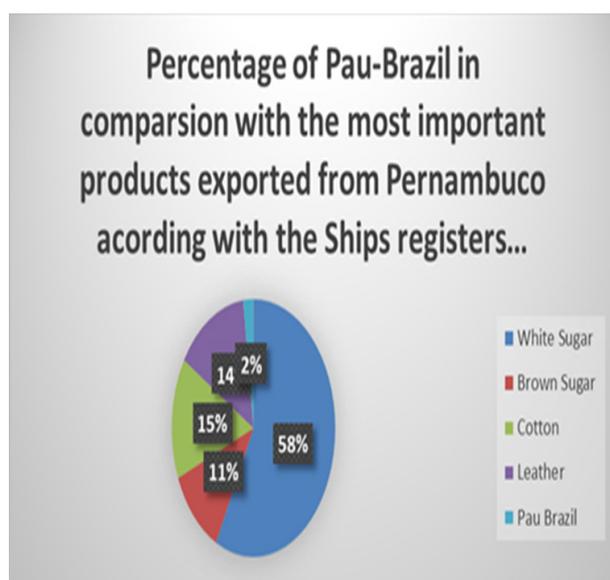
According with Diogo Carvalho Cabral in the period in revise, the exportation of *Pau-Brazil* to Portugal reached the amounts of £1.885 pounds exported between 1796-1811 had been just half of the value exported in 1788 £4.084[46]. Following these data, he problematizing if the wood production of *Pernambuco* would have felt into decline, our production was being passed aside the trade balances (by contraband). Let us here by consider the part of *Pau-Brazil* in Portuguese international economy and trade. After the war of succession of Spain, there is a decrease on the commerce of this product. In opposite the period among the years 1732-1739 was a period of sudden growth that leads it to reach a maximum of 31.33 Guilders per 100 pounds, until 1766 there is stability in its price in Brazil, from this date and until 1780 there is a low trend [18]. The Netherlands, in the pre and post restoration, absorbs a significant percentage of this wood and redistributes it; even, to the north of Europe [17]. The demand for this colorant plant follows the development of textile manufacturing, which is important in the early industrial revolution. However, even with the joint occupation of Portuguese and Dutch, the supply of this wood was enough to satisfy the international market of the XVII century [17].

This chronological period at the end of the eighteenth century brings together a strange historiography consensus, where it is unanimous to affirm the Portuguese economic vitality, as result of the measures of *Marques de Pombal* and the international conjecture; Brazil knows in the second half of the XVIII century a diversification of its production. This diversification had its positive consequences, contributing for the basis of the Portuguese wealth by re-export the goods of Brazil to the international market. Although there was a growth of products originating in Portugal, like the case of wine and salt, that didn't had the economical weight of the products of Brazil [19]. The Portuguese colonial economy at the end of the XVIII century had as its main destination the European markets, demonstrating a great vitality in the international context [20]. During this period, Brazil was an indisputable pillar of Portuguese prosperity, both as a supplier market for products and as a recipient market for manufactured goods. However, for the period under study, 64.4% of the products sent it aboard were from the re-

export of colonial products, whose demand in the international markets had increased from the 70's to 90 [21]. This diversification, promoted by D. Rodrigo de Sousa Coutinho, was inspired by the division of labor of Adam Smith, creating an idea of regional production specialization, in view of the international market [22]. About the goods from Brazil six of them made about 95% of the re-exports of the colonial products. And from those the most valued were white or brown sugar and cotton which together made about 70% of re-exports from Portugal to Europe [21]. This addictive, sugar, that was one of the most valued trade good, had a new boom becoming the most important asset in the re-export of Portugal. This diversification of production also means diversification of the trading partners, although England receives 40% of exports, Portugal has active trade relations with Italy and the United States along other nations/states [20].

As António Almodovar and José Luís Cardoso stated, there is a great importance given to agriculture in the economical thinking [23]. But could have been just agriculture, the use given to this Portuguese colony? Like José Jobson de Arruda affirms, the colony was a main source of income because of the use of the several natural goods. Those where not restricted to agriculture products, but all the goods that could be profitable in the terms of XVIII century economy. This notion of wealth enters in contact with the natural history, whose propose was to know all the productions of utility for men in his daily life. For the study of the final years of the XVIII century there is a great deal of sources in A.H.U and in *Torre do Tombo* that allowed us to study the same phenomena. Sources like: Ships products maps, Portuguese Trade Balance, Ships entrance in Portuguese harbors, gives a view of the commerce in the XVIII century which includes information about *Pau-Brazil*. I searched for several institutions, including *Brazilian University's*, and the silence in the historiography production of this subject it's astonishing. In spite of that early importance at the end of the XVII century, as José Jobson the Arruda demonstrates *Pau-Brazil* doesn't figures on the Portuguese list of most valuable exportation's to Europe. But, in spite of the lost of prominence, doesn't imply a full stop of exportation neither of importance. The study of some products, both by Portuguese and Brazilian researchers, has been conducted in the notion of economic cycles. The same notion, in spite of still being an operative concept, it starts to lose the methodological value. Like Frederic Mauro, appointing several examples, that the cycle theory it's a generalization. To strengthen is statement he regards that in the period where apparently the sugar cycle was dominant, there was not a reduction of volume of *Pau-Brazil* trade, but instead he observes an increasing on its exportation [24]. In this process of diversification, with the results in the Portuguese re-exportation economy, I launch the question and *Pau-Brazil*?

In the end of the XVIII, as indicated by José Jobson de Arruda, it occupied the 15th position on the totality of exportation's don't demonstrating, apparently, a great impact in Portuguese economy [25]. In comparison with the re-exportation of sugar and cotton, the exports of *Pau-Brazil* only represented about 1%. In the total of the exports of *Pernambuco* to Portugal it represents about 2% of the re-exportation. Now, the *Pau-Brazil* was not as high-priced, as sugar, or as Cotton, or leather, at the colonial level (Graphic 1). On the other hand if we looked at quantity, we would be tempted to indicate leather as the main product of re-export from Brazil. The decisive factor to establish the weight of a product in the XVIII century trade was not the quantity but the price per *arroba*.



Sources: A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 177, Doc n° 12423, 18 July 1791; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 181, Doc n° 12621, 23 July 1792; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 181, Doc n° 12623, 12 September 1792; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 185, Doc n° 12880, 17th May 1794; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 197, Doc n° 13522, 29 March 1797. INE: Balanças Comerciais do Reino de Portugal, 1796, 1797, 1799, 1800.

**Graphic 1.** Percentage of Pau-Brazil in comparison with the most important products exported from Pernambuco According with the ship registers between 1796 – 1800.

Once it is a monopoly product, there is no information about *Pau-Brazil* price in the A.H.U documents. There for it is crucial to see the commercial scales of the Kingdom, where the price per *quintal* is present. In 1797 was calculated 1,801.5 *quintais* of *Pau-Brazil* to 1000 the *quintal* in a total of 1,801 \$ 500 *reis*. In 1799 about 10,030 *quintais* of *Pau-Brazil* were sent to 1000 *quintais* for a total of 10,030 \$ 000. In 1800, about 12,149 *quintais* of *Pau-Brazil* were sent to 1,000 *reis* the *quintal* in a total of \$ 12,149,000 *cruzados*. This price meant that its value was not high, what places him in a peripheral economic position. Along with this comparison, we can note two

specific moments in the export of *Pau-Brazil* to Portugal. Between 1790 and 1800, comparing the sources of the cargo maps with those of the House of India, they show a difference of 2688 *quintais*, with a total of 76,623 *quintais* being sent in these ten years from *Pernambuco*, with about 73,935 *quintais* being received in Lisbon. Among the trends the data provided allowed us to conclude that the pick of the exportation of this asset to Lisbon was between 1790 - 1795 were where sent to the Kingdom about 76% of this good in that decade. Nevertheless the information available in the records of the House of India indicates that 70% of the *Pau-Brazil* was sent in the same period (1790-1795). Despite the percentage difference of 6%, compared with the data taken from the load maps, and even given the lack of data from the house of India to 1790, the large period of re-export of *Pau-Brazil* are the first five years of the decade. However despite this factor, there is an export of about 76623 *quintais* in the period of ten years to the kingdom according to the data of the cargo maps, and 73935 according to the records of the house of India, and came from Brazil approximately about 26920 *toros*. Among these data provided by both the Cargo Maps and the India House Records, there is a difference of 2688 *quintais*.

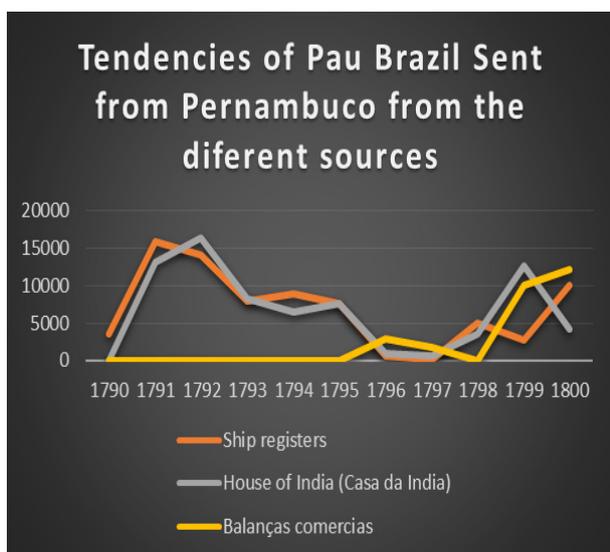
A first factor is that the India House registration for the year 1790 is not available, being that data missing. Even in the absence of such information there are discrepancies between the different data compared at annual level. In the years in which high values of *quintais* appear in the house of India, the sum of the load maps does not correspond, which indicates a lack of unanimity in the sources. From 1797 to 1800 there is a fantastic recovery from the collection of Brazil wood, which increases to 12149 *quintais*, making about 45% of the exports of this period. But in 1796 there is the most unusual case, since both the cargo maps register the scent of about 100 *quintais*, and the Indian house registers about 660 *quintais* received. There was a crash in the average of the order of 10%, according to the data of the Load Maps, being the lowest value of the export of this product.

Until then it is not problematic, it becomes problematic when the data of Commercial Balance of the Kingdom presents that it was received from *Pernambuco* near 1801.5 *quintais* of timbers of the woods in study. This huge difference raises certain questions, such as what is the difference in the data presented? What destination would have been given these woods? The absence of sources does not allow me to reach any conclusion. However I have data to understand the impact of the *Pau-Brazil* break, according to the load maps, as well as the records of the house of India. And to question what impact it had on the economy of *Pernambuco*, from that period. Soon does not represent a significant weight in the colonial economy, in comparison with other products (Table 1, Graphic 2, Graphic 3).

**Table 1.** *Pau-Brazil* sent from *Pernambuco* according different sources:

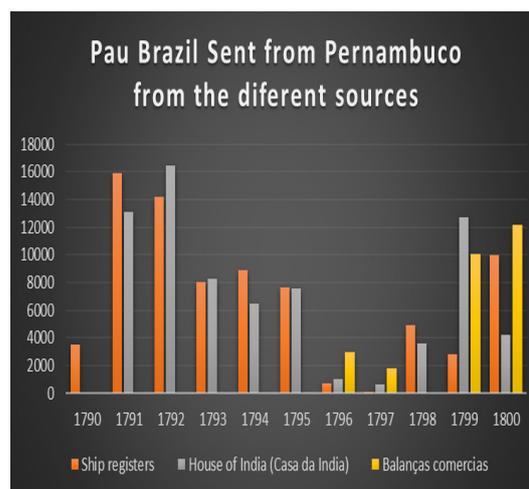
Year	Ship registers	House of India (Casa da Índia)	Balanças Comercias
1790	3490	0	0
1791	15875	13061	0
1792	14189	16435	0
1793	8000	8243	0
1794	8872	6484	0
1795	7674	7548	0
1796	680	1008	2939,5
1797	100	660	1801,5
1798	4938	3574	0
1799	2805	12724	10030
1800	10000	4198	12149
Total	76623	73935	26920

Sources: ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 657, 1790-04-20a 1790-10-15.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 652,1791-03-21a 1791-09-13.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 610, 1792-01 a 1792-11.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 603,1793-01-30a 1793-10.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1585,1795a 1796.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 661,1795-04-07a 1794-11-04.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 660,1795-12-29a 1795-11-27.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1586,1796-12-16a 1797.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1587,1798-08-07a 1798-12-01.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1696,1799-01-02a 1799-12-11.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1697, 1799-12-12a 1799-12-16.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1699,1800a 1801. A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 177, Doc n° 12423, 18 July 1791; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 181, Doc n° 12621, 23 July 1792; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 181, Doc n° 12623, 12 September 1792; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 185, Doc n° 12880, 17th May 1794; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 197, Doc n° 13522, 29 March 1797. INE: Balanças Comerciais do Reino de Portugal, 1796, 1797, 1799, 1800.



Sources: ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 657,1790-04-20a 1790-10-15.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 652, 1791-03-21a 1791-09-13.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 610,1792-01a 1792-11.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 603,1793-01-30a 1793-10.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1585,1795a 1796.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 661,1795-04-07a 1794-11-04.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 660,1795-12-29a 1795-11-27.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1586,1796-12-16a 1797.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1587,1798-08-07a 1798-12-01.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1696,1799-01-02a 1799-12-11.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1697,1799-12-12a 1799-12-16.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1699,1800a 1801. A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 177, Doc n° 12423, 18 July 1791; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 181, Doc n° 12621, 23 July 1792; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 181, Doc n° 12623, 12 September 1792; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 185, Doc n° 12880, 17th May 1794; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 197, Doc n° 13522, 29 March 1797. INE: Balanças Comerciais do Reino de Portugal, 1796, 1797, 1799, 1800.

Casa da Índia, liv. 603,1793-01-30a 1793-10.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1585,1795a 1796.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 661, 1795-04-07a 1794-11-04.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 660,1795-12-29a 1795-11-27.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1586,1796-12-16a 1797.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1587,1798-08-07a 1798-12-01.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1696,1799-01-02a 1799-12-11.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1697,1799-12-12a 1799-12-16.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1699,1800a 1801. A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 177, Doc n° 12423, 18 July 1791; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 181, Doc n° 12621, 23 July 1792; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 181, Doc n° 12623, 12 September 1792; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 185, Doc n° 12880, 17th May 1794; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 197, Doc n° 13522, 29 March 1797. INE: Balanças Comerciais do Reino de Portugal, 1796, 1797, 1799, 1800.

**Graphic 2.** Tendencies of *Pau-Brazil* sent to Lisbon according the Different Sources

Sources: ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 657,1790-04-20a 1790-10-15.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 652,1791-03-21a 1791-09-13.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 610,1792-01a 1792-11.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 603,1793-01-30a 1793-10.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1585,1795a 1796.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 661,1795-04-07a 1794-11-04.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 660,1795-12-29a 1795-11-27.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1586,1796-12-16a 1797.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1587,1798-08-07a 1798-12-01.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1696,1799-01-02a 1799-12-11.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1697,1799-12-12a 1799-12-16.; ANTT/Torre do Tombo: Alfândegas de Lisboa, Casa da Índia, liv. 1699,1800a 1801. A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 177, Doc n° 12423, 18 July 1791; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 181, Doc n° 12621, 23 July 1792; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 181, Doc n° 12623, 12 September 1792; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 185, Doc n° 12880, 17th May 1794; A.H.U, Conselho Ultramarino, avulsos, Brazil, Pernambuco, Caixa 197, Doc n° 13522, 29 March 1797. INE: Balanças Comerciais do Reino de Portugal, 1796, 1797, 1799, 1800.

**Graphic 3.** Pau Brazil sent to Lisbon According the different sources

It continues, in this period, to have a relative demand in the great textile centers like in London, where it was one of the export markets of *Pau-Brazil*. Nevertheless at the end of the eighteenth century, this wood had others main markets, like Hamburg, where about 60% (17412 *quintais*)

the same tree were sold between 1796 and 1800. The re-export of this product is almost a barometer of what happens in re-exports of other products. This city is of the first position in 1796, 1797, 1800, in the consumption of the products of Brazil *Pau-Brazil* in particularly. This was followed by Britain which is secondary nation of re-export of this product with a total of 15% (4185 *quintais*), even reaching preeminence in 1798 and 1799. Followed by the third, Italy, with a total of 9% (2639), over these years, except in 1800, which is in second place. The fourth is Castile, where it was re-exported about 6% (1705) of the total. The Netherlands who were fifth, with a total of 5% (1488 *toros*), corresponding to the first two years of the data collected. (Table 2A, Table 2B, Table 3, Graphic 4

and Graphic 5). And last Prussia, where it went about 3% of the total [24]. This is accompanied by a drop that accompanies all the other nations that consume this product, Denmark which has increased by 1799 to 1500 *quintais* of this product (Table 3, Graphic 5).

Comparing that the years of the fall of this product were in 1796-1797, there is no correlation with the shortage at the base of the break of this product. Except for the substitution of Italy by the Netherlands, it follows all the parameters and trend of the nations that commercialize Portuguese colonial products. In fluctuations, despite the fall in Hamburg demand, they are slight in the demand for this product. In spite of that low value, its consumption in Hamburg make it very important.

**Table 2A.** *Pau- Brazil* re-exported to Europe in *Quintais*:

Year	Hamburg	Great Britain	Netherlands	Italy	Castile	Barbary
1796	2655	0	144	768	217	55
1797	7643	768	1344	702	510	108
1799	5664	1353	0	512	596	178
1800	1450	2064	0	657	382	87
Total	17412	4185	1488	2639	1705	428

Sources: INE: Balanças Comerciais do Reino de Portugal, 1796, 1797, 1799, 1800.

**Table 2B.** *Pau Brazil* re-exported to Europe in *Quintais*:

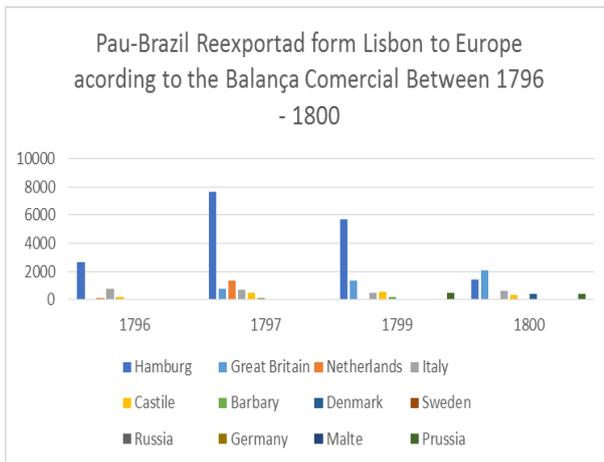
Denmark	Sweden	Russia	Germany	Malta	Prussia	Total
0	9	1	44	15	0	3980
0	0	0	0	0	0	11075
0	0	0	0	0	480	8783
400	0	0	0	0	400	5440
400	9	1	44	15	880	29206

Sources: INE: Balanças Comerciais do Reino de Portugal, 1796, 1797, 1799, 1800.

**Table 3.** Percentage of *Pau-Brazil* sent from Lisbon for the deferent's parts of Europe from 1796 – 1800.

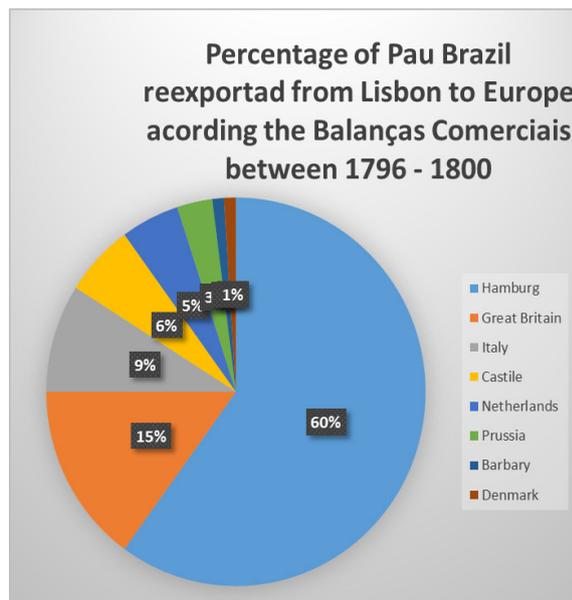
Hamburg	60%
Great Britain	15%
Italy	9%
Castile	6%
Netherlands	5%
Prussia	3%
Barbary	1%
Denmark	1%

Sources: INE: Balanças Comerciais do Reino de Portugal, 1796, 1797, 1799, 1800.



Sources: INE: Balanças Comerciais do Reino de Portugal, 1796, 1797, 1799, 1800.

**Graphic 4.** *Pau-Brazil* Re-exported form Lisbon to Europe according to the *BalançaComercial* Between 1796 – 1800.



Sources: Sources: INE: Balanças Comerciais do Reino de Portugal, 1796, 1797, 1799, 1800.

**Graphic 5.** Percentage of *Pau-Brazil* Re-exported from Lisbon to Europe according the *BalançasComerciais* Between 1796 – 1800.

In spite of those percentages this product was very valorized in the international markets (according to Jorge Pedreira and Jobson de Arruda) reaching 778, 7% of profit taxes [24], [25]. This phenomenon, more that the quantity it's consequence of over price by unit that allows to balance the reduction of unities [24]. The *Pau-Brazil* that came to the price of 1 \$ 000 *reis* the *quintal*, and was sold to 4 \$ 400 *reis* allowed some return of 3 \$ 400 *reis* profit per *quintal*. Nevertheless, there is a steady decline in demand for this product in Hamburg from an average of 8000 *toros* to about 2,000 *toros* in 1800.

To understand this valorization we must also understand, the exotically goods in the end of the XVIII century. The eighteenth century is characterized by the

search for exotic goods among which the different parts of the Overseas [26]. About this search Maxine Berg and Elizabeth Eger report the demand for Asian products, mainly Chinese silks and porcelains [27]. The expansion of this consumption, which leads to the appearance of new products in daily consumption, shows that there was a market for any new productions.

This is explained by the diversification of the supply and demand, which illustrates why didn't experience a total break. When there is a breakdown of one of the main markets for this product, a fragmentation of its demand by some trading partners, permitted the stabilization of this product. Now here is a question, what is the weight, besides sugar, that Brazil wood had in the Portuguese colonial products? Despite being 1%, it is the fifth most re-exported product in Brazil to kingdoms capital. And we speak of 1% which means earnings, over the whole of the 4 years, in the order of 24,032,188 \$ 400 *reis*, so we speak of a relatively high value in that period of time. This percentage margin, although minimal, corresponds to the highest value, after the 6 most important products in commercial traffic.

The reduction and rarity, among a consumer society in growth would ensure a market for those same goods. In the case o *Pau-Brazil* we have a product that could be use either to ship building, either to taint the tissues made in the factory's with a red ink. Not being consumers good for a person, it was a asset with a great profit tax, in a moment where industrial revolution was making its steps. There is a change here, compared to the XVII century, of the main exporters of this wood. The Netherlands had access to an Asian variant, which explains the reduction of exports. Great Britain had access to the colored cotton that came from Asia, not having to export *Pau-Brazil* in great qualities. From these nations there is a loss of interest in *Pau-Brazil*, since they do not need their action as a dye plant. Contrasting these data with those of scarcity, I can affirm that the problem generated ends up not having an influence on the re-export of this matter. The trade balance, compared to 1796, is relatively low approaching 2000 *quintais* . Since 1782 because of its trade with America [28], Hamburg its one emergent commercial city establishing a trade bridge between America and the German city states. Part of that importance, as well, came from the connection between Hamburg, and the Atlantic ports. Nevertheless the importance of *Pau-Brazil* insured a trade with a harbor that meant access to goods provided from Germany. This, in potential, meant the continuity of a relationship that allowed Portugal to have a positive economic balance. In this case the re-exportation of *Pau-Brazil*, in spite of its low numbers, allowed Portugal to keep Superavit in the relation with Hamburg. In the case of Italy it can be integrated in the crisis, after the famines of 1763 – 1765 when Italy start import raw materials and agriculture goods instead of luxury goods [29]. *Pau-Brazil* due to its coloring properties ability's was a raw material

who could be used in the painting of clothing in the Italian markets. On the other hand, this re-exportation from Brazil helped Portugal to reestablish connection with old markets and to open new markets for trade.

And even in re-exports, with the data we have access did not have a significant impact, since in the year 1796, remittances to the kingdom were over 2000 *quintais*. And that the decrease is continuous, and the losses of demand even with the recovery don't have an impact in the economy. In my view, we are facing a decline in the demand for *Pau-Brazil* in the international context.

### 3.1.1. Results: The Decrease of *Pau-Brazil*

#### 3.1.1.1. Causes and Measures of Preservation

Seen the importance of this wood, let us start to attend the motives for deforestation, and scarce of the *Pau-Brazil* in the period of study. If this data about the tree, can be tackled in an economical approach, can also be studied in an ecological turn. Inquiring the Portuguese empire, in the subject of environmental history, has been more approached on the acclimation of Asian plants in America, or about the migration of native African consumption plants to America (case of *mandioca*). That question makes us consider about the impact of trans-Atlantic economy in the exploration of colonial resources? Paul Ward, as already was stated, the early modern expansion as a "pathway of ideas, and species" crossing around the globe [10]. In the perspective of an interconnected history or a global history, allows understanding the ramification of the circulation of goods and ideas around the Earth. But, and about the impact of the same process, in the point of depart of the species?

According to Marsh, as already written, there the action of men, in the natural has deep consequences. If by one hand it could have its effects on economy, for the other implies that this good was being reduced to a near extinction. In one hand, the history of nature, can connect with the history of circulation of plants, can always connect with their extinction. If in an international economy perspective the interpretation was, that the *Pau-Brazil* was being difficult to supply, in an ecological perspective meant that this timber could be disappearing at an extinction level. This affected its economic use, because it could not be the risk of its extinction was never be commercialized again. It's not necessary to analyze the numbers, to not make the information superfluous so let's see what literary information (the sources) can provides about the question. Connecting this numbers with environmental demand, the functions to establish the trends to regular services can be applied to environmental goods [47]. The functions, as only difference it's the accounting of the pay, that it's related to natural elements and not to natural goods [47]. Has already saw, this product was valued and had a price in European Markets. In answer to the second question placed by Diogo de Carvalho Cabral, about the shortage of *Pau-Brazil*, lets

inquiry what information the sources of the A.H.U can provide to trace the causes of the deforestation.

In 1792 came the first warnings about the exhaustion of this wood from the part of *Pernambuco*, mentioning that could bring an irreparable damage to both *Pau-Brazil* and Naval construction timber. This question it was also pointed, as the motive for the lower exportation of the mentioned assets [30]. Presented this situation the crown choose to use a preventive approach, but without stop the shipping and cutting of the trees. The recommendations followed was to choose well the *toros* of the wood that would be sent to the *Ribeira das Naus*, so that the contractors do not continue to refuse them. In this line of action, at the date of this office, it was not possible to see such a gauge, referring to the thinner logs that is already paid for by the *Fazenda Real*, for while do not reach the required dimension is suspended the purchase of more *Pau-Brazil* [31].

But in 1796, after having been ordered an inquiry into the state of the woods, the first real solid information appeared [32]. That *Oficio* gives a picture of a devastated forest witch (according to the source), results in a reduction in its size.

In July of that same year, there was another *oficio*, in which he made known the state of the *Alagoas* wood. The Judge Corregidor José da Mendonça Mattos Moreira, made a personal inspection of those bushes. The situation becomes serious to the point of the contractors João Roque Jorge, to send a letter to the king, stating that he has only received half of what he should have receive from this wood [34]. The governor is justified by the scarcity of the tree, which he had already warned the crown. Although the Governor has increased the value of this product, in order to attract more labor to its extraction, the values according to him, are not enough to fulfill the contract [8]. Leaving here the question, what are the causes of this drastic reduction in the wood of *Pau-Brazil*?

According to Anthony Pena, one of the ecological fields of interpretation it's the part of men: in forestry, fire, environmental change [10]. It's inseparable the part of men in the reductions of the *Pau-Brazil* forests, what forces to regard the multiple motives in its core. There are four causes pointed out in the documents to justify this devastation: The chopping of the wood, the breach of royal contract, Smuggling, the use of the timber in sugar production.

About the chopping of the wood the Governor of *Pernambuco* indicates, that for 50 years there were, in these forests, cuttings that surrounded the average of 10 - 12 *quintais* year demonstrating great admiration for the contraction found. It is made by this governor a diagnosis, in which he points out that since the cancellation given to the junta of the city had been annulled, and given the authorization to the peoples to make the cuts as before, it caused a shortage of the same wood [30]. All those who wanted to make the cut were called, and to say the price

they wanted. What is not possible to reach a legal consensus, it was established that it would be a thousand kings by *quintal* [33]. About this question, according to Cippola, the peasants of modern Europe had poor incomes [2], which made it justifiable by the high investment in subsistence goods [2]. In Europe, incomes were low, which forced smallholders to seek additional resources from those they had. In this logic, the small owners had to seek either income or extra resources to be able to subsist or be a complement for sale. At this point it becomes essential to speak of the concept of agricultural economy as Daniel Thorner has developed: as a system in which production aims at self-sustenance and that surpluses seek to look for what the household does not produce. However, within the criticism made by Francesco Boldizzoni, we must distance ourselves from the theoretical bases that are not economy and an economic object, but rather subsistence seeking complementary in the market. As the historian himself indicates many of the choices, rather than those made on a rational basis, are made on the basis of more irrational than a rational parameters [5]. As part of that critic, he points that cliometric interpretations begin with a theory that it's then applied to history, instead of the theory being elaborated based on the data and crossing with cultural, economic and social question of the historical period.

Other of the causes mentioned is the breach of the royal monopoly, causing that the action of the people in the cutting of these forests had reduced drastically those woods. Did this occur in 1791, if it is possible, as it was? From 1791 to 1795 with the reduction of those forests to, that level? It is certain that there is an increase of 3000 *quintais* to the order of 15000 from 1790 to 1791, which in fact with the increase of demand, reduced the number of trees available, beginning the abrupt decline from 1793, affecting the region from which these woods are extracted, to an almost irremediable point.

But those were not the only causes that were indicated. Other causes for this thinning, according to this document, were the fires, to give pace to the sugar plantation a practice that was being recurrent since the introduction of that plant in Brazil [32]. Many of the best land were already used for the mills, which forces more areas of forest to be felled in order to obtain new soil for cane planting. A later office of the same governor indicates that in the lack of fertilizers, fire was being used to burn the soil as an alternative fertilizer [35]. Along with the search for new soils, it was also used to fertilize those lands that already were used for sugar cultivation. This theory, it's interesting but to what point can explain the destruction of the forest. If we talk about lands near the river, then we are certainly talking about one of the main causes to pave the path for sugar plantation. Sugar and its cultivation need a lot of water, and sugar cultivation in *Pernambuco*, was in a period of high, being the 3rd main supplier to the kingdom [24]. If we speak of the use of this method to

conquer lands for this purpose, in riverside zones, then it will do justice to this intention. In the environmental level, this meant the destruction of the landscape, not to use the same wood, but because of the sugar trade. One of the theories, and research basis in Ecological History, it's the part of men as a changing force in the Natural Landscape. As already stated, this parts (according to Turner) the domestication of nature by humanity. In the ends of the XVIII century, sugar trade was gaining – after the rebellion in *Tahiti* – a new boom in Brazilians exports. This meant that the woods would have been shopped, to give place to new land of cultivation. It's a hypothesis since like it happened in *Bahia*, most of the farmer's start – due to its high profits – to turn to sugar production instead of subsistence good productions [36]. This question however was not restricted to subsistence goods, but also to the woods. In spite – in the case of *Bahia* – there is separation between the lands where were the sugar mills (*reconcavo*), and the woods in the end of XVIII century who, where in danger. The main cause, more than the shipbuilding, was due to the maniac cultivation. To protect the woods, all forests around the coast and in river banks, where considered royal property and could not be given in *sesmarias* [37]. According to that theory, that action had fundament cause the landscape was being tamed, due to men's interests. But, was the fire the main cause for the forestation of Pau-Brazil? There is here a pattern that should be considered, like it's clear in the documents – in comparison with what happened in *Bahia* – one of the main actions taken by farmers was to burn land and shop wood to have more available soil for the production of sugar. But, can this be applicable in this case? The scenario indicated riverside as well as coastal lands with a marked deforestation [32]. Sugar culture it's mainly strong in regions where there is a great deal of water flew, which doesn't happened when we go to the inland. And fire would consume large areas, and not only a specific species. Therefore, to be used to justify the cuts in the interior would not make sense, for this reason since the sugar, by the conditions of production, more to the backwoods there is no longer.

Another reason mentioned is the use of wood as fuel wood for sugar mills, which alone do not justify the level of deforestation found [35]. Whether given the geographical question or connected to the sugar production in *Pernambuco* in the second half of the XVIII century. Only the fires themselves were not enough to cause this damage. Another cause is the cutting of illegal wood, on this when doing the above-mentioned survey the forests, it is noted that excessive cuts were made, losing much of the forest heritage.

On the other hand they were done in an irresponsible and negligent way, seriously damaging the trees. The reason for negligent action in the eyes of the Portuguese authorities is the prohibition of *calafates* (caulk) and *carpinteiros* (carpenters) in Brazil, given the smuggling of

timber in *Rio de Janeiro* that all caulkers and carpenters are sent back to the kingdom [38]. Paradoxically what would be to avoid the cutting of illegal wood, ended up having an opposite effect in *Pernambuco*? This measure deprived of a large part of good labor to carry out the thinning of the forests where there was wood. That makes the people do it, on their own initiative. Already in the XVI century the king, who had allowed this activity to his subjects, found himself obliged to place this business on a royal contract, given the excessive slaughter of these trees [17]. With the lack of labor there is no one who makes these cuts in condition, nor does anyone who goes to the forest cut the wood. Who made the cuts was not able to do it, damaging seriously the forests of *Pernambuco*. On the other hand, if there is no good price, the manufacturers stop cutting them or if they do, then they did it clandestinely do what the extent of the coast is not possible to watch. This issue is therefore related to the lack of skilled labor, which leads to unqualified people doing it. There is the difference in the type of cut that is made, since those who are not professional, make the cut of subsistence, which is for the wood, for the construction, but not with commercial intentions. The thinning that was badly done resulted in an inability of the forest to regenerate, with consequent reduction of its trees. One of the reasons pointed out by various offices is the lack of maintenance of the areas, for lack of an intendant that was to watch the forests and to supervise whether or not there were illegal cuts. As a consequence both of the fires and of the bad cuts, the woods near the coast have been extinguished making, the wood not already near the coast, but rather the 12 leagues from the port of *Embarque* [32].

The smuggling it's another of the causes pointed, as responsible to this decrease. According to the documentation in the summer it was easy to access this captaincy, namely by the *Bahia da Traição*, where any ship could come, being close to the woods where the cut is made [39]. There were thus conditions for the smuggling to be made, but was this a real cause? The smuggling has resemblance with the myth in *Fernando Pessoa*, is the all or nothing of the Portuguese documentation. It is often mentioned, but there is rarely any concrete data to allow its investigation. Even if you want to make projections, there is no data that will allow you studied properly. In the first place, it is difficult to quantify, there is a lack of studies to compare in the different parts of Europe, what has arrived from products of Brazil, through this practice, comparing with the different statistical sources for this period. Contraband is in the view of José Jobson de Arruda, one of the main reasons for the retraction of the Brazilian colonial economy [24]. Jorge Pedreira contests the premise of Jobson de Arruda, stating that for this in what he designates as an estimative, they presuppose a balance in the commercial operations that are not there [25]. Even the negative level of trade is too small to be the work of commercial competition. One of the factors

responsible for its increase, and demand is the price increase of a particular product, which makes it attractive and cheaper to obtain. This phenomenon cannot be seen here, since re-export to the kingdom did not value this product, which would correspond to a maximum of 2% of that captain's exportation to Lisbon. At the price level, as we have seen, from the colony to the metropolis were 1 \$ 000 *reis* a yard, with a valuation of 4 \$ 4400, on the other hand as we have seen this business did not have a strong impact on the economy, neither Brazilian nor *Pernambuco*. In order to get a sense of the size of the contraband, we would have to know where the ships came from, their origin, and destination, which is not even mentioned in the documents. It was not difficult to know which ships and which nations did the activities, in the case of Benguela, Angola, there is reference to the presence of ships to smuggle in the coast. And even in Brazil there are several that indicate where the ships come from, if the destination is unknown. In the case of *Pernambuco*, the idea of smuggling is associated, but it is not even a debauchery, much less one tries to know what nation it was, which in itself makes the idea suspicious [39]. On the other hand the documents affirm a possibility, indicating a place from where it could be done, but does not attest that there is indeed such a practice. Soon there are means by which one can know, or determine whether it was or not smuggling.

In a general view, we can't determinate only one cause for the scarce of *Pau-Brazil*. In my view all of these factors, with exception of smuggling, made their contributions to the deforestation and it's in short supply. If by one way the search of complementary profits, forced the farmers to chop the tree, the culture of sugar – in spite of not being the most appropriated soil – was one of the causes to make the chop. All those reasons, by itself, could not be cause for the deforestation. But all of them together had its influence in the disappearing of this wood. In an ecology interpretation, the causes may consider men changing influence in the landscape (sugar cane); And economical ones (source of income, that led to *sesmarias* and fires). Given these problems, the following question arises, what solutions have been found?

### 3.1.2. Solutions to Stop De Deforestation

Talking of measures of preservation of Brazilian wood, it's not only regarding the period in study. By the beginning of the XVII century, in 1605, that the Portuguese crown tried to restrict the cut of the same wood to ho had concessions promulgated by the *provedor-mor*. Nevertheless in spite of the situation, the authorities took measures to stop and regulate the chopping of the trees. In what concerns both this period, we have the work of Warren Dean about the Brazilian rainforest. Not making a large comment to this interesting book, let's go directly to the results this historian presents about the period in question. This author concludes that

Portugal was losing its economy to other European Nations and was necessary a larger fleet, more diverse production and economy from the colonies, better colonial infrastructure, and, perhaps, major productive integration inside the colonies itself in the sectors that sustain economy. In this question he underlines the risk of deforestation that was very high, and using science for that effort could (in case of a situation of continuous exploration) accelerate its demise; in the other hand a situation of cautions and delivered exploration could allowed it's preservation and renewal being economically beneficial. According to Warren Dean some hypotheses of preservation of the Amazonia Rainforest where made in the beginning of the second half of the XVIII century. Measures that, by one hand pass by the use of science, where there wasn't a stop in the cut of trees but a selection that could not take more than a certain type and number. Most of the criticism, it's based more of the little know of the species, then actually some practical measures and the creation of a botanical garden in *Rio de Janeiro*. Nevertheless the theme, he makes no reference of this case of the *Pau-Brazil*, doing for the XVIII century a small survey about the contacts with the ideas with Europe [40]. In the other hand, he studies more the creation of botanical gardens in that chapter like a way of conservation.

The pattern established was the regulation of the cutting, to avoid the extinction without compromising the economy. About the economy process of forestation of Brazil there as been a field some research, like the works of Dean Warren, in which they resume a topic of the destruction of the Brazilian Atlantic Forest by the Portuguese.

Nevertheless beside that general view, the governor suggests other solutions. The governor warns the crown that in order to have large forests of *Pau-Brazil* and other woods, it was necessary that these forests be saved for a period of 10 - 12 years in order to regenerate themselves [41]. Within this line of action it was recommended preservation measures, as well as of conservation. This measure implicates the total stop of chopping, what meant that for that period it would not be done no chopping at this wood to allow that it could be regenerated. On the fields of economics, we should consider the base of per-industrial economies. Early Modern and previous economic times, where widely depend of Nature. The climate, plagues, scarce, could be the basis of great crises. And, also, was largely dependent either for energy terms, either for resources to complete the scarce resources of a person. And in the economic boom that Portugal was having, it wasn't wise to suggest any measure that could harm but one that could mean the best of both worlds. The solutions for this problem are debated between what we can call the notions of preservation and prevention. But, how can we apply this concepts historically without commit any anachronism. The concept of Preservation

collects several practices that, for the conservation of wild life, and natural world, imply the restriction of the access of men at certain species animal and vegetable. To achieve those principals, it's tried to maintain natural areas as closest possible of their natural condition. Conservation, by other hands, has it implicate the possibility of some, but reduced interaction with men but at a level that the environment wouldn't be damaged. Other concept, that we should take an account; it's the notions of prevention. In which the natural areas must be intact, and protected from the action of men.

The first to prevent further reduction of the *mata*, is through the vigilance preceded by Sergeant mor *Antônio da Costa Araújo*, reinforcing penalties and threats if they were made [32]. This is a preventive measure, in order to avoid further reduction by preventing people from undergo the illegal chopping. In the same line of action to avoid the cuts and the action of the individuals in the *matta*, it is on behalf of the governor forbidden the cut in the best forests, incurring in serious penalties that would be caught in these actions [32]. Another part of the solution found goes through a Bureaucratic solution, in order to better control the state of the forests. To do this, and to maintain the forests, the office of a superintendent of forests is created; that would be in charge of the preservation of these forests [43]. When the post is created, it suggests that it be given to a skilled, intelligent man of these matters, who will reserve for the crown the best woods. Within this profile it is suggested that should be awarded to José de Mendonça Matos Moreira, so that he could investigate these forests in a competent way [39]. After that survey was carried out, the reserve of the best forests for the Crown, the remaining was for the use of the Peoples [32]. This measure is based on the same practice done to the pine forests of Leiria, where there is a superintendent of forests responsible for their investigation. The demarcation by *tombo* begins, being the superintendent responsible to all the cuts are necessary to the wood[32]. Within the same bureaucratic part, a monopoly action was developed on the riverside lands. The creation of this office of *Juiz Conservador das Mattas*, according with B.N.L Souza, would be responsible to regulate the shop the woods; improve the methods of chopping; and see if the timber already chopped where of great quality; but also conserve the woods, and know what diseases may affect it [44]. This solution, can be regarded as preventive measure, that – if by one hand – permits the chopping in which can be also regarded as with conservation proposes, because I theory would allow some chopping but, without disturbing the trees, it can also be inter operated as of preventive objectives. The creation of those offices had as a main objective to insure that those forests would be unharmed and that the chopping wouldn't affect them to extinction near level. In case of any law breakers be found, they were instructed to punish them according with the Portuguese Law.

Another solution was the search for new forests, in order to ensure that there is continuity in the shipment of *Pau-Brazil*. In the absence of timber of the tree in study, the crown starts to search the same commodities in other *capitanias*. In this period, within its plans of autonomy from the jurisdiction of the captaincy of *Pernambuco*, the captaincy of *Paraíba* sends several offices in which allude to the quality of its woods advocating that its separation from *Pernambuco* would be more propitious to this contract than its dependence on *Pernambuco* [42].

In 1796 there is an inspection of the neighboring forests, to see which ones have the best woods and those that do not correspond to the desired measures. An examination of the forests and ports of *Paraíba* confirms this same facility for the shipment of construction woods, nearby ports and forests, and easier paths [31]. However, the non-existence in *Paraíba* of forests that correspond to the criteria of the Kingdom.

What leads to search in the forests of *Pernambuco* in the region of *Alagoas* [32]. In this way the solution found, in the absence of good forests in *Paraíba*, is to intensify the demand within the own *capitania* of *Pernambuco*. Hence, after an extensive and cautious investigation, the forests of *Inhaum*, *Fiquia*, and *Benguela* found the site of the cuts calculated to be roughly 10,000 to 12,000 *quintais*, with these lands being able to send timber [33]. Finding out in these woods, where there were the logs of greater quantity and quality, not only of *Pau-Brazil* but also for the naval construction [32]. But if they helped to reduce the shortage of timber to the crown was unable to solve the situation in the *Pernambuco* forests. The commander of the same comarca, *Alagoas*, José de Mendonça Matos Moreira states that in the woods where no cut had been made, woods of palm groves, according to the *meirinho*, had woods inside the conforms [39].

Another measure introduced, with the same finality, was the creation of *cotas* and the given to the Jesuits the Monopoly of the cut of *Pau-Brazil* [23]. This measure is part of a request of 1797 to conserve the forests, prohibiting their cuts to individuals, restricting them to actual use [32]. The same prohibitions were extended to the forests of *Paraíba*, besides those of *Pernambuco* [32]. These forests are all considered exclusive property of the crown, and no one can make use of them, neither for chopping neither for *sesmarias* [45]. This measure, can be include in conservative measures, as it separates part of the forest from the general populations permitting a reduction of the actions caused in them.

One of the causes that the documents indicate, as a cause for this deforestation, letters of *sesmarias* given, which led the Portuguese crown banning this practice in areas that are planted or near the rivers as well banned future award of land for that zone. To survey this process the *corregedores*, reviewed the possession of the lands. To whom the *sesmaria* already had been given, in the lands near the coast, as well as the land near the woods, must

bring the documentation to be ascertained its legitimacy. On the other hand, it is ordered to demarcate the lands where the forests are, and where there are the rivers to take into account the richest forests, so that they can be used only by the crown [45]. In this perspective a situation of legal action is used, in consonance with the exploration of the territory to solve the situation. This measure aimed at legally restricting the ownership of land, as well as of people who could harm them. It is hoped, in my view, that this would prevent the peoples from making use of the restricted forests the royal authority. The governor testifies that the *corregedores* were always open-minded, hoping to punish whoever incurs in that crime. In order to cope with this measure, it is tried to generalize the use of the already ground cane, as fuel instead of using the wood for the sugar boilers [43]. It is thus tried to give alternatives to the peoples, so that they do not use the wood in the boilers, trying to implant this method already used in the Antilles. This measure, can be regarded as a conservation measure, in spite no being conceptualized with this notion in the same historic period. By restricting access to the forests, the chopping of the wood and the right of property, was only off the Portuguese crown and its authorities that could provide access as well of the chopping that should be done by crown regulation. In theory that would allow, by the restriction both to lands, and forest that the trees wouldn't be harmed, and therefore

In another perspective we have here a sample of the care generated by the diversification of production, in view of colonial exports. Treating-When dealing with a product that only exists in *Pernambuco*; its disappearing could result in serious damage to the economy, while sugar is in several captaincies. Diversity of production was safeguarded, guaranteeing the continuity of a product. Once the matter was settled legally, the quality of the *Pau-Brazil* of *Alagoas* was examined, and two logs were sent to *José de Mendonça de Mattos*, Judge and Corregidor of the same county, where the quality is documented [35]. The decision is nothing new, unless the monopoly on forests is strengthened. In this way the traditional system of exploitation is maintained, being protected of legal action, being revoked the freedom of cut of the same forest, to benefit of the crown. The same measure reinforces the initial practice made by the Portuguese crown on the Brazilian forests. In my view, despite the different reasons, the lack of this same wood, paralleling the brutal increase in exports from 1790 to 1791, is the deregulation that leads to indiscriminate cutting, the other issues being responsible to its near extinction.

## 4. Conclusions

The concept of nature, was more important, not only in official language, but also in safeguarding the natural

goods of which the economy depended in XVIII century. The same good, if economically loses its importance continually from the XVI century to XVIII century, its profits and importance among other products makes it important to preserve. Though most of the historiography tends to study this matter in an economical perspective, it's possible in the ends of the XVIII century to study it, due to the level of information and documentation available in the different Portuguese archives, in an ecological perspective. In economical view the same diversification of production that accompanies a favorable recovery of sugar does not accompany *Pau-Brazil*, which has a peripheral position in Brazilian products. This product had an insignificant weight both in the economy of *Pernambuco* and in the Portuguese re-exports economy. However the scarcity of this and other woods, leads to a reversal of a policy of free exploitation of it, in the face of a monopoly policy. But, nevertheless, what it's not achieved in quantity it's achieved in profit for overvalued, reaching the perceptual value of 778, 71% in the European Markets. In spite of the absence of great volumes of trade, it's generated a greater cost than the search turns in extra profits. That makes one product, in spite of the low weight in exportation the high profit range made it important. This economical importance would be the basis to try to safeguard the same accent, not by preserving it as we understand today, but under the logic of the Ancient regime economy from which meant a balance between preservation and collection. Beside the economical numbers, the official documentation provides us safeguard to see, within that periods view, the causes that explain the numbers in question. As which it is seriously reviewed several aspects of economic policy in *Pernambuco*, reducing the *sesmarias*. The drop in exports to Portugal is not accompanied in the same dimension at the international level. There is a general fall of the same product, with few increases of its demand in Europe. However, despite the weak demand, there is a stabilization provoked by the diversification of commercial partners that although they look for it in small quantities, they allow a reduced fluctuation of the demand of the same ones. However, although it also accounts for only one per cent of the weight of the economy in the trade balance, Hamburg has no significant value. The weak impact, and also seeks, of this wood internationally, related to the transformation of the dye industry, also explains this drop in demand. However, given the already weak demand, and despite the statistical paradoxes in this case, the fall of the *Pau-Brazil* does not have a significant impact on the re-export, neither in the global scope, nor in the regional scope. However, this is due to a fall in demand, a steady reduction in demand and a stabilization of demand. Soon after the *Pau-Brazil* scarce, it does not have a significant impact on its demand. But, due to the fact that it's involved, in an economical search of the exotique the profits could go very high making it an interesting product

to spare. There for, in a moment that Portuguese economy was getting a boost, it meant that the slightest gain could make a difference. If by one hand, the numbers indicate the commercial importance of the wood, it also indicates the level of deforestation that the same woods

In this economical process it's necessary the safeguard of its woods, so it could continue to produce timber for re-exportation. With that guideline it's necessary to act to preserve the same accent so it doesn't extinguish. In that part, the number can be interpreted in an ecological view, connected with the causes of the scarce of timbers. For that reason there its several causes that could explain its scarce all connected with human and economic activity like: give pace to sugar production; illegal and unregulated cuts and contraband. It's not possible to determinate just one cause, all of them with the exception of smuggling to which there was no evidence, only suspicion, may had contribute to the deforestation. The solution however, didn't pass by totally prohibition of the cutting of the woods, as it his subjacent in the thought of D. Tomás José de Mello, but regulation in the cuts and search so it wouldn't lose its economic value. About the safeguard of the same wood, once Portuguese authorities had a long relation with this product, was not to send it to any botanical garden. The preservation here must be seen in symbioses with economy and within the standards of the XVIII century. Under that duality that Portuguese crown use, due to the economical conjecture, prevention according to principles of ancient regime, and Portuguese tradition. It passed by creating means of regulation, about the cut, about to the access to the tree, and also means of control and coercion of necessary. Part of that measure's involved the creation of alternatives for the cut of the wood, determination from where and if she could be cut. To prevent the chopping, the applications of new methods and techniques to boil sugar, that tried to avoid or reduced the use of the timber. By regulation creating measures to stop the same cuts, was integrated the creation of the rank off the *conservador das mattas*, that should be responsible about the prevention of the Atlantic tropical rainforest and was a preventive action, watching it and to stop in the field any law breaker providing as well some information to crown about the states of the woods. On the other hand it was reviewed also the *sesmarias*, to stop that they would be given land where the *Pau-Brazil* was. By reorganizing this Portuguese practice it would permit that the people had restricted access to the land, which implies that they could not have the possibility to reach the woods, and cut the trees, and was a conservation measure and avoid more damage that it had been done. But, the Portuguese crown issued orders to try to minimize damage that would try – by making those woods less accessible – to avoid further deforestation. And also, to create alternatives to the use of timbers, in the boiling of sugar, so that trees were spared. These measures intended to prevent the disappearing of the *Pau-Brazil* keeping some

control over those woods. Those measures, to avoid the same problem that occurred in *Pernambuco*, were extended to the forest of *Paraíba*. Here we can see that the Portuguese crown used these measures as model, to the safeguard of a specific species of tree. The ecological measures taken by the Portuguese crown, where preventive to avoid that the *Pau-Brazil* woods suffered a bigger shortage. To sum it up, the need of the good, in the context of Portuguese economy, as an asset of exotic value, force the crown to create measures to protect the same good so it could maintain its weight in economy of the XVIII century.

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