Amazon

Brazilian Challenge of the XXI Century

The need for a scientific and technological revolution

Science and Technology for National Development

Strategic Studies

Amazon

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The need for a scientific and technological revolution

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Proposal of the Brazilian Academy of Sciences
of a New Model for the Development of the Amazon

Presentation

With the objective of collaborating, specifically to Science and Technology, in the search for solutions to important problems which affect our society, the Brazilian Academy of Sciences (ABC) has attempted to adopt a more proactive posture, aiming to contribute in an effective way, to the process of formulation of public policies. Within the various initiatives which have been developed, and are still being developed, we can cite actions in the areas of education – from pre-school to university schooling and up to post graduate studies, - health, climatic changes and environment, energy and water resources, always with a focus on S & T as the base of our studies and of our proposals for improvements in finding solutions to critical issues.

It is worth mentioning the needed efforts ABC has been making towards decentralization, which has greatly contributed towards enabling us to think about and see Brazil through a more ample scope. The creation of Regional Vice Presidencies is a proof of this. It is important that when we discuss a country, we are able to do so through a global perspective. Accordingly, the presence of Vice Presidencies in the South, Southeast, Northeast, Minas Gerais and Midwest and in the Northern region, greatly contributes to the Academy, in its analysis and reflections, in having a far richer perspective of Brazil.

Within this context, which perceives the Amazon as being strategic for Brazil and for the planet, and attempting to collaborate in the construction of a new horizon for the region, in the year of 2007, ABC instituted the Study Group on the Amazon. Constituted by part of ABC´s Board of Directors and some of the main Brazilian scientists who develop research in and about the region, this group embraced the challenge of elaborating a proposal for the Academy focusing on S & T, which would be able to serve as a common base for different alternatives for the development of the Amazon, while still preserve the riches of its environment.

Thus, ABC seeks, with this proposal, to lay the foundations for a process which contributes to the strengthening of S & T in the region. Such action will allow for the implementation of a development model that is – at the same time in which it generates jobs, income and social inclusion – also sustainable from an environmental point of view. We hope as well, that it contributes, in an even more effective way, towards including the Amazon in the list of national priorities.

It is therefore, with great satisfaction that I present the document “Amazon: Brazilian Challenge of the XXI Century”. I perceive with great joy, the warm welcoming with which it has been received by ample sectors of the Brazilian society. There have been innumerous manifestations of support from Ministers

and important people from the Federal Government, from the State Government, from the National Congress, from the State Legislature , from Brazilian scientific institutions, from the national press and from several other colleagues and citizens interested in the future of the country. I could not fail to mention another important support, which greatly honors us, that of our priceless partner, the *Sociedade Brasileira para o Progresso da Ciência* (Brazilian Society for the Progress of Science) (SBPC), who readily embraced the project as its own. Thus, this document now jointly belongs to ABC and SBPC. The warm welcoming manifestations excite and inspire us, increasing and strengthening our desire to contribute towards the construction of a new tomorrow.

We acknowledge the fundamental support of MCT (Ministry of Science and Technology) and its agencies CNPq (National Council for Scientific and Technological Development) and FINEP (Financier of Studies and Projects), in promoting ABC´s Study Groups, among which we have the Study Group on the Amazon.

To the Conrado Wessel Foundation (FCW), our greatest thank you for yet another special contribution to ABC in publishing our study on the Amazon.

Jacob Palis

President of ABC

This *Proposal of the Brazilian Academy of Sciences for a New Model of Development for the Amazon* shall be, as of now, an object of mandatory consultation and indispensable reading for all who in some way share the public policies in our country.

And who are those who do not share them?

Excluding those who are judicially incapable, nobody. Everyone is responsible; everyone is an agent, a beneficiary or a victim of the minor and major events of a social coexistence.

If not only for this reason, there is yet another, bigger reason for the urgent analysis of this document: its content of formal quality and of high scientific precision.

We stand before a critical study whose suitability is indisputable, it brings the seal of the Brazilian Academy of Sciences and the authorship of the Study Group formed by Adalberto Luis Val, Bertha Koiffmann Becker, Carlos Afonso Nobre, Hernan Chaimovich Guralnik, Jacob Palis Junior, Roberto Dall´Agnol, having Marcos Cortesão Barnsley Scheuestuhl as Executive Secretary.

In our academic universe, such names oblige us to meditate over what they defend, evaluate their considerations, materialize their proposals and follow them, or present better ones. Stolidity is not an option. The circumstance in which the predictions over the development of Brazil entangle themselves, in this new century, lead to the debate over the Amazon region, an area of deep environmental concerns with yet unexplored riches whose demands rapidly take on gigantic proportions and spread throughout the world.

A theme apparently known but rigorously poorly studied, the Amazon is leaving its enigmatic and rhetoric halo behind; the frontiers of the national growth are invading and it shall soon become the most agonizing space of our growth and of the interchange with the other nations.

Its potential, due to its enormousness, due to the amazingness and novelty it comprises, due to the variety it absorbs, will only be safely unraveled with the intervention of scientists and technologists.

It has mandatorily become a great center of interest of Science and Technology. Of the scientists specialized in the sector, one expects a sensible orientation to transform the Amazon into a mainstay of the Brazilian future. It is no exaggeration to say that it shall be a core factor of sustainability of the planet itself.

Any public policy committed to the prospects of life in our planet will have the Amazon in mind. How to protect it? How to explore it? How to renew it and count on it? Science can and knows how.

It would be tedious to expand on the considerations to understand the ultimate reason for the new partnership between the Conrado Wessel Foundation and the Brazilian Academy of Sciences, through which the current study launches a series dedicated to strategic themes for Brazil.

It's worth remembering that the Conrado Wessel Foundation and the Brazilian Academy of Sciences are partners in the formatting of the FCW Prize, together with CAPES (Coordination for the Improvement of Higher Education), CNPq, FAPESP (Foundation for Research Support of São Paulo), CTA (Aerospace Technical Center) and SBPC (Brazilian Society for the Advancement of Science). In addition the FCW was honored to receive the diploma of "Institutional Associate" of ABC.

The vision of Science and of Technology is the great statutory objective of the Conrado Wessel Foundation. Take into account the FCW Prizes of General Science, of Applied Science, of Medicine and the Prize Almirante Álvaro Alberto also sponsored by FCW. They correspond to 25 great awards in the last 5 years, to Science alone, aside from another 20 to Arts and 5 to Culture. Added to these prizes are 6 great Complementary Scholarships attributed to the CAPES Great Thesis in the last two years. Each year these numbers grow on average to 3 more in Science and 3 more Complementary Scholarships.

We are proud to initiate, together with ABC, a set of publications destined to offer solutions to the great challenges of modernity: generate and distribute resources to grow and survive, protecting nature and privileging the environment. If we can congratulate someone, it would be all those who under the guidance of ABC, contributed towards our partnership achieving the goal of offering the country a document of the caliber of this *Proposal of the Brazilian Academy of Sciences for a New Model of Development for the Amazon.*

Here you will find correct forms of integration without frontiers with nature, inserting Brazil in the leadership of the safe proposals for an ecologically sustainable development, while still valuing the human being.

The readers shall see in this "*Amazon: Brazilian Challenge of the XXI Century*" and in other publications of this series which we have initiated, the bases for a Scientific and Technological revolution proposed by the ABC together with the FCW, a cycle of studies of opportune content and dimensions, compatible with the national alternatives.

Américo Fialdini Júnior

Conrado Wessel Foundation

President Director

Amazon

Brazilian Challenge of the XXI Century

The need for a Scientific and Technological Revolution

Proposal of the Brazilian Academy of Sciences

of a New Model for the Development of the Amazon

The Challenge

The Amazon is a global, regional and above all national issue. As such, the challenge of promoting its development is a State issue, to be debated by the government and by the entire society of the Country. It is up to Science, Technology and Innovation to supply crucial contributions with regards to dealing with these challenges.

The development model needed for the Amazon is challenging, innovative and unique. In this region it is still possible to absorb a conception of a production and consume model sustainable of its natural resources, which allows not only for a social and economical development of the region, but also for the conservation of nature and the culture of the indigenous people who live there.

This model needs to meet the demands of the Brazilian and the International societies with regards to the mitigation of the environmental problems which affect the Earth. The challenge of transforming the Amazon´s natural capital into social and economic profits in an environmentally sustainable way, is singular. There is no “model” to be copied, because there is not one tropical country developed with an economy based on diversified natural resources, mainly based of forestry, that has an intensive use of high quality S&T and a work force which has been educated and capacitated in the use of S&T.

Throughout its history, Brazil has created islands of competency in S&T which compare to those of the richest and most developed countries in the world. Yet, a history of regional inequalities has created obstacles which drastically limit the generating, the transference and the intensive use of S&T towards an equal economic and social development in all its regions.

Meanwhile, the demands of the global market for water, energy, food, biofuel and drugs, together with the increasing worldwide worry about the risks for humanity arising from destructive environmental practices, increase the geopolitical importance of the Amazon and of all its natural resources. Great investments in infrastructure, energy and mineral exploration in the region are expected to be performed soon, which adds to the challenge of a new standard of development, the issue of urgency. Only the attribution of an economic value to the standing forest will allow it to compete with other uses which foresee the cutting down of its trees and its degradation and only S, T & I will be able to show the way to utilize the natural patrimony without destroying it.

The natural patrimony of the Amazon and the environmental services it provides need to be seen as the foundation for a real revolution of the frontiers of science, which should provide an agreement between the regional development and the environmental conservation. The rational utilization of the vast natural resources of the Amazon has to be permanently incorporated to the strategies of the national development.

In this context, the Brazilian Amazon arises as an important area of political attraction, of economical opportunities and of integration with its neighbors. Brazil counts on a complex system of science and technology which generates increasing opportunities and multiple possibilities of action. Political efforts should be made in the sense of narrowing ties with neighboring countries, in order to seek competitive regional advantages which allow for a leveraging of the developmental process.

The economical and social importance of the rich natural patrimony of the region represents a gigantic scientific, economic and cultural potential, whose transformation into riches is intrinsically related to the availability and continued production of adequate knowledge and technologies which can be applied by a work force capacitated to understand and deal with this knowledge and these technologies. To the majority of the countries, the benefits of S&T are traditionally derived not only from new knowledge, but from the utilization of the already produced knowledge, translated into goods and services.

Development therefore, depends predominantly on the capacity of producing and productively applying the knowledge, as well as on its ample dissemination. However, there is still very little systematic knowledge about how to create and maintain institutions which promote the transformation of information into knowledge, which effectively generate sustainability or who, at least, contribute towards the conception of the strategy and of the planning necessary to attain this objective.

Therefore, the real scientific and technological revolution should have a transdisciplinary nature as a key mechanism of a new paradigm of development, together with the strengthening of the areas of participation and of promotion of modernization with the capacity of adaptation to changes in the institutional structures and cultures.

Moreover, the scientific-technological revolution requires a definition of mechanisms for the diffusion of information and for regional planning, in order to reach the regional structure and allow it to organize itself into a new standard.

Due to its commitment with the Brazilian society and being conscious of its responsibility, ABC instituted a Group of Study to promote a reflection which will be the foundation of a radical chance in the scenery of S, T & I in the Amazon, focused on the creation of a new paradigm of development for the region.

Barriers to Overcome

Based on a vision in which the economic appreciation of the forestial and aquatic resources of the Amazon is placed as a fundamental mark for its own conservation, recommendations are presented focused on the implementation and the consolidation of a new paradigm of S, T & I for the region, capable of decisively impacting its own development. Despite the Amazon having antique scientific institutions of excellent quality, they are in quantity, insufficient for the execution of this strategy.

In the last 30 years, the preoccupation with S, T & I culminated in several initiatives towards the promotion of Science and Technology in the Amazon[1]. Several programs, plans and projects were designed and inserted in a fragmented Amazonic Agenda. Among them, and to cite just a few: The Humid Tropic Program– PTU; the document of the Regional Coordination Commission of Researches in the Amazon – CORPAM; The North Program of Research and Post-Graduation – PNOPG; The North Program of Internalization – PNI; The Protocol of Integration of the Universities of the Legal Amazon – PIUAL; and the forum of the Universities of the Amazon – UNAMAZ, Interinstitutional Master and Doctorate of Capes, among others. In the turn of the millennium, important and advanced projects of research were implemented in the region by MCT. The benefit of these actions has been substantial, even though they present overlays and gaps due to the lack of articulation. It is consensus that all these instruments focused, in some way, on the efforts for a creation of a stronger institutional base, with special attention on the identification of priorities in S & T, access to the financing, and qualification of personnel. All of them however, are characterized by a phase of expansion, followed by a stagnation and then decline, which occurred mainly because of the dislocation and the lack of continuity of the public policies. It is essential therefore, that the instruments of evaluation and control of the plan be permanently put into practice.

[1] Mecanismos Estratégicos de C&T na Amazônia – MECTA, 2005 (Strategic Mechanisms of C&T in the Amazon)

So, an integrated planning of great proportions for the scientific, technological and innovative development requires the participation and coordination of different Ministries, State Governments, business sectors and civil society, through the means of one corrected action.

In response to these preoccupations, the Governments have launched plans and programs to promote development parallel to the environmental conservation of the region. Numerous governmental efforts have been aimed directly towards the Amazon[2], without managing however, to solve the social and environmental inequalities associated with the progress in the farming and cattle raising fronts in the forest; which result in generating negative effects over the local atmosphere and over global warming. Nor have these actions been able to promote a sustainable development of the region. This situation occurs, greatly, due to the lack of integration of the several initiatives, and due to the difficulty in executing the national laws, which then open the doors to external interference and social and territorial fragmentation. The country´s actions with regards to building systematic policies which indicate new paths and new horizons for the Amazon are still shy and very poorly articulated. Also shy and poorly articulated, although proactive, are the multilateral policies with the countries which hold mega biodiversity and those which compose the Amazon.

It is valid to suppose as well, that the stagnation and the lack of continuity of the efforts in S, T & I and the insufficient efforts towards containing the deforestation can derive from other factors, among them the distancing between the research agendas - and even of the curriculums – and the objective demands of the regional structure and the specific characteristics of the region.

Simultaneously, the shortage of human resources and the shortage of infrastructure in research and technological development are, agreed by all, without a doubt, a basic barrier which needs to be overcome.

This reinforces the need to rescue the planning and integrate its various dimensions, in order to attain a priority agenda that will guide the interaction of the research projects and of the institutions together with the coordination of the ministerial policies, in order to strengthen them and associate them to the demands of the region. This planning needs to be updated continuously due to the rapid changes which occur in the Amazon. The articulation with the research institutions of the Amazonic countries need to be part of this process.

It is worth remembering that, due to the extension and the diversity of the region, the integrated planning of S, T & I should mandatorily include the territorial dimension of the development.

Based on this perception, this proposal has as its main objective, the goal to define the conceptual bases for a revolution of science, technology and innovation for the Amazon, as a pillar of support of a new paradigm of regional development.

[2] Creation of Extractive Reserves, Pilot Program for the Protection of the Brazilian Tropical Forests and the Ministry of the Environment between 1987 -1995; and most recently, Sustainable Amazon Plan (2003), Combating Deforestation Plan, Sustainable Regional Development Plan for BR 163 (Cuiabá – Santarém), Deter.

Urgent Challenges

- The creation of new public universities, to serve the meso-regions which have a population density which justify such an investment.

- The creation of scientific-technological institutes associated to technological teaching and research, decentralizing the S&T infrastructure and allowing for the articulation of a web with greater exposure.

- Expansion and strengthening of Post-Graduation, expressively increasing the training, the attraction and the placing of highly qualified personnel in S, T & I.

- Strengthening of the information network in the region, enabling it with a minimum bandwidth of 2 Gbps.

The Creation of New Public Universities and Scientific-Technological Institutes

The country graduates more than 11 thousand doctors per year. The actions towards graduating and attracting highly qualified teachers and researchers to the region will be deemed useless unless effective hiring mechanisms are guaranteed by IES (Higher Education Institution) and by the local research institutes, allowing for their work to be extended over time. In synthesis, it is indispensable that work opportunities be created in order to absorb this new group of researchers. This can only be attained with policies specifically designed for the region, for it involves decisions from several ministries, among which we can mention MEC (Ministry of Education and Culture), MCT (Ministry of Science and Technology) and the Ministry of Planning. In order to guarantee the permanence of teachers and researchers in a quantity adequate to deal with the challenge of a sustainable development for the Amazon it is necessary to break the apparent equality which only leads to the preservation of the distortions. It's imperative that vacancies be induced for the region, both for researchers and teachers as for technicians who are capable of working in advanced research laboratories.

This policy needs to be associated with the creation of new universities of international quality, in the region, adapted to the present time and capable of leading to the graduation of human resources in the interior of the Amazon, as well as the creation of scientific-technologic institutes with researches aimed at important issues of the meso-regions. There are many relevant themes, among them: Water, Mining, Health, Recuperation of Degraded Areas, Biodiversity, Anthropology and Linguistics, Environmental Rights, Logistic, Transport Engineering, Services of the Ecosystems, Renewable Energies, among others. Nevertheless, it is urgent to create in the next decade, three scientific-technological Institutes focused on applied researches in the following main areas: a) forestry and biodiversity resources; b) aquatic resources; and c) mineral resources. These three institutes need to adapt to the size of the challenge, producing knowledge at the frontier of knowledge. Each Institute should count on personnel of highly qualified teachers, researchers, engineers and technicians, and should count on world class laboratories. Universities and Institutes articulated in a network around the three main areas: a) forestry and biodiversity resources; b) aquatic resources; and c) mineral resources, will strengthen the sectors for the development of innovative industrial centers, disseminated throughout the Amazon.

The expansion and the strengthening of the S, T & I system of the Amazon will have as its focal point the development of technologies and innovations for the improvement of the social-environmental and economic conditions of the Amazon. The target for this decade is to generate knowledge which promotes the use of the natural resources of the Amazon, with an adequate management of the species and of the ecosystems. The goal is to propose a complete development of productive chains for a

significant amount of products for a global market, from drugs to environmental services, generating a regional economy potentially superior to the current one, which has been substituting the forest and exploiting the lumber resources in a non sustainable fashion.

In addition it's essential to modernize the existent infrastructure, with a direct support to the public institutions and an indirect support to the private institutions, enabling the implementation of a network of multi-user laboratories integrated with actions focused on scientific investigation and for the specialized provision of services. Such a network of laboratories will also have the purpose of serving as technical-scientific support for all the post graduate programs.

Expansion and Strengthening of Post-Graduation in the Amazon

It is unquestionable the importance of post-graduation for social and economical development. Post-graduation has a crucial role in the production of highly qualified human resources, in the dissemination of scientific discoveries and on the advance of knowledge through means of the education of future generations of professionals, who in turn contribute to the effective practice of citizenship and sovereignty in the region.

The expansion of post-graduation in the Amazonic Region is one of the central axis of the policies of S, T & I proposed. Yet, it is necessary to be conscientious that it will be extremely necessary to have a parallel development of programs to attract and establish researchers, engineers and technicians from other regions of Brazil and from foreign countries. Starting from the basic assumption that the Amazon consists of a national challenge, one should seek the commitment of the existent critical mass to contribute to this decisive effort (see Appendix).

Strengthening of the Information Network in the Region

One of the aspects which should also be considered and which if ignored, all efforts proposed would be compromised, is the strengthening of the information networks in the region. Without a doubt, a better use of the information and communication technology is needed in order to break the vicious circle which comes from the current relative regional isolation, so that it is possible to launch the foundation for a virtuous circle of communication and cooperation in real time which allows for the generation of knowledge, the transference of technology and the regional development. In the Brazilian telecommunication satellite for the Amazon, it would be important to reserve a channel (transponder) for academic-technological communication. Another priority is the immediate ground connection with the other regions of the country. The proposal is for the region to count on a network with a minimum bandwidth of 2 billion bits per second (Gbps), linking educational and scientific institutions, and technological centers. It is also important to mention that the strengthening of the information highways is also a key element in the environmental monitoring of the region.

Necessary Resources

In order to be executed, these actions require considerable investment in the following years, detailed in the appendix.

Even though it might seem like lofty values in comparison to the historical values regionally invested in higher education and in S, T & I, such efforts will allow for the decrease in the current inequality picture and will allow for the creation of a contingent of highly skilled labor, at a level unseen in the region. Such scenery will engender the essential foundation for the launching of a new development cycle in the Amazon, consolidated in science, in technology and in innovation.

What we propose is that the region reaches, in a period of four year, a level of investment in the scientific and academic fields of about 1% of the Gross Regional Product (PRB). It is worth mentioning that in the national plans, the projections for this area, including industry, show a new level of investment of around 1.5% of the GDP (Gross Domestic Product). In other words, the intention is that the region manages to not only recompose the existent discrepancy, but also share the new horizons which are being created for S, T & I in our country. Further down the horizon, we propose that within 10 years, three new Scientific-Technological Institutes and three new Universities be created, representing

and additional investment corresponding to 1.9% of the GRP (Gross Regional Product) or 0.2% of the GDP (Gross Domestic Product), in other words about R$30 billion in 10 years.

Such a measure will have an enormous impact in the region. Only with investments of this magnitude in S, T & I will we be able to face the challenge of a conception of a new paradigm of development for the Amazon. Anyway, the investments will be fully compensated due to the urgent need for new economical activities, the speedy innovative industrialization and the expansion in number of jobs and of highly qualified personnel. Such a foundation will constitute the essential conditions for the implementation of a new model of development, one which values the forest and its products, giving it an economical value which justifies a sustainable exploration and not deforestation.

Monitoring and Evaluation Processes

Not less challenging, but equally important, is the need to support the actions proposed through means of evaluation processes of strategic reach. CAPES (Coordination for the Improvement of Higher Education) and CNPq (National Council for Scientific and Technological Development) can contribute to these processes, creating specific evaluation groups within their establishments (for example, CAPES evaluating the graduation of researchers and CNPq evaluating the research itself). In the states of the Amazon, the Foundations for Support of Research can equally take on responsibilities in the process of monitoring and evaluating. In order to cover the cost of the evaluation and monitoring process, each agency should allocate 1% of their invested budget in the proposed actions for this purpose. ABC is committed to collaborate with these efforts, performing global evaluations of the execution process of the proposal.

Final Considerations

In order to believe in the effective scientific-technological revolution needed for the consolidation of a new paradigm for the development of the Amazon, it is necessary to ascertain the commitment of the proposed resources, which also means we need to overcome the current regional asymmetry in investments in S, T & I in the region.

Another aspect which needs to be brought forward is the need to consider the diversity of the Amazon. With this in mind, the strategies need to take into consideration the different meso-regional specificities and the local political dynamics, as in the case of the creation of technological centers which have been encouraged by the state governments and by the governmental agencies of regional development (SUFRAMA and SUDAM).

Considering that one of the main obstacles and challenges is to make the laboratory generated knowledge leave the table, the connection with the business sector is also a need. Another aspect which should not be ignored is the investment in economic activities, associated to the new paradigm of development, which meets the existent needs of part of the population already in the region (70% living in urban centers).

The creation of a new model of development for the Amazon, in harmony with the governmental guidelines of economic growth, social inclusion and social-environmental sustainability, demands an

audacious program of investments in S, T & I oriented by the new paradigm of a standing forest. It is important to reinforce that this scenery is indeed possible and with political willingness, it is possible to ease great part of society´s yearnings in a short period of time, avoiding that one repeats in the Amazon the expansion of the social, economical and environmental inequalities seen in other parts of the world

S, T & I form an irreplaceable pillar for the construction of the bases of a sustainable development which, in the long run, generates a social well-being and enhances the region´s participation in the national economy. The truth is that the time has come to transform the statements and the visions of the future into concrete achievements, which contribute to the improvement of the quality of life of the Amazonic population. Such action needs to be developed while protecting the biological richness, utilizing in a sustainable way, the rich cultural and natural heritage which hosts one of the most important biomes of the planet and the geographical heart of South America: the Amazon. By doing so, Brazil will be taking gigantic steps in becoming the first tropical country fully developed.

In the appendix which follows, we present the new investments needed to implement what we define as Urgent Challenges, starting with the expansion and strengthening of the existent Institutions and continuing with the implementation of a New University and a New Scientific and Technological Institute.

Appendix

A strong expansion in graduating, attracting and placing of highly qualified personnel and estimated resources for the modernization and enlargement of the S, T & I systems of the Amazon.

In the Amazon, the lack of human resources to work in the areas of teaching, research, technological development and post graduation *sensu lato and stricto* is common knowledge and has been indicated as one of the biggest obstacles for the development of the area and for its effective insertion in the country[3], putting into evidence the enormous lag existent in terms of training to graduate teachers and above all, doctors in the Amazon. The insufficient number of doctors working in the region create negative constraints which prevent the expansion of the S, T & I system, and generates a vicious circle: without doctors one cannot attract resources, expand post-graduation, select teachers who achieved higher qualifications in contests of higher education institutions (IES) and in research institutions, and especially not insert qualified skilled labor in the programs of P&D (Research and Development) of companies and industries. The existent mechanisms in the current national system of science and technology tend to perpetuate and emphasize the existent inequalities. The Amazon (nine states) has 140 academic courses for Masters, 39 for doctorate and 6 for professional masters (4.8% of the 3.854 courses existent in Brazil in 2007). Despite the enormous efforts of the higher education systems and the research systems of the region, there is no tangible condition for substantial changes in this situation unless an integrating policy is defined involving several government agencies who consider this issue a priority.

Therefore, the expansion of post-graduation in the region is a *sine qua non* condition of the policy which needs to be adopted. Such a process will also require a big influx of researchers from other regions. In view of the big demand and the urgency in the need for the expansion of the system, guided programs

[3] National Conferences on Science, Technology and Innovation, documents MCT and CGEE, National Plan of Post – Graduation 2005-2010 – PNPG; CAPES, 2005.

are essential to attract researchers with ample experience in research and post graduation for the Amazon, in order to add them to the groups already installed there or encourage them to create new groups. This is even truer when we bear in mind the need for researchers, engineers and technicians for the new scientific-technological institute and the new university proposed. These *senior* researchers can contribute towards attracting young researchers, allowing for the establishment of new groups and the acceleration of the development process of the research, always prioritizing strategic areas of knowledge or geographical areas, in a way of strengthening meso-regions or development centers. Support programs to the recently graduated doctors linked to IES or to the research institutes should similarly be encouraged, by facilitating their insertion and stimulating their full productivity in research (for example, programs like PRODOC (Support Program for Institutional Projects with the Participation of Recently Graduated Doctors) from CAPES, but focused exclusively on the Amazon). In the same way, programs for temporary placement of researchers in post-graduate programs or in research groups should be created or strengthened, aiming towards the hiring of visiting teachers and researchers. The table below suggests an expansion in the capacity installed in the region, duplicating in a short period of time, the number of doctors involved in teaching and scientific research activities in the Amazon.

As mentioned in the item Necessary Resources, if we implement the proposal of creating 3 new institutes and 3 new Universities, we will have in 10 years an additional investment of around R$30 billion, corresponding to 1.9% of the GRP or 0.2% of the GDP.

Current Universities and Scientific Technological Institutes			
Activity	**2009**	**2010**	**2011**

New Doctors [1]	700	700	700
Existing Doctors [2]	3500 (2800+700)	4200	4700
Cost of Securing New Doctors [3]	95.742.640,00	191.485.280,00	287.227.920,00
Additional Scholarship [4]	16.892.400,00	33.784.800,00	50.677.200,00
Differentiated Productivity Scholarship [5]	33.784.800,00	28.717.080,00	24.409.518,00
Training of HR [6]	12.960.000,00	25.920.000,00	38.880.000,00
Research (50 thousand reais per doctor per year) [7]	70.000.000,00	94.500.000,00	120.600.000,00
Strengthening of the existing infrastructure and support staff [8]	300.000.000,00	300.000.000,00	300.000.000,00
Strengthening of the information network in the region [9]	100.000.000,00	100.000.000,00	100.000.000,00
Subtotals (New Investment)	629.379.840,00	774.407.160,00	921.794.638,00
GRP	145.600.000.000,00	151.400.000.000,00	157.500.000.000,00
% GRP	0.43	0.51	0.59

New Universities – New Scientific-Technological Institute			
Creation of University		1	

New Doctorate vacancies[10]		100	100
Creation of Infrastructure and support[11]		100.000.000,00	100.000.000,00
Maintenance of Infrastructure[12]		15.000.000,00	20.000.000,00
Creation of Scientific-technological Institute[13]		1	
New Doctorate vacancies[14]		100	100
Creation of Infrastructure and support[15]		100.000.000,00	100.000.000,00
Maintenance of Infrastructure[16]		15.000.000,00	20.000.000,00
Doctors in the New Univ. and New Sci. – Tec. Inst.[17]		200	400
Cost of securing personnel for New Uni. and Inst.[18]		27.355.040,00	54.710.080,00
Training of HR[19]	-	-	3.240.000,00
Research (50 thousand reais per doctor per year)[20]		10.000.000,00	20.000.000,00
Subtotals (new Institutions)		267.355.040,00	317.950.080,00
%GRP		0.18	0.20
TOTALS			
Grand Total	629.379.840,00	1.041.762.200,00	1.239.744.718,00
Total % GRP	0.43	0.69	0.79

EXPLANATORY NOTES

1. Number of new doctors to be secured in the region, from the post graduate programs existent in the Amazon attracted from other regions, and from abroad for the research and technological development programs in the region. The numbers reflect a strategy which aims to double the number of doctors with activities in S&T by the end of the third year.

2. Contingent of existing doctors in all the public and private teaching and research institutions, existent in the region, summed to the number of new doctors to be hired (700 per year). Of the original contingent, between 40 and 50% only, work directly on research projects.

3. An estimate, considering the minimum proposed by the Ministry of Planning for S&T (R$8.448,24, CL3, PDI (Institutional Development Plan)), added to a productivity scholarship level 1D (R$1.011,00) plus the additional bench (R$1.000,00), totaling R$10.459,24 per month and R$136.775,20 per year (13.33 salaries + 12 scholarships with additional). Only the productive doctors shall be hired through this initiative.

4. Additional productivity scholarship as a stimulus for the securing to be negotiated with the Amazon´s state governments (just like the initial value of the Productivity Scholarship level 1D of CNPq (R$1.011,00) plus bench tax (R$1.000,00) totaling R$2.011,00 per month and R$24.132,00 per year. These values may be negotiated in the form of consideration with federal agencies.

5. Equivalent scholarships (R$2.011,00/month) for personnel with doctorate degree already in the region. This value was estimated considering that not all the doctors in the Amazon are involved in research and teaching. A concession of scholarship was estimated for the 1400 doctors who are the most productive (equivalent to 50% of the existent ones).

6. Estimate for the expansion of the teaching body taking doctorate degrees in the existent post-graduate and in those to be created in the Amazon, at a rate of 200 new doctorate students each year. Also included are the costs for the proportional expansion of students taking masters degree (2 per Doctorate) and for scientific initiation (4 per Doctorate). The estimate accounts for a doctoral internship abroad for 30% of the contingents. Thus, an average value was estimated at R$64.800,00 per doctor per year, excluding the scholarship. (One doctor – R$1800,00; two teachers – R$2400,00; and four students of IC (Undergraduate Research)– R$1200,00).

7. Estimate of investments in the areas of research to be performed by professionals established in the region at an estimate cost of 50 thousand reais per doctor deemed productive. An ineligibility of around 15% per year of the initial contingent was estimated. So, assistance for 1400 doctors in the first year was foreseen; 1890 in the second year (1190 of the initial contingent plus 700 new doctors) and 2412 (1012 of the initial contingent plus 1400 new ones) in the third year.

8. Estimate of an additional 15 million for the new University or new Institute per year, aiming at accommodating the new researchers and the new demand for infrastructure (20 existent Uni/Inst.).

9. Estimated value considering that the RNP (National Network of Education and Research) cost approximately 300 million dollars

10. Teachers with doctorate degrees to be hired per year, in the first two years, for the new University to be created out of the axis Manaus-Belém.

11. Estimate for the creation of infrastructure, per year in the first two years. Values estimated based on regional experiences, like the creation of State Universities. In this value the cost of support staff has been included.

12. Estimate for the maintenance of the infrastructure, based on current costs for Institutions in the region.

13. The creation of a new research institute in the interior of the Amazon out of the axis Manaus-Belém.

14. Researchers with doctorate degrees to be hired per year, in the first two years, for the new Institute to be created out of the axis Manaus-Belém.

15. Estimate for the creation of infrastructure, per year, during the first two years. Values estimated based on regional experiences, with the creation of State Universities. In this value the cost of support staff has been included.

16. Estimate for the maintenance of the infrastructure, based on current costs for Institutions in the region.

17. Sum of doctors to be established in the new University and in the new Institute.

18. An estimate, considering the minimum proposed by the Ministry of Planning for S&T (R$8.448,24, CL3, PDI(Institutional Development Plan)), added to a productivity scholarship 1D (R$1.011,00) plus the additional bench (R$1.000,00), totaling R$10.459,24 per month and R$136.775,20 per year (13.33 salaries + 12 scholarships with additional). Only the productive doctors shall be hired through this initiative.

19. Estimate for the expansion of the teaching body taking doctorate degrees in the existent post-graduate and in those to be created in the Amazon, at a rate of 200 new doctorate students each year. Also included are the costs for the proportional expansion of students taking masters degree (2 per Doctorate) and for scientific initiation (4 per Doctorate). The estimate accounts for a doctoral internship abroad for 30% of the contingents. Thus, an average value was estimated

at R$64.800,00 per doctor per year, excluding the scholarship. (One doctor – R$1800,00; two teachers – R$2400,00; and four students of IC (Undergraduate Research)– R$1200,00).

20. Estimate of investment in research activities to be performed by the established professional in the new University and in the new Institute at an estimated cost of 50 thousand reais per doctor.

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