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Managing the Environmental and Social Impacts of Major IDB-Financed Road Improvement Projects in the Brazilian Amazon: The Case of BR-364 in Acre

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This Technical Note was prepared by the Environmental and Social Safeguards Unit (VPS/ESG) of the Inter-American Development Bank (IDB). ESG works to promote the environmental and social sustainability of Bank operations. It collaborates with project teams to execute the IDB's commitment of ensuring that each project is assessed, approved and monitored with due regard to environmental, social, health and safety aspects, and that all project – related impacts and risks are adequately mitigated or controlled. ESG also helps the Bank respond to emerging sustainability issues and opportunities.

This manuscript documents the experience of the Inter-American Development Bank in managing the environmental and social impacts of two major completed rural highway improvement projects in the western Brazilian Amazon region, and presents lessons on how such impacts can best be identified, assessed and addressed in large ecologically sensitive and socio-culturally diverse areas such as the Amazon.

This document was prepared under the supervision of Janine Ferretti, Chief of the Environmental and Social Safeguards Unit (VPS/ESG). The author was John Redwood III, consultant. Insightful inputs were provided by John Horton. Editorial support was supervised and provided by Gabriela Infante and Iona Hawken.

Contents

Acronyms

APAs	Environmental Protection Areas
DNER	National Department of Roads
EEZ	Economic-Ecological Zoning
EIA	Environmental Impact Assessment
EMBRAPA	Brazilian Agricultural Research Enterprise
FUNAI	The National Indian Foundation
IBAMA	Brazilian Institute of Environment and Renewable Natural Resources
IBDF	The Brazilian Institute of Forest Development
IDB	Inter-American Development Bank
IMAC	Acre Environmental Institute
INCRA	National Institute of Colonization and Agrarian Reform
IPEA	Economic and Social Planning Institute
IRR	Internal Rate of Return
NPV	Net Present Value
PAC	Growth Acceleration Program
PAD	Definitive Action Plan
PCR	Project Completion Report
PMACI	*Projeto de Proteção do Meio Ambiente e das Comunidades Indígenas*
RIMA	*Relatório de Impacto Ambiental*
SEA	Strategic Environmental Assessment
SEMA	Secretariat of Environment in the Ministry of the Interior

SEPLAN	Secretariat for Planning and Economic Development
UGAI	*Unidade de Gestão*

Executive Summary

The Inter-American Development Bank has been involved in managing the environmental and social impacts of major rural (or inter-urban) highway improvement projects in the western Brazilian Amazon region, and more specifically in the state of Acre, almost continuously since the mid-1980s. Bank experience with two succeeding – and generally successful – operations in this regard, thus, provides a valuable learning opportunity with respect to how such impacts can best be identified, assessed and addressed in large ecologically sensitive and socio-culturally diverse areas such as the Amazon. The present paper summarizes this experience, focusing selectively on relevant aspects of project design, implementation and results, and draws lessons from it, both reiterating those of particular relevance from the Bank's own post-project assessments and more general ones that emerge when the two projects are considered together.

Two Bank loans for pavement of the Porto Velho-Rio Branco section of the federal BR-364 highway, connecting the state capitals of Rondônia and Acre, were approved in January 1985. Following closely upon a World Bank-financed project to pave the section of this road between Cuiabá, Mato Grosso and Porto Velho, which had generated significant adverse environmental and social impacts, the Bank built a specific component into its own highway project to help protect regional ecosystems and local indigenous peoples. During the early stages of implementation, however, the measures initially proposed to help protect the environment and indigenous communities were deemed inadequate, leading the Bank, under strong pressure from the US Government, to suspend disbursements for road pavement activities until the Brazilian federal authorities were able to develop a more adequate program that later became better known by its Portuguese acronym, PMACI. From thereon, the project, and PMACI in particular, were closely supervised and numerous lessons were drawn by the Bank both in the Project Completion Report and in an international seminar organized several years later.

These lessons included the following, among others: (i) environmental and social projects should value regional knowledge and experience, support local initiatives, and value the intervention of non-governmental and other civil society organizations; (ii) projects that affect traditional communities, such as indigenous peoples and rubber tappers, should have clearly defined objectives and targets; (iii) an unidentified risk was that local institutions were not

explicitly included in project design; (iv) the Bank's close accompaniment of project execution was decisive to accelerate it and authorize alterations in the Definitive Action Plan for PMACI in accordance with the needs and priorities of the beneficiaries; and (v) there is a complex relationship between economic, environmental, and social problems in tropical forest areas, requiring an expansion of the notion of environmental impact mitigation for infrastructure works through specific quality control measures to a more integrated vision of social and environmentally sustainable development.

Other key lessons that emerge from this experience not explicitly drawn by the Bank in its ex-post evaluation documents were: (i) the critical importance of the up-front identification and assessment of potential direct and indirect environmental and social impacts in the project's broader area of influence; (ii) the need to explicitly incorporate measures to mitigate these impacts as an integral part of the associated road improvement operation itself and to include contractual clauses in Bank loan agreements requiring the borrower to carry out the necessary environmental and social due diligence and establishing clear sanctions, including the suspension of disbursements, if this does not occur to the Bank's satisfaction; and (iii) contracts with the construction firms responsible for the road improvements need to include environmental management measures, and financial resources and technical support to strengthen the government – and non-governmental – institutions responsible for carrying out and monitoring environmental and indigenous peoples' protection need to be provided.

The Bank loan for the follow-on Acre Sustainable Development Project, which contained a component to pave another section of BR-364, was approved in May 2002 and benefited from the lessons learned from the previous operation. However, unlike the earlier project, the road component was embedded in a broader multi-sector spatial development program focusing on the sustainable management and conservation of renewable natural – especially forest – resources, sustainable productive activity and employment development, and local institutional capacity building, as well as road and other infrastructure investments. Further protection of local indigenous communities was also included in the project design. Completed successfully in June 2010, it too generated important lessons, including: (i) applying the concept of environmental sustainability in all the actions of the Program, with the participation of affected stakeholders, demonstrated that, even in Amazônia, it is possible to invest in transport

infrastructure without increasing deforestation; and (ii) before deciding to finance a program of this nature, it is necessary to secure a high degree of political commitment.

Taken together, these two projects provide rich lessons with respect to the management of the impacts of major road improvement projects, especially in active natural resource "frontier" regions, such as the Brazilian Amazon, the most important being that: (i) both the potential direct and indirect -- including induced development -- and cumulative environmental and social impacts of these investments need to be properly identified, assessed, and addressed; and (ii) doing so requires taking a broader sustainable development approach to – and in – their direct and, more importantly, indirect areas of influence, which also need to be clearly identified and well understood in terms of their ecological, demographic, economic, social, political and institutional characteristics and dynamics in advance of project implementation. An important corollary of the second lesson is: (iii) the need to effectively involve all affected local stakeholders -- and especially those most vulnerable to the social and environmental impacts in question -- in the process of identifying and monitoring these effects and, to the extent possible, ensuring their active participation in the implementation and evaluation of the associated measures to mitigate and/or compensate for these impacts. Finally, (iv) for this to occur, strong and persisting political commitment at the local -- in this case, both state and municipal – level is critical.

I. The Porto Velho-Rio Branco Road Improvement Project: Background and Design

In January 1985, the IDB approved two parallel loans, for US$ 44 million (150/IC) and US$ 15.5 million (503/OC) respectively, to partially finance the widening and pavement of 502 kilometers of the BR-364 highway between Porto Velho and Rio Branco in the states of Rondônia and Acre. This complemented and followed the paving of a 1,500 kilometer section of the same federal highway between Cuiabá, capital of the central western state of Mato Grosso, and Porto Velho, partially financed by a World Bank loan approved in December 1981.[1] Thus,

[1] This road improvement project, in fact, was part of a broader federal regional development program called Polonoroeste, which the World Bank supported through five complementary projects for small farmer agricultural development in both Mato Grosso and Rondônia and new settlements and public health investments in Rondônia designed to be implemented in parallel to the pavement of BR-364. The experience with the implementation of this program, especially its environmental and social aspects, was later assessed by the World Bank together with several

the IDB operation was part of an ongoing process to improve access to (and within) the western Amazon region from the rest of Brazil, but could also benefit from the lessons being learned from the World Bank's earlier experience with this program. The proposed road improvement project was first presented to the Bank in 1981 as one component of a larger intermodal regional transport program that included investments in roads, waterways and ports in parts of Bolivia, Peru, Paraguay and Brazil.[2] In April 1984, the Brazilian Government requested Bank financing for "an independent component of the larger regional project for which final engineering designs and construction plans were already completed and whose nature permitted a separate appraisal."[3] This project entailed upgrading the existing Porto Velho - Rio Branco dirt road to an all-weather surface and other enhancements (new bridges, improved ferry service, etc.) along its route. It was justified in the following terms:

> *The major impact would be to significantly increase the integration of the project area with the rest of the country by providing the present inhabitants with permanent access by land. At present, little or no road traffic is possible during five months of the year due to the inability of the road to resist flooding that affects the entire region. In addition to this direct impact, the improvement of the road is an integral part of an overall effort to develop the economy of the project area. A better road would contribute significantly to this effort by reducing transportation costs and guaranteeing access to and from markets.*[4]

Thus, paving the road was seen primarily in terms of the potential benefits for local development that improved access and reduced transportation costs to the region would bring. More specifically, "a better road would benefit activities such as agriculture, cattle raising, tree

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other major infrastructure, environmental and agricultural development projects in Brazil and its results were summarized in *World Bank Approaches to the Environment in Brazil: A Review of Selected Projects*, published by the Bank in 1993. For a more general discussion of the World Bank's experience in the Brazilian Amazon region through the 1990s, see John Redwood, *World Bank Approaches to the Brazilian Amazon: The Bumpy Road Towards Sustainable Development* in Anthony Hall (editor), *Global Impact, Local Action: New Environmental Policy in Latin America*, Institute for the Study of the Americas, London, 2005.

[2] This proposed broader initiative was an early precursor to what would later become the Integrated Regional Infrastructure for South America (IIRSA) Program, established in 2000, in which the Bank has played an important role.

[3] Inter-American Development Bank (IDB), *Federal Republic of Brazil, Porto Velho – Rio Branco Road Improvement Project (BR-0066) Project Report* (hereafter "project report"), Washington D.C., December 7, 1984, pg. 1.

[4] Ibid., pg. 2. The report went on to affirm: "The true magnitude of the economic and social dislocation caused by the total degeneration of the road surface during five months of the year can only be adequately appreciated when account is taken of the fact that neither waterways nor airplanes constitute individually or jointly a viable alternative to road transport in the area."

cropping, fishing and mining, which could therefore be expanded." However, the report also explicitly recognized that this investment would "increase the pressure on the area's physical and social environments, both of which are relatively complex and fragile." For this reason, "safeguards" were introduced "to minimize unnecessary destruction of the area's soils and forests or damage to the indigenous population from increased economic activity attributable to improving the road."[5]

The Bank's concern with the potential adverse impacts of this operation was reflected in the participation of both an environmentalist and an anthropologist in the project appraisal team, which was led by a transport specialist, and is especially noteworthy because the IDB did not yet have specific environmental and social safeguard policies at the time. It is also noteworthy that the Bank was concerned with both the direct and indirect environmental and social impacts of the road project in its broader area of influence, which involved parts of three states: Rondônia, Acre and Amazonas. According to the project report:

> *The area that would be most affected by the project includes land between Porto Velho, the capital of the state of Rondônia, and Rio Branco, the capital of Acre….*
>
> *Porto Velho already has access by land to the rest of Brazil via paved highways and its trade with Rio Branco consists largely of transshipments of goods either sent from other regions to supply Rio Branco or exports from Rio Branco to regions beyond Porto Velho. On the other hand, the Porto Velho - Rio Branco road represents Acre's lifeline to the rest of the country. In addition, Rondônia has already been the focus of considerable investment in agricultural activities and migration.[6] The result is that Rondônia has little scope for further expansion of agricultural output and absorption of new migrants. The states of Acre and Amazonas are in effect the new frontier with prospects for investment in agriculture and capacity to absorb new migrants. Based on the foregoing it is considered that the proposed project would have the greatest impact on Acre, a lesser*

[5] Ibid., pg. 2.

[6] In fact, due in good measure to Polonoroeste, Rondônia experienced a major influx of migrants during the 1980s due in part to pavement of BR-364, which resulted in considerable environmental devastation and social disruption. For one published account of this experience, see Adrian Cowell, *The Decade of Destruction: The Crusade to Save the Amazon Rain Forest*, Henry Holt and Company, New York, 1990.

impact on the southern portion of state of Amazonas, and a still smaller impact on the northwest portion of Rondônia.[7]

Much of the project's efforts to mitigate the potential environmental and social effects of the proposed road improvement, therefore, were focused on Acre.[8] Bank concern with the larger area to be affected by the road investments was appropriate considering that "the proposed project would not only benefit the current inhabitants of the project area, but would also serve to accelerate the process of spatial occupation by migrants attracted by significantly improving the area's physical integration with the rest of the country." The project report went on to reiterate that "the allure of available land in Acre and the advent of the improved road are expected to cause the rate of migration to increase significantly. Therefore, it is necessary to establish safeguards to minimize the adverse effects of increased migration on the region's natural resources and indigenous population."[9] With respect to the potential effects on indigenous communities, more specifically, the report noted that:

…improvement of the Porto Velho-Rio Branco road will open the way for new colonization in the State of Acre and Southern Amazonas. Although a settlement process has already been occurring for some time it will be greatly accelerated by the road project. Although the Indian lands are not adjacent to the road, they will become easily accessible through the rivers that intersect with BR-364 to the west of Rio Branco. As a result, the Indian groups will be directly affected since the project is expected to increase traffic on this portion of BR-364, as well as the number of settlements in the area. In fact, it has been estimated that all of the groups from the State of Acre will probably be affected by the opening of the road.[10]

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[7] IDB, project report, *op. cit.*, pp. 11-12. The report goes on to state that "The project area produces half of Brazil's domestic production of rubber with 30% produced in Acre and 20% in Rondônia. It is estimated that in 1980 there were 250,000 head of cattle in Rondônia and 300,000 head in Acre. Significant gold deposits have been found in Rondônia in the Madeira River and although only 4% of the active population was employed in this industry at least 4.5 tons of gold were sifted from the river in 1982."

[8] Similar measures for Rondônia were included in the World Bank's loans for Polonoroeste, which is the main reason why the IDB project gave less attention to it.

[9] Ibid., pg. 15.

[10] Ibid., pg. 18. The report noted, more generally, that "experience has shown that the single most significant development activity that adversely affects the welfare of indigenous groups has been the opening of roads which makes their lands directly accessible to new settlers" and it stated that "without adequate protection, the indigenous communities will be subject to: (i) invasion of tribal areas; (ii) exposure to diseases carried by non-indigenous people; (iii) destruction of their culture through premature and uncontrolled contact with settlers; and (iv) exploitation by landowners in the exchange of goods by paying very little for the Indian products and charging the Indians exorbitant prices for inexpensive items and staple foods."

Concerning potential environmental impacts, the project report indicated that "improvement of the road could have direct negative effects, mainly in the right of way of the road, on the environment including deforestation and deterioration of vegetation, water pollution during construction, creation of ponds of stagnant water, thereby increasing the risk of sickness, and the alteration of surface water drainage patterns thereby leading to erosion of the soil." But, significant as these were, the overall effects were considered likely to be much broader:

> *…there could also be an indirect negative impact on the environment. By reducing transportation costs and assuring permanent access by land to and from markets, the level of land occupation and agricultural activity are expected to increase through wider and more intensive exploitation of land resources. The institutions responsible for organizing and controlling the use of the area's natural resources do not have access to sufficient human and financial resources to adequately fulfill their responsibility.*
>
> *…the wet tropical forest ecosystems, characteristic of the project area, are extremely complex and fragile. The potential deforestation of large areas for cultivation could therefore have negative effects on the ecosystems, including increased flooding, leaching and erosion of the soils, and on a grand enough scale could even alter the local and regional climate.*[11]

Because of these potential impacts and the identified capacity constraints at the federal (and state) level, as in the case of indigenous peoples, measures -- including for institutional strengthening and land use planning and zoning in its area of influence -- were included in the project "to mitigate the direct and indirect negative impacts of the project on the environment." This took the form of a specific project component for environmental and indigenous protection, which later became known as PMACI,[12] with the allocation of US$ 2.8 million of the IDB loan (in local resources) and an anticipated total cost of US$ 7 million, or 4.8% of the expected total

[11] Ibid., pg. 19. It goes on to say that "The institutional capacity in Acre, Amazonas and Rondônia for planning and zoning for the management of natural resources is considered to be inadequate. In Rondônia, institutions responsible for natural resources management and control, including IBDF [The Brazilian Institute of Forest Development] and SEMA [the Secretariat of Environment in the Ministry of the Interior], have a marginal presence, but do not have the capacity to take an effective role. This institutional weakness is the major cause of inadequate management of the area's natural resources, as has been evidenced in other cases where measures to mitigate the impact of road projects in the Amazon Region have not been applied effectively." IBDF and SEMA were later merged together, in 1990, with two other federal agencies to form IBAMA, the Brazilian Institute of Environment and Renewable Natural Resources.

[12] For Projeto de Proteção do Meio Ambiente e das Comunidades Indígenas.

project cost of US$ 146.7 million.[13] The Bank's appraisal report also contained specific annexes (in Spanish, although the main text of the report was in English) both outlining the environmental precautions to be taken by the implementing agency and its private sector contractors during pavement of the road in its direct right of way and providing the basis for the action plan to organize the process of land occupation in its indirect area of influence. The latter plan was expected to entail the following:

- Preparation of a semi-detailed model for land occupation in the indirect area of influence of the road that permits territorial organization ("*ordenamiento territorial*") and ecological-economic land use zoning, taking as a basis, among other factors, renewable natural resource potentials, fragility and/or resilience of the ecosystems and technological levels most appropriate for the region, as well as the needs and rights of indigenous communities.

- Establishment of criteria for the integral use and exploitation ("*aprovechamiento*") of the renewable natural resources in the road's indirect area of influence.

- Determination of administrative measures and actions for implementation and operation that should be adopted by the national institutions responsible for renewable natural resources and the environment, to prevent and minimize losses and/or deterioration of natural resources in the road's indirect area of influence, including the establishment and participation of public entities in the execution of these measures and actions.

- Specification of measures and norms that FUNAI [The National Indian Foundation] should adopt and execute to prevent or reduce the impacts that could affect indigenous communities as a result of the expected improvements in the road.[14]

[13] In practice, this component apparently involved a total cost of US$ 10 million, of which the IDB reportedly financed 40 percent, or 6.8 percent of total project costs.
[14] IDB, project report, Appendix IV-6, pp. 1-2. My translation from the original Spanish.

As the Bank did not yet require an environmental impact assessment (EIA) prior to approval of the proposed road project, an "Environmental Study" was financed under this component to be completed within 18 months after the loans were signed to help convert a preliminary Action Plan into a definitive one, which would become the basis for PMACI. While implementation of road improvements was to be carried out by the National Department of Roads (DNER) in the Ministry of Transport, execution of measures to mitigate the project's potential adverse effects on the environment and indigenous groups was initially assigned to the Economic and Social Planning Institute (IPEA) in the Secretariat for Planning and Economic Development (SEPLAN), later the Ministry of Planning. IPEA was to coordinate and supervise the activities of the other pertinent federal institutions -- SEMA, IBDF, FUNAI, EMBRAPA and INCRA -- through an inter-institutional Technical Group to be established prior to the signature of the loan contracts.[15] The provisional Action Plan to be implemented by SEMA, IBDF, and FUNAI, was also to be presented to the Bank prior to the signature of the Loan Contracts. According to the project appraisal report, the definitive Action Plan would "not only modify the measures to be implemented by SEMA, IBDF, and FUNAI, but would also include measures to be implemented by EMBRAPA and INCRA."[16]

While these measures were quite visionary, the fact that only federal government agencies were to be involved in implementing environment and indigenous peoples-related actions in the state of Acre is noteworthy, as is the selection of IPEA, a planning institute with no prior experience in the actual execution of development projects, to coordinate this initiative. However, in fairness to the Bank, largely similar arrangements had been incorporated in the earlier World Bank-financed projects for Mato Grosso and Rondônia at a time when the federal government was still dominated by the military and leading development activities in Amazônia, while state and local government institutions in the region were either incipient or very weak. As in the case of the World Bank-supported Polonoroeste program, the environmental and social safeguard measures included in the Porto Velho-Rio Branco road improvement project, however, were clearly Bank-driven rather than "owned" by the borrower, which had significant consequences for their subsequent implementation.

[15] EMBRAPA is the Brazilian Agricultural Research Enterprise and INCRA is the National Institute of Colonization and Agrarian Reform.
[16] IDB, project report, *op. cit.*, pg. 28.

II. PMACI in Practice

The Definitive Action Plan (or PAD, as it is referred to in the Project Completion Report, or PCR) for PMACI, covered an area of 252,000 square kilometers in the states of Acre, Amazonas and Rondônia[17] and was composed of five subprograms: (1) territorial organization, which consisted in "an instrument that would permit the coordination of the actions of the diverse agents that interfere in the organization of physical space;" (2) protected areas, which involved the creation and implementation of conservation units (National Forests, Environmental Protection Areas – known as APAs in Brazil -- and an ecological station) in the project's area of influence in the three affected states; (3) environmental monitoring and control ("fiscalização ambiental"), containing "a proposal for an integrated system of monitoring and control as well as a program for protection and management of turtles ("*quelônios*"); (4) environmental education and forestry extension, including proposals "to promote the best utilization of environmental resources through increased awareness, education of the local population and provision of assistance to productive agents;" and (5) indigenous communities, containing proposals for the protection of such communities that incorporate actions in the areas of health, education, productive activities, and regularization of indigenous lands.[18]

According to the PCR, the objectives and targets of the PAD were maintained throughout the life of the project, but, with the decentralization of PMACI starting in 1990, there was a "wide revision" of specific activities in four of the five subprograms – only the territorial organization component remained largely unchanged – in order "to integrate and articulate them with other actions that were already being developed in the region." More generally, paving of the road was completed in 1992 – more than three years later than originally anticipated (although the PCR does not give the reasons for this delay), but PMACI was not concluded until May 1995, more than ten years after the project was approved, "in virtue of delays verified in the conception and implantation of the PAD."[19] The PCR does not indicate how long these delays were or exactly why they occurred, although it does refer to disagreements and overlaps between

[17] Roughly half of the state of Acre, which has a total area of nearly 153,000 square kilometers, was reportedly included in this area together with parts of the other two states.

[18] Inter-American Development Bank, Project Completion Report (hereafter PCR), the Porto Velho-Rio Branco Road Project, Brasília, no date, pp. 3-4. My translation.
This report, which is in Portuguese, however, only covered the environmental and indigenous peoples' protection component (PMACI).

[19] Ibid., pp. 1 and 4. The two Bank loans were not formally closed, however, until March 1997.

some of the participating federal agencies, as well as IPEA's previous inexperience with implementation of development projects, again without providing details. This situation was reportedly reverted once responsibility for coordinating PMACI was transferred to the then federal Secretariat of the Environment, which did not yet exist when the project was approved. More specifically, the PCR observes that PMACI's implementation involved two phases:

> *The first, between 1985 and 1989, was characterized by the centralization of decisions for planning and execution of the project in federal government agencies. The authoritarianism with which it was conducted reflected the lack of attention to locally defined priorities and lack of consideration of the activities of local governmental and non-governmental institutions. Project coordination was in Brasília, rarely visited the area, and did not demonstrate any concern for coordinating with local organizations or the beneficiary communities. There was no transparency regarding project information.*
>
> *The second phase, from 1990 to the end of the project, began with the transfer of general coordination to the Secretariat of Environment in the Presidency of the Republic, today the Ministry of Environment, Water Resources, and Legal Amazônia. From then on, participation – on all levels and instances – of the beneficiary communities and local institutions was assured; wide access to information about the project was permitted; the appearance of monitoring and control mechanisms accessible to all stakeholders was encouraged; and it was possible to celebrate formal agreements ("convênios") directly with local institutions, thus resulting in a broad and general decentralization.* [20]

As of this point, not only did implementation of PMACI proceed much more rapidly, but it also contributed significantly to "integrate and coordinate local actions, which were entirely consistent with its purposes, but had previously been ignored by the project and, not rarely, overlapped with its activities." Bank agreement with and support – apparently including that of the Resident Representative personally – for this decentralization was considered critical both for the modification of implementation arrangements to have occurred and for the project's ultimate success. Also essential was the decision to suspend disbursements for the project in December 1987 – the first time this had happened with an IDB loan to Brazil – according to the PCR, because the Bank found the PAD presented by the Government to be "an inconsistent document and inadequate to confront the problem of the environmental and social impact of pavement of

[20] Ibid., pg. 5.

the road in addition to not giving space for local participation."[21] In fact, this decision came as the result of strong pressure on the Bank by the US Congress in mid-1987 following a visit of the rubber tapper leader and internationally renowned environmentalist Francisco ("Chico") Mendes to Washington, during which he described the growing social conflicts and environmental problems in the region in general and those faced by resident rubber tappers and rural workers in Acre in particular.[22] In the words of the PCR, this "unprecedented" decision on the Bank's part was "the starting point for the profound changes that were subsequently effectuated in the management of PMACI, which were decisive for the project's success in its second stage starting in 1990."[23]

III. Results of PMACI

Largely due to the aforementioned decentralization, PMACI reportedly achieved most of its objectives and targets. Indigenous peoples' organizations received support, as did "management of their territory," indigenous health, education, productive activities, training and "identification of their lands," while FUNAI's local offices in Rio Branco and Porto Velho were also strengthened. Government and NGO performance with respect to territorial organization, environmental monitoring and inspection, forestry extension, and environmental education also improved; diagnostic studies were undertaken with respect to forest cover, deforestation, and other relevant matters; practices to recover degraded areas through the implantation of agro-forestry systems were encouraged, as were alternative proposals for the use of (non-timber)

[21] This suggests, moreover, that presentation of the PAD may also have been significantly delayed beyond the 18-month time horizon following the loan signature (March 1985) originally established, although the PCR does not specifically confirm this.

[22] More specifically, according to one later IDB report on the project, "the immediate outcome of the pressure applied by Mendes was a letter from members of the United States Congress to the President of the IDB on April 1, 1987, suggesting that the road project be suspended until the Bank could ensure that the mitigation components required had been implemented. Another letter, dated June 5, 1987, requested that the Bank formally suspend disbursements until the environmental issues had been resolved. On June 16, the Government of Brazil was notified by the IDB of the risks of delays in the implementation of the mitigation measures. On June 25, the United States Treasury Department asked the Bank to suspend disbursements and to cancel the loan if the borrower would not commit to the plan by the end of March 1988. On August 5, United States Congressmen threatened to cut United States funding to the IDB, and the IDB's Environment Committee decided to send a notice to the Brazilian government about the delays, setting a 60-day period for clarifications to be submitted." See Mary Allegretti, Carlos Ramirez, and Anne Deruyttere (editors), *Public Participation and Sustainable Development in the Amazon: The Case of PMACI*, Inter-American Development Bank, Washington D.C., December 1998, pg. 7.

[23] IDB, PCR, *op. cit.*, pg. 9. The Government's formal response to the Bank's suspension of disbursements was followed by a mission from Bank Headquarters to Brasília and Rio Branco in April-May 1988 to redefine and negotiate the basis for proceeding with Bank financing for the project, the alternative having been outright cancelation of the associated loans. (See Allegretti, Ramirez, and Deruyttere (eds.), op. cit. pp. 9-10.

forest products. The protected areas subprogram permitted the creation of National Forests and gave particular attention to extractive reserves,[24] including physical demarcation of the Chico Mendes Reserve, which was legally established in early 1990,[25] and provided support to education, health and economic development programs for rubber tappers in both Acre and Rondônia.[26]

PMACI's support of the Chico Mendes Reserve is identified by the PCR as one of the most significant changes that occurred during implementation, as this conservation unit, which covered nearly one million hectares, had not yet been created when the PAD was developed, but was demarcated with project resources. This also reflected a considerable shift in the focus of the protected areas component, which, after 1990, gave increasing emphasis to responding to the demands of local rubber tappers and to strengthening existing assistance programs, including those of international and local NGOs, rather than just the formal establishment of new National Forests, APAs and Ecological Stations. According to the PCR, it also meant an important broadening of PMACI's emphasis from the conservation of natural resources to sustainable development -- including its more general social and environmental aspects.[27]

Other changes that affected PMACI's results included cancelling the use of helicopters to monitor deforestation and forest burning under the environmental monitoring and control component, because IBAMA, once created, took over this activity for all of Amazônia using funds from other sources, and reformulation of the environmental education and forestry extension component to give greater support to existing initiatives to recover degraded areas through reforestation with native species. This also permitted extending greater project assistance to small farmers that lived along the right of way of BR-364, who, in the words of the PCR, "received little attention in the original PAD but constituted a group that was strongly affected

[24] Extractive reserves are publicly owned areas with long-standing populations who use the natural resources, such as rubber and Brazil nuts, on a sustainable basis. They began to be formally established as federal protected areas in October 1985 in response to a proposal drawn up by the National Rubber Tappers Council in order to avoid land conflicts with ranchers and other large landowners and invaders, especially in the states of Acre and Rondônia.

[25] This extractive reserve was named in memory of Chico Mendes, who had been assassinated in May 1988. This pivotal event and its aftermath is described in Andrew Revkin, *The Burning Season: The Murder of Chico Mendes and the Fight for the Amazon Rain Forest*, Houghton Mifflin Company, Boston, 1990, and Alex Shoumatoff, *The World Is Burning: Murder in the Rain Forest*, Avon Books, New York, 1990. This tragic event, which focused tremendous international media attention on the plight of the Amazon rainforest at the time and gave further impetus to the NGO-supported rubber tapper movement in Acre, also contributed directly to the aforementioned establishment of IBAMA by the Brazilian federal government and probably also played a role in the Bank's decision around the same time to suspend disbursements and press for the reformulation of PMACI as discussed above.

[26] IDB, PCR, *op. cit.*, pp. 1-2.

[27] Ibid., pg. 4.

by pavement of the road."[28] According to another Bank report on the project, these small farmers, who had settled along the border between Acre and Rondônia, managed to reverse the risk of extensive deforestation earlier witnessed in much of the latter state by developing "a different system in already deforested areas with diversified crops alongside subsistence crops, which would later become known as agro-forestry."[29] In reality, however, this may have been mainly due to rapidly diminishing migration pressures on the region (see below). The indigenous communities' subprogram, finally, reportedly experienced only minor alterations in its contents, but witnessed "important changes" in its implementation by permitting NGOs, which had initially been excluded from the project, to participate in its activities.

The PCR concludes that the original PAD became "obsolete" in many ways because of the elapsed time -- nearly three years -- between its elaboration and effective implementation and because it had been formulated on the premise that it would be executed exclusively by federal agencies, when, in practice, it was implemented largely by state and municipal government entities and NGOs. As it turned out, moreover, the significant increase in migration to the project area, which, based on the earlier experience in Rondônia, had been anticipated by the Bank's appraisal team, did not materialize for "diverse reasons," which, unfortunately, the PCR does not describe. However, this fortuitous circumstance facilitated PMACI's shift in focus from managing the expected population inflow to promoting the sustainable development of existing settlements, including the new formally established extractive reserves.

The principal unanticipated result of PMACI, according to the PCR, was that the project would become "a model and example of intervention in Amazônia, assisting and stimulating local initiatives, with total support from the beneficiary communities, and articulating and integrating experiences with an eye toward sustainable development."[30] In the process, most of the entities that implemented specific projects, including the NGOs, were also strengthened, leaving them with increased capacity at the end of the project to pursue their objectives and activities. The only initially proposed actions that were not achieved were the creation of an Ecological Station in Amazonas and of an APA in Acre, due to lack of interest by the two state

[28] Ibid., pg. 4.
[29] Allegretti, Ramirez, and Deruyttere (eds.), *op. cit.* pp. 9-10.This report goes on to state that "they obtained startup resources from a Dutch cooperation agency, organized an association, and established a simple financing system. The "RECA" project was thus launched and was included among PMACI beneficiaries. Small associations similar to the RECA were organized in other areas and were also considered by PMACI."
[30] IDB, PCR, *op. cit.*, pg. 6.

governments and despite the efforts by PMACI's coordination unit, including offers of financial support and technical studies, to encourage the respective state environmental agencies to establish these facilities.[31]

IV. Lessons Learned

A number of important lessons, which go beyond the project's environmental and social safeguard aspects - but nevertheless are of relevance to these concerns -, were drawn by the PCR. Still others can be gleaned from this pioneering Bank experience. Starting with those identified in the PCR:

1. Environmental and social projects should value regional knowledge and experience, support local initiatives, value the intervention of non-governmental and other civil society organizations that possess mechanisms to respond and intervene in a rapid and efficient manner and at low cost, make available all types of information about the project, permit the democratic discussion of problems, and guarantee the participation of beneficiary communities from the conception phase through the end of execution.
2. Projects that affect traditional communities (such as indigenous peoples and rubber tappers) should have clearly defined objectives and targets. But at the same time, they need to be sufficiently flexible to permit constant evaluation and adaptation to the needs and circumstances of the local reality, creating agile mechanisms that permit eventual modifications to their specific targets.[32]
3. Formulation of an Action Plan that contemplated a variety of environmental problems and issues contributed to project success. Difficulties encountered during the first phase – which could have led to the failure of the project as a whole – were due to the excessive concentration of actions in federal agencies when, in fact, this was a regional project to be implemented in an area that was already highly mobilized and active in terms of addressing its problems.
4. In terms of what PMACI proposed – to mitigate the effects of pavement of the road – the project was reasonably well dimensioned, especially after reformulation of the specific projects contained in the PAD when the proposed actions and targets effectively incorporated local aspirations and included segments of the population,

[31] Ibid., pg. 6.
[32] Ibid., pg. 2.

such as the small farmers, who were largely overlooked in the initial version of the Plan.

5. An unidentified risk was that local institutions were not explicitly included in project design. This resulted in significant pressure -- especially from the government of Acre, which was allied with NGOs in the state – on PMACI's coordination, which was unable to respond effectively. Not involved in the project, the local entities proceeded with their activities, many of which were parallel to and overlapped with those of PMACI, while the project, which was hampered by institutional, political, and budgetary problems, was able to advance only slowly in its execution. As a result, the project was discredited among its supposed beneficiaries and was largely ineffective in the region, a situation that was only reversed with its decentralization in the second phase.
6. The most serious problem affecting PMACI, above all in its second phase, was the difficulty encountered by the Ministry of Environment to enter into formal agreements with and transfer financial resources to the local entities, especially NGOs. This resulted in delays that adversely affected project implementation and meant that many activities took longer to execute than originally programmed. Despite various institutional changes during the second phase of project implementation, these problems were partially overcome by continuity of the technical team responsible for its general coordination.[33]
7. The Bank's close accompaniment of project execution was decisive to accelerate it and authorize alterations in the PAD in accordance with the needs and priorities of the beneficiaries. By being sensitive to local demands, the Bank became an important interlocutor for the beneficiaries, at times taking on the role of mediator between the federal government and local governmental and non-governmental institutions. The Bank's determination that the project should not proceed without substantial modifications in its management and priorities, suspending disbursements for nearly a year, was decisive in the Brazilian Government's eventual willingness to make the needed changes to PMACI.

[33] Ibid., pp. 7-9.

Other important lessons that can be drawn from this experience but were not specifically mentioned in the PCR include: (i) the critical importance of the up-front identification and assessment of potential direct and indirect environmental and social impacts in the project's broader area of influence; and (ii) the need to explicitly incorporate measures to mitigate these impacts as an integral part of the associated road improvement operation itself. Where relevant, especially in ecologically and socially sensitive agricultural frontier areas such as the Brazilian Amazon, the identification, assessment, and mitigation of indirect impacts should include induced development effects – such as new migration and land settlement and their potential adverse environmental and social impacts -- in the project's larger area of influence in the case of a major road improvement and, where more than one development intervention is taking place, their cumulative impacts as well. This process should include identification of the institutions responsible for carrying out each such action and provision of the financial resources required to do so. Subsequent close monitoring and supervision of the implementation and evaluation of the results of these actions by the financing institution or institutions involved is also essential.

Another important lesson is the need to include contractual clauses in the Bank loan agreements requiring the borrower to carry out the necessary environmental and social due diligence and establishing clear sanctions (i.e., the suspension of disbursements) if this does not adequately occur to the Bank's satisfaction. Similarly, requiring that environmental management measures be included in the contracts with the construction firms responsible for the road improvements and providing resources to strengthen the governmental – and eventually non-governmental – institutions responsible for environmental and indigenous peoples' protection were very positive measures. Many of these elements were explicit or implicit in the project design in the case of the Porto Velho-Rio Branco road pavement project. The IDB should be complimented in this regard for establishing and following "best practice," especially at a time when prior environmental (and social) impact assessment was not yet a formal Bank requirement.

V. An Ex-post Participatory Review

PMACI was also the subject of a Bank seminar in December 1994, involving representatives from all the major stakeholder groups involved in the project, and subsequently resulting in a technical publication that drew additional lessons from this experience. The

seminar concluded that this operation differed in the way it was carried out from other IDB-financed "infrastructure projects with an impact on environmentally fragile areas inhabited by indigenous groups" and was particularly "noteworthy because it achieved its objectives at the critical juncture for the Amazon of the 1980s, which was marked by serious social conflicts, high deforestation rates, and criticism of the prevailing development model." More specifically, "PMACI was launched just as the Polonoroeste resources were suspended by the World Bank.[34] Denounced by the potential beneficiaries during its first years of implementation, the project was completed ten years later with a request for its continuation filed by the same institutions that had rejected the project earlier." Also according to this report,

> *PMACI made history in a number of ways. Brazil developed and used innovative management techniques. NGO and local communities changed the very course of development. For the IDB, the project represented its first large-scale experience in participatory development. Today, it can be asserted that, under the auspices of PMACI, the Government of Brazil, local governments, communities, and the IDB learned an important lesson: opening up a forum for dialogue and negotiation can help harmonize overall policies, emphasize local priorities, and resolve conflicts about development.*
>
> *A road through the tropical forest of the Amazon has the potential to cause irreversible environmental damage and increased land conflicts resulting from both the speculative increase in land values and uncontrolled migration. During the life of PMACI (1985 to 1995), both the deforestation and demographic growth rates increased only marginally in the project's area of influence. In other words, the phenomenon (sic) that had occurred during the previous 10-year period in Rondônia was not repeated in the state of Acre.*[35]

The extent to which this positive outcome was a result of the actions implemented through PMACI or were due to other factors, including the fact that many of the most affected areas in Acre were already occupied by small farmers, rubber tappers, or indigenous groups, some of which were already very politically active, there was a significant decrease in new migration pressures on the region, and the existence of a very different view of development priorities by -- and political constellation of forces in -- state and local governments in Acre

[34] The World Bank suspended disbursements from all five of its loans for Polonoroeste in March 1985 just as a new civilian-led federal government was taking office in Brazil and were resumed in August 1985 after the new administration took steps to improve the protection of several highly vulnerable indigenous reserves and agreed to a Bank-proposed agenda for redirection of the program.

[35] Allegretti, Ramirez and Deruyttere (editors), *op. cit.*, pp. 1-2.

compared with those in Rondônia, and the negative environmental and social, including serious public health consequences (especially the widespread incidence of malaria) associated with recent experience in the latter state, is not specifically assessed in this report, but project interventions and the Bank's support undoubtedly contributed to the more positive results in the case of the Porto Velho-Rio Branco road. These considerations notwithstanding, the seminar and subsequent report highlighted five key lessons from PMACI which reinforce and complement those summarized above:

- *Recognition of Land Rights*. The land of the indigenous and extractivist (e.g., rubber tapper) communities, the long-time inhabitants of the region who employ non-destructive systems for natural resource use, were legally protected and their rights over their land recognized according to the historical and cultural peculiarities of each group. This prevented a significant part of the land from being commercialized and its inhabitants expelled to the shantytowns of city outskirts.
- *Decentralized, Participatory Management*. For the first five years, the project was administered in Brasilia, with little involvement by local institutions, but the available resources could not be disbursed and the project lost credibility with the beneficiaries. The management system changed by providing direct support for initiatives already under way in the region, with community participation in priority-setting and decentralized allocation of resources, thereby strengthening local organizations and generating sustainable alternative sources of income.
- *Interconnection between Environmental and Social Issues*. The project demonstrated to all the parties involved that there is a complex relationship between economic, environmental, and social problems in tropical forest areas, by expanding the notion of environmental impact mitigation for infrastructure works through specific quality control measures towards a more integrated vision of social and environmentally sustainable development.
- *Consensus-building and Conflict Resolution through Negotiation*. Conflicts over land ownership and widely diverging development alternatives for the region predated the road and gave rise to violent confrontations, almost causing the project to collapse. The IDB's understanding of its potential role as facilitator with respect to the various

groups in confrontation was decisive in reversing the situation and leading to negotiated solutions.

- *Clear Contractual Rules Combined with Flexibility in Execution*. The measures for mitigation of the environmental and social impact established in the contractual clauses as conditions precedent to disbursement, together with the flexibility allowed in execution of the plans of action, enabled the Bank and the beneficiary communities to adjust project management and achieve effective results in the short term.[36]

Another important lesson, according to this report, was that "good development projects recognize conflict as part of social life and ensure the institutional and political conditions for them to be explained and a negotiated solution to be reached. PMACI proved that the environmental and social impact of an infrastructure works project could be mitigated if it was recognized that social conflicts express unmet demands and overshadow new types of proposals that require legitimate institutional spaces to be implemented and give rise to new development policies. Regularizing traditionally inhabited areas and strengthening local organizations, converting them into protagonists in the process, generates self-confidence, an essential condition to ensure a sustainable future."[37]

The seminar concluded that:

> *The adverse impact of the road was mitigated because the conditions for indigenous groups and local communities to remain in the areas they had traditionally inhabited had been ensured and because their institutions were strengthened. This result was achieved once arrangements were made under the project for the beneficiaries to participate directly in the planning and implementation of activities to which the beneficiaries themselves had assigned priority. To achieve this objective, the concept and methodology of the project had to be structurally revised during the project execution period. The key to the project's success was to recognize the legitimacy of the existing social conflicts in the area and to ensure their resolution through negotiations by the parties involved, a process facilitated by the intermediation of the Bank and the Government of Brazil.*[38]

More generally, the report argues that PMACI contributed to a "paradigm shift" that "led to the model for sustainable development which has since been incorporated into international

[36] Ibid., pg. 2.
[37] Ibid., pg. 12.
[38] Ibid., pp. 2-3.

development cooperation." While this statement may give insufficient credit to other contemporary participatory development initiatives and efforts to address the direct and indirect social and environmental impacts of infrastructure investments in agricultural frontier regions in the Brazilian Amazon and elsewhere in the developing world, the PMACI experience is nevertheless instructive as to how the Bank and other development agencies should approach large rural road improvement projects in such areas. However, the seminar also pointed out an important limitation to PMACI: "it had helped discontinue a certain development model, but did not replace it with another. As the impact mitigation component of a road project, PMACI was able to control the environmental and social impact of the road and prevent the occurrence in Acre of the same process that had occurred in other parts of the Amazon. However, precisely because it was just a component, it did not ensure development of the region on a new, sustainable basis." This would require an even broader, multi-faceted approach that, in fact, the Bank has also supported through a follow-on project for Acre, approved in May 2002.

VI. The Acre Sustainable Development Program: Design

This project, which was initially estimated to have a total cost of US$ 108 million, was partially financed by a US$ 64.8 million IDB loan that was fully disbursed by the time it was completed in June 2010. Its general objective was "to improve the quality of life of the population and to preserve the natural wealth of the State of Acre in the long term."[39] To achieve this objective, the project had three components, one of which included additional road improvements to a section of BR-364:

1. *Sustainable management and conservation of natural resources* (US$ 17.2 million), which sought to "modernize the State's capacity for environmental management and…ensure the efficient use of natural resources." Activities to be financed were aimed at: (i) resolving the irregular land tenure situation in the State; (ii) creating and administering a state system for the conservation of protected natural areas as well as implementing three comprehensive protection units involving a total of 220,000 hectares and protecting the surroundings of the Serra do Divisor National Park; (iii) continuing to improve the institutional capacity of the state government to implement

[39] Inter-American Development Bank, *Brazil – Acre Sustainable Development Program (BR-0313) – Loan Proposal*, Washington D.C. Executive Summary, pg. 1.

environmental legislation; and (iv) valuing the cultural identity of 12 indigenous groups and extractivist and riverine populations.

2. *Support and promotion of sustainable productive development and employment* (US$ 36.5 million), which sought to increase the rate of growth of the agriculture and forestry sector and generate employment by: (i) developing the technical capacity critical for the efficient, relevant, and cost-effective provision of services to generate and transfer agricultural and forest technology; (ii) supporting traditional populations and small producers; (iii) the long-term strengthening of permanent sanitary services for agriculture and forestry; (iv) creating the institutional framework necessary for the efficient management and regulation of the sustainable exploitation of forestry resources, as well as establishing and implementing four state production forests on one million hectares, for the harvesting of certified forest products; and (v) fostering productive investments that increase competitiveness of strategic sectors or products with comparative advantage in Acre that generate employment and do not harm the fragile environment.
3. *Public infrastructure for development* (US$ 33.4 million) whose purpose was to cut transportation costs and increase access to rural electrification in Acre by: (i) paving a 70.1 kilometer stretch of an isolated section of the BR-364 highway, together with the final engineering designs and supervision and environmental audit of works; (ii) improving navigability of rivers in the state; and (iii) providing electric energy to isolated rural communities.[40]

Under the heading of "Environmental and Social Review," the Executive Summary of the Bank's loan proposal document observes:

> *The environmental strategy of the State authorities supported by the proposed Program consists of limiting the expansion of the agricultural frontier to a maximum of 16% of the total area of Acre over the course of 20 years, reducing the rate of deforestation to 0.3% annually. This goal will be attained by (i) expanding the State's protected areas from 33.5% to 58% of the territory; (ii) developing sustainable forestry activities; (iii) consolidating the occupied areas in the southeast part of the State by increasing*

[40] Ibid., pp. 1-2. The third component of the project also included rehabilitation of the road to the Cachoeira Agro-extractivist project.

agricultural productivity and seeking economic alternatives to reduce pressure on the land; and (iv) strengthening the State's capacity for environmental monitoring and control. The Program was specially designed to attain Acre's development by addressing the existing environmental liabilities (e.g., degradation of deforested areas) and, in particular, avoiding new negative impacts in the future. Therefore, the main socio-environmental problems that can be foreseen would occur in the event that the Program's actions are not carried out as anticipated.

With respect to the proposed new road improvements, more specifically, it affirms:

It is expected that paving 70.1 kilometers of the isolated section of highway BR-364 will not lead to the problems caused by similar works in the Amazon region because: (i) the section is 450 kilometers from the next paved road section, and so would not allow for the flow of possible immigrants from other states or from southeast Acre; (ii) 95% of the section to be built will be protected by the proposed state forest in the area of influence and by the Katukina Indigenous Reserve, reducing any efforts to settle or deforest. Nonetheless, in addition to the mitigation plan already being carried out by the Acre state government, the Program includes actions to clarify property rights to the land and strengthen the capacity for environmental supervision and oversight in the area impacted by this highway construction.[41]

This notwithstanding, one of the principal risks identified in the project document refers to the paving of the BR-364 highway – the other being change in priorities of the State of Acre. As concerns the former, the report notes that construction of BR-364 in the 1970s "made it possible to integrate Acre, Rondônia, and northern Mato Grosso into the rest of the country. Nonetheless, the lack of adequate land management led to its disorderly occupation and the development of agricultural activities with a low rate of return that spurred on the deforestation of these areas." In order to avoid this, the appraisal report states that paving of the additional

[41] Ibid., pg. 3. Interestingly, the expected benefits from the project, in turn, are identified as resulting from: (i) the foregone losses of biodiversity resources and carbon sequestration from the conservation of 352,000 hectares by diminishing the annual rate of deforestation from 0.4 5 to 0.3% over 20 years; (ii) the net returns from sustainable harvesting of forest resources amounting to one million hectares of state forests; and (iii) the net expected benefit from the recovery of 450,000 hectares of degraded lands and conversion to environmentally sustainable agricultural activities of 30,000 hectares of pastureland.

section of BR-364 would be "conditioned on first completing the following activities in the area of influence of the road-building activity: (i) clarifying the property rights in the municipality of Tarauacá [i.e., where this road segment is located]; (ii) establishment of the state production forest; (iii) strengthening the environmental oversight units; (iv) instituting environmental licenses; and (v) evidence of private-sector interest in sustainable forestry exploitation in the state production forests."[42]

In consequence, among the pertinent legal conditions set in connection with the Bank loan were, prior to issuing the call for bids for paving the first segment of the road, which was divided into two parts -- Liberdade-Rio Tauari (50.1 kilometers) and Rio Tauari-Igarapé Santa Fé (20 kilometers), respectively) -- to be implemented in sequence: (i) submission of the final engineering designs; (ii) contracting the supervision and environmental audit; (iii) culmination of the public presentation of results of the cadastral survey in the municipality of Tarauacá, creation of the state forest and installation and operation with appropriate staff of two surveillance posts by the Acre Environmental Institute; and (iv) submission of a roster of firms interested in the sustainable exploitation of the state production forest in the area of influence of the section of the road to be paved. Additional conditions prior to procurement for the latter segment were: (i) initiation of works for the former section; and (ii) having adjudicated the exploitation of not less than 35,000 hectares of the state production forest. An additional Bank legal requirement was submission of the respective environmental licenses and compliance with any other necessary environmental conditions prior to the public call for bids for civil works.[43]

The project report does not clearly explain why the specific segment of BR-364 to be paved was selected or what justified its improvement in this way at this particular point in time, but apparently this was one of the last segments of the road providing access to areas for sustainable forestry that was not yet all-weather.[44] The report nevertheless affirms that "the proposed Program has been structured such that the investments in road transportation infrastructure will be economically viable and implemented once the capacity for environmental

[42] Ibid. pp. 3-4. To minimize the second risk, the report notes that "the Program has been designed to enable civil society to participate in supervising its implementation. To this end, the Commission for Evaluation and Monitoring of the Program has been created, with representatives of the public sector, both federal and state, indigenous organizations, labor groups, business associations, and local and national non-governmental organizations, and should serve as a forum for consultation, dissemination of results, and taking in suggestions." Formal establishment of this Commission was a disbursement condition for the Bank loan.
[43] Ibid., pp. 5-6.
[44] Personal communication from John S. Horton.

management, surveillance, and control is in place in the area of influence, so as to minimize deforestation."[45] It notes further that "to determine the economic viability of the paving of 70.1 km of the isolated section of BR-364, the internal rate of return (IRR) and net present value (NPV) of the difference between the net benefits generated by the situation with and without the project were calculated, i.e. the savings in operating and maintenance costs of vehicles that normally use the road, and the generation of new traffic of forest products (certified timber in uncut logs from the state forests to Cruzeiro do Sul) and non-forest products, once the work is completed."[46] It also observes that this estimate did "not include the environmental benefits that would result from sustainable forest management and the extraction of certified products from the state forests," which once added to the analysis resulted in an estimated "social IRR" of 35%.[47]

Bank safeguard requirements were clearly quite different at the time this project was appraised and approved than when the Porto Velho-Rio Branco road improvement operation was processed in the mid-1980s. The new operation also reportedly incorporated key lessons from the earlier one, which are relevant for other types of development project as well, more specifically: (i) environmental projects that affect traditional populations require the active participation of the affected communities from their design until their final implementation; (ii) decentralization of the implementation of sustainable development projects to local organizations and participation of civil society institutions in project execution reduce the possibility of conflict and allow for an appropriate pace of implementation; and (iii) participation mechanisms for the beneficiaries of socio-environmental projects should be provided for in the loan agreement.[48] In addition, as required under Brazilian law and Bank safeguard policies at the time it was appraised, the State Government prepared an environmental impact assessment (EIA) in 1996 for the road section to be paved. This assessment was revised and broadened to cover the entire proposed project at the Bank's request in 2001. According to the project report, the EIA and its associated mitigation plan "followed a broad process of consultation with the parties affected, including indigenous groups, through public hearings. The mitigation plan, reviewed and approved by the Bank, includes specific actions in the areas of production, health, education, land tenure regularization,

[45] IDB, loan proposal, *op. cit.* pg. 7.
[46] Ibid., pg. 34.
[47] Ibid., pg. 35.
[48] Ibid., main text of the loan proposal report, pg. 5.

valuing of indigenous culture, environmental management, the obligation to include a code of conduct in the terms of reference for the contractor firms and staff in relation to the local society and the environment, and the strengthening of local organizations."[49] There is no further description of the original EIA and/or the updated assessment in the appraisal report but copies of the pertinent documents are housed in the Bank's Public Information Center (see the next section).

The project implementation unit in the Secretariat for Planning and Economic Development (SEPLAN) would be responsible for environmental supervision with the support of a management firm, which was to prepare reports every six months and a mid-term report on the environmental and social impacts of the construction and other activities under the project. Evaluation of the project also called for "meeting specific environmental indicators, such as reducing the rate of deforestation and the use of remote sensors and satellite images for measuring it." Over the long run, the institutional capacity building activities to be carried out under the project's subcomponents for land management, the establishment and management of protected areas, strengthening the state environmental management system and forest resource management would seek "to make more efficient and effective use of the State's capacity to manage natural resources and control possible impacts of sectoral actions in these areas."[50]

VII. The Environmental Impact Assessment and Associated Reports

The EIA and associated RIMA (Relatório de Impacto Ambiental) for pavement of 217.7 kilometers of BR-364 between Tarauacá on the banks of the Tarauacá River and Rodrigues Alves on the banks of the Juruá River was prepared by a consulting firm in September 1996.[51] At the Bank's request, the State of Acre updated this assessment for pavement of 101.5 kilometers of the road (i.e., out of the larger segment originally considered in the earlier EIA-RIMA) and extended it to cover the other components of the Acre Sustainable Development Project in 2001.[52] It is interesting to note that, for reasons that are not explained in the appraisal report, the

[49] Ibid., pg. 26.
[50] IDB loan proposal, *op. cit.*, pg. 27.
[51] STCP Engenharia de Projetos Ltda, EIA-RIMA, *Pavimentação da BR-396 Trecho entre Rodrigues Alves e Tarauacá*, Curitiba, Paraná, Setembro 1996. The EIA is in four volumes and the RIMA, which summarizes it, is in a fifth. (hereafter EIA or RIMA).
[52] Marcelo Piedrafta Iglesias, *Impactos Socio-Ambientais do Programa de Desenvolvimento Sustentável do Estado de Acre (BID-BR-0313)*, Rio de Janeiro/Rio Branco, April-May 2001. In addition to the pavement of 101.5 kilometers of BR-364, the road infrastructure improvements to be undertaken that were also considered in this report

section of BR-364 actually paved under the IDB project was further reduced to 70.1 kilometers.[53] A specific study on "indigenous affairs" was also carried out for this project by another consultant around the same time, again at the Bank's request.[54]

The EIA-RIMA for the proposed road improvement, which covered physical, biological, and socio-economic aspects,[55] was technically well done, focusing on both potential direct and indirect impacts during both construction and subsequent "operation" of the paved road in its direct and indirect areas of influence. The latter included the four municipalities of Tarauacá, Cruzeiro do Sul, Rodrigues Alves, and Mancio Lima.[56] Altogether, this involved a total area of 36,305 square kilometers, or 23.6 percent of the State of Acre. It also carried out a diagnosis of environmental quality with and without the proposed road improvement and considered both its positive and negative potential impacts (referred to specifically as "environmental balance" of the undertaking).

Among the potential negative indirect impacts identified in the indirect area of influence of the road segment to be improved were: (i) adverse air quality as a result of fires (to clear land for agricultural and ranching purposes); (ii) removal of vegetative cover and surface soil, leading to erosion and soil nutrient loss as the result of "dinamization" ("*dinamização*") of the regional economy; (iii) deforestation due to the need for wood for civil works, improved access of the local population to forest areas and, again, "dinamization" of the regional economy, leading to destruction of forest reserves and even the removal of rare species; (iv) loss of biodiversity due to increased land invasion and new rural properties; and (v) increased pressure on renewable natural resources as the result of increased agricultural and ranching activities induced by the improvement of access.[57]

Proposed mitigation measures for these potential impacts included: (i) monitoring and control ("*fiscalização*") of fires in the indirect area of influence of the road segment to be

included paving of 20.1 kilometers of the access road to the Chico Mendes Agro-extractivist settlement and the improvement, conservation and maintenance of 744 kilometers of branch roads.

[53] In both cases, it is likely that alternative funding sources were found for the additional 147.6 kilometers that were covered in the 1996 EIA-RIMA.

[54] Carlos Ultramari, *Programa de Desenvolvimento Sustentável do Estado do Acre – Assuntos Indigenas*, Rio Branco, July 2001.

[55] More specifically, it covered the following types of impact: (i) physical – air, surface water, and soils and subsoils; (ii) biological – flora and fauna; and (iii) socio-economic – local populations, infrastructure, historical and archaeological sites, and regional economy.

[56] The road segment to be upgraded cut through the first three of these municipalities, but the fourth was also included in its indirect area of influence because the section to be paved would also improve access to it.

[57] EIA, *op. cit.*, Volume II.

improved associated with implementation of the Economic-Ecological Zoning (EEZ) for the region; (ii) elaboration of a master plan ("*Plano Diretor*") for occupation and regional development and a specific land use plan along the road corridor, both based on the EEZ, with the objective of reducing the predatory exploitation of flora and fauna in a way compatible with the exiting human settlements along the road; (iii) implantation of an efficient system of "*fiscalização*" to combat non-authorized cutting of timber and prevention of accidental and deliberate fires in the area of influence; (iv) allocation of financial resources equivalent to five percent of the value of the road improvement project to strengthen conservation units (and to better structure and improve the management of existing ones in particular) along the section of the road to be upgraded as a legal requirement for the licensing of these works; (v) creation of agro-forestry poles along the highway to take advantage of the sustainable timber production potential; (vi) "*fiscalização*" of deforestation resulting from the "dinamization" of the regional economy and promotion of EEZ to order land occupation and use in the area; (vii) regularization or prohibition of predatory hunting and fishing; (viii) preventive actions by municipal governments by identifying, keeping a cadastre and monitoring immigrants in their territories to orient and manage the implantation of new productive activities; (ix) installation of agro-villas along BR-364 as a way of orienting new occupation along the road in accordance with the EEZ; and (x) regularization of land tenure situation in the area.[58]

The RIMA, which summarized the findings and conclusions of the EIA, affirmed the following:

> *'Dinamization' of the economy is the principal positive impact [of the proposed road improvement] since…it will permit the increase of regional production and improve the level of income and the quality of life of the population, as well as being the principal economic justification for execution of the works foreseen.*
>
> *The indirect negative environmental effects of the 'operation' of the road in its area of influence of BR-364 will be produced primarily by the process of 'dinamization' of the regional economy, with one of the principal ways of minimizing these effects being elaboration of the Economic-Ecological Zoning of the State of Acre associated with a regional development program based on agro-forestry production having agro-vilas,*

[58] Ibid., Volume III.

extractive production areas and industrial transformation, with the first phase emphasizing the processing of wood and food products of extractive origins.[59]

The Bank-financed Acre Sustainable Development Project was designed in good measure to respond to the mitigation measures and help implement the regional development program proposed in the EIA-RIMA, also taking into account the findings and recommendations of the two 2001 consultants' reports mentioned above. The first of these reports noted, for example, that "for the paving of BR-364, the "sanitation" ["s*aneamento*" – referring in this case to the clear definition of land tenure] of the lands in the area of influence, establishment of public production forests, strengthening of surveillance ("*vigilância*") units, application of environmental norms and sanctions, and application of the mitigation plan proposed in the [1996] EIA-RIMA will be required." It also identified as a significant environmental risk in the absence of these measures, "the potential deforestation, over a period of 25 years, of approximately 33 percent of the 100 kilometer corridor along the stretch of road to be paved, or roughly 4000 square kilometers." To avoid this, the report specifically recommended undertaking a territorial organization plan ("*plano de ordenamento territorial*") for the corridor entailing 50 kilometers on either side of the road section to be improved and to strengthen the "*fiscalização*" of fires. It went on to state:

In general, it can be said that there will be [potential] socio-environmental impacts due to an increase in the rhythm of conversion of forests to agricultural and ranching use, degradation of forests due to their inadequate exploitation, and generation of conflicts with traditional populations, above all indigenous ones. Project activities consider these possibilities by proposing institutional and legal restructuring, recuperation of degraded areas, creation of new protected areas, support to forest management, dissemination of sustainable practices and implementation of social actions that can serve to correct these externalities.

Of the aspects analyzed in this diagnostic study, some are striking due to the volume and complexity of the expected impacts: the increment in the number of branch roads as a result of the pavement of the stretch of BR-364 [under the project], the advance of agro-ranching activities, and the risk of the increase in the rate of deforestation in general due to the increase in productive activities. It should also be noted that continuity of the

[59] RIMA, *op. cit.*

presently observed posture of the Government of Acre in terms of its preoccupation with socio-environmental questions will be fundamental."[60]

In short, the environmental assessment process required first by the Brazilian federal government for the road segment to be paved – i.e., the 1996 EIA-RIMA – and subsequently by the Bank for the broader project as a whole, whose results were manifested in the two consultants' reports briefly described above, represent a comprehensive approach to the identification of potential environmental and social impacts and the proposal of measures – some of which were incorporated as major components of the project itself – to mitigate them. By taking potential indirect – including induced development – as well as direct impacts in the project's broader (i.e., indirect, as well as direct road right of way) area of influence, this, indeed, represents an example of good practice in advance of project approval and implementation. However, the extent to which these and the other mitigation, monitoring, and environmental management measures, as well as those to protect and assist vulnerable indigenous and other traditional populations, (such as the rubber tappers), were adequately implemented and effectively evaluated during and after project execution remains to be seen.

VIII. Project Implementation and Results

Implementation took four years longer than originally anticipated and is summarized, together with associated general results and lessons, in a Project Completion Report (PCR) issued in October 2010.[61] The project cost considerably more (US$ 142 million) than originally anticipated due to a significant increase in road paving costs, which more than doubled from an estimated US$ 33.4 million to US$ 76.7 million, according to the PCR. This increment was financed in part through reallocation of Bank loan funds from other components and subcomponents of the project and, to an even greater extent, with an injection of additional resources from the federal government's Growth Acceleration Program (PAC), which was launched in 2007.[62] The cost increases are attributed largely to delays – although the PCR does not indicate how long these were -- in the initial procurement of works for the road pavement,

[60] Iglesias, *op. cit.*, pg. 60.

[61] Inter-American Development Bank, *Relatório de Término de Projeto – Programa de Desenvolvimento Sustentável do Acre*, Brasília, October 29, 2010. All citations from this report are my translations from the original Portuguese.

[62] More specifically, the Bank reallocated roughly US$ 7.7 million of its loan to the infrastructure subcomponent from other components and subcomponents and local resources for this subcomponent increased from an original allocation of US$ 17.1 million to a total of close to US$ 52.7 million, according to the PCR, *op. cit.*, pg. 13.

which, in turn, were apparently due in good measure to the fact that the final design studies revealed the need to bring all of the basic construction materials to the project area by river from Manaus and "the much more stringent construction requirements in an area in Amazônia that is flooded during half of the year."[63] The difficulties involved in paving a road segment that was crossed by several rivers and, thus, traversed several major watersheds, was also a significant factor, [64] although presumably this should have been easily foreseen at the time of appraisal. The PCR also indicates that start-up delays were caused in part by a "constant rotation" of staff in the State's project team.

The project also faced "a great challenge" in promoting entrepreneurism, "initially in demonstrating to small farmers and ranchers the importance of adding value to their products and because, in some local agencies, some of the technical staff with a very traditional profile lacked relevant experience in business promotion."[65] There was likewise limited demand at first for business promotion services and this activity was reportedly given lower priority by the implementing unit, which also faced difficulties in accompanying some project objectives and indicators because the State lacked a specific agency with the responsibility to do so and because some of the initial targets were over-dimensioned. Finally, among the factors that negatively affected project implementation, there was an increase in the incidence of forest burning in the State in 2005 due to the "longest drought period in the past 30 years," exacerbated by local slash-and-burn land clearing practices, which increased the number of fires well beyond the capacity of firefighters and the pertinent state agencies to control them.[66]

These problems and delays notwithstanding, the PCR judges project outcomes to have been largely "satisfactory," which is attributed mainly to the following factors:

- The project's "methodology…whose key was the strictly respected sequencing of interventions" and which inhibited uncontrolled occupation of land by immigrants

[63] Ibid., pg. 14. The PCR suggests that somehow these contingencies had been overlooked in the preliminary design studies for the road section to be paved upon which the initial cost estimates were based.
[64] Personal communication from John S. Horton.
[65]PCR, *op. cit.*, pg. 14. The staff rotation problem was reportedly later solved by assigning staff to the project coordination unit from within SEPLAN that were "qualified in Bank procedures."
[66] For an interesting study on this subject in general, see Cheryl A. Palm, Stephen A. Vosti, Pedro A. Sanchez, and Polly J. Ericksen (editors), *Slash-and-Burn Agriculture: The Search for Alternatives*, Columbia University Press, New York, 2005. This book is based in part on extensive studies by Steve Vosti and others in Acre and there are three specific chapters on the western Brazilian Amazon and one on the Peruvian Amazon.

without titles "to the contrary of what occurred in areas adjacent to previous[ly improved] stretches of BR-364."[67]

- The existence of a high level of political will and commitment on the part of the state and municipal governments, which created a very favorable environment for project progress, together with SEPLAN's leadership and the collaboration of a variety of institutions that "allowed the project to overcome the high risk of conflicts and inefficiencies as a result of the multiplicity of stakeholders and technical areas involved."
- Robust growth of the national economy starting in 2005 which favored increased incomes of project beneficiaries and made possible the availability of additional federal resources through the aforementioned PAC that allowed the project to mobilize a much higher level of counterpart funds than initially anticipated.
- Application of the concept of sustainable environmental management by the state Secretariats involved in order to reconcile reduced deforestation and development in project activities.
- "Strong social mobilization," consolidated by cooperatives and environmentally oriented social movements, which contributed to "totally inhibit any type of land speculation" in the project area, at the same time strengthening the cultural identity of the communities involved, avoid conflicts, and contribute to project implementation.[68]

Among the "success factors" mentioned above and recognizing that a forest policy needs to remain consistent over the long term "given the slow biological cycle at the base of the system," the PCR highlights the "commitment of the government of Acre since 1999 [which] has permitted the new equilibrium between the protection of natural resources with social inclusion and the growth of the chain of forest products and associated businesses." It affirms further that "without the increase in political will and broad and consistent dissemination of concrete policies, achievement of the Program's targets would not have been feasible." As concerns potential risks to the sustainability of project outcomes, in turn, it observes that, while "the strong

[67]PCR, *op. cit.* ,pg. 13. More specifically, this refers to the following sequence of actions: (i) mapping of the areas communities, and the cadastral situation prior to construction; (ii) dialogue with the existing populations, especially with the traditional (e.g., rubber tapper, small farmer) and indigenous communities, which facilitated communication with local authorities regarding land invasions; (iii) the presence of the Acre Environmental Institute (IMAC) in different localities on the ground, its use of remote sensing technologies and its monitoring and control ("*fiscalização*") of forest fires and deforestation which has complemented the control of land invasions; and (iv) the mitigation measures for socio-environmental impacts required in order to obtain a permit from IMAC.
[68] Ibid., pp. 13-14.

tendency of cattle ranchers to curb deforestation, in many cases, incorporating new forestry activities in a farming-ranching-forestry system, has contributed significantly to the reduction in deforest clearing," any change in this pattern could lead to a reversal in this regard.[69] The PCR does not specifically report on implementation and results of the environmental and social management, monitoring and mitigation measures -- whether recommended in the pre-project EIA or introduced subsequently – taken in connection with pavement of the additional 70 kilometers of the BR-364 road, but a "final evaluation" of the project carried out by a consultant firm between October 2008 and November 2009 reportedly included an assessment of the social and environmental impacts of the works and actions implemented under the project.[70] Thus far the Bank's office in Brasília has not been able to locate any specific written output from the consulting firm that assessed the project's environmental and social impacts and how they were addressed.[71] The head of the consulting firm that carried out the final evaluation of the project affirmed, however, that its assessment as to how project environmental and social impacts were handled was quite positive and emphasized that "the key innovation was the establishment of the two UGAIs (Unidade de Gestão) that were set up, one at the beginning of the road and one at the end, as part of the social and environmental protection. Even during the 2.5 years of construction, when they had to be vigilant regarding not just about deforestation but the direct impact of 600 workers near poor and indigenous communities – where specific risks had been identified for prostitution and disease transmission (whether Sexually Transmitted Diseases or other) -- the UGAIs worked and that there was not a single incident reported or detected."[72] While the PCR itself does not provide any specific information in this regard, it does record many of the outputs and outcomes of the project more generally.[73]

[69] Ibid., pg. 15.
[70] Tellus Consultoria SA, *Programa de Desenvolvimento Sustentável do Acre – Relatório de Avaliação Final*, Rio Branco, December 2009. This firm also reportedly assessed: (i) the project's physical and financial progress with an emphasis on the objectives achieved; (ii) the degree of satisfaction of project beneficiaries through a structured questionnaire administered to a sample of this population; and (iii) the problems encountered during implementation and proposed mitigation measures.
[71] A recent email exchange between the author of the Bank's PCR and the head of the consulting firm that carried out this "independent evaluation" suggests that, if in fact this specific assessment was carried out, it may have been overseen by the State Secretariat of Environment, which, being the entity ultimately responsible for implementing many of the required environmental and monitoring measures, would hardly have made such an assessment truly independent.
[72] Personal communication from John S. Horton on July 1, 2011.
[73] These results are summarized in the table on pages 8-12 of the PCR and will not be repeated here.

IX. Lessons Learned

The PCR puts forward a number of useful lessons which can be added to those drawn from the earlier Porto Velho-Rio Branco Road Improvement Project summarized above. Among the most relevant for our present purposes are the following:

- The program proved definitively that it is possible to reduce deforestation in Amazônia following a consistent methodology. The key to the change in behavior of producers and residents in a rural area in this region is to demonstrate the socio-economic advantages of sustainable production at the same time that [environmental] monitoring and control continue.[74]
- Before making a decision to finance a Program of this nature and to begin the process described above, it is necessary to demonstrate the existence of a high degree of political commitment.
- An undertaking as ambitious and innovative as the present one could not be implemented in a period of four years as originally anticipated.
- Applying the concept of environmental sustainability in all the actions of the Program, with participation of all the affected stakeholders, demonstrated definitively that, even in Amazônia, it is possible to invest in transport infrastructure without increasing deforestation.
- Preliminary road engineering design studies are insufficient in the challenging context of Amazônia which requires final studies.
- The Results Framework (or "*Marco Lógico*") of the project should not contain associated targets in the absence of a concrete baseline and well-defined indicators for which data can be easily obtained.[75]

[74] It adds that "the sequence should begin with the reliable mapping of communities and their cadastral situation as the initial approach to the communities in each area, followed by a genuine dialogue with the beneficiaries, with proactive inclusion of traditional and indigenous communities. The presence on the ground of a normative and control agency like IMAC is essential to continue the process of delimiting areas to be protected, authorizing and controlling [land] use, and ensuring that communication continues. At the same time, the [land use] control activities have to be undertaken in collaboration with agencies that can transfer technology and promote businesses that can demonstrate alternatives that bring higher incomes, taking advantage of the new context of sustainable production."

[75] Ibid., pp. 16-17. Other lessons contained in the PCR refer to up-front analysis of the need for a management firm for the project, the need for "pump priming" or initial stimulation of new private businesses, and the importance of involving civil society and the academic community in the dissemination of lessons learned.

X. General Lessons and Conclusion

Taken to*g*ether, these two largely successful Bank operations provide rich lessons with respect to the identification and management of social and environmental impacts of major road improvement projects in the Brazilian Amazon and other agricultural and ranching frontier regions, particularly those that are ecologically and/or culturally sensitive, in Latin America and elsewhere. The most important of these lessons are that: (i) both the potential direct and indirect -- including induced development and cumulative -- social and environmental impacts of these investments need to be identified, assessed, and adequately addressed; and (ii) doing so requires taking a broader sustainable development approach to – and in -- their respective (direct and indirect) areas of influence, which also need to be clearly identified and well understood in terms of their ecological, demographic, economic, social, political and institutional characteristics and dynamics in advance of project implementation. An important corollary of the second lesson is (iii) the need to effectively involve all affected local stakeholders -- and especially those most vulnerable to the social and environmental impacts in question -- in the process of identifying and monitoring these effects and, to the extent possible, ensuring their active participation in the implementation and evaluation of the associated measures to mitigate and/or compensate for them. Finally, (iv) what is clearly critical for this to occur is strong and persisting political commitment at the local (i.e., in this case, state and municipal) level. Each of these key lessons will be further developed below.

Especially in frontier regions, the indirect environmental and social effects of major road improvements – particularly construction of new roads or the pavement of existing ones – may be much greater and more widespread than their direct ones. This is the case because, as the appraisal report for the Porto Velho-Rio Branco project clearly recognized, one of the main purposes of such investments is to improve access and reduce transportation costs to and from formerly remote areas, thus “opening” them up for new settlement and/or the increased exploitation of their natural resources, both renewable, such as forests and soils, and non-renewable, such as minerals and hydrocarbons. In short, their purpose is precisely to induce further development. So doing can result in considerable land use conversion and/or environmental damage, including significant deforestation and forest burning with associated adverse impacts on vital ecosystem services, natural habitats, biodiversity – and possibly even

local climate – being among the most significant, and whose destruction or loss may prove irreversible. If indigenous peoples and/or other "traditional" and potentially vulnerable populations -- such as rubber tappers and small subsistence farmers and riverine communities in the case of Acre -- are located in these formerly remote areas, improved access can also imperil them as the result of the likely increased contact – and potential conflicts -- with loggers, miners, farmers, ranchers and others that may be induced to come into the region. This includes the possible invasion/encroachment of indigenous lands, whether demarcated of not, and legal reserves. Thus, it is necessary to identify the entire (i.e., both direct and indirect) area of influence of any major new road investment and to consider the economic, social, and environmental impacts it may have within this area and on its resident – and potential immigrant – populations.

Given that one of the main purposes of rural road improvements in frontier areas is precisely to induce further local development, which may have significant environmental and social, as well as economic, impacts, it is also necessary to consider the potential effects of these investments together with those of closely associated development interventions – i.e., to consider their cumulative impacts. As in the earlier case of Rondônia, at the time the Porto Velho-Rio Branco Road Improvement Project was appraised by the IDB, it was considered likely that one of the associated outcomes of this initiative would be new agricultural settlement, either as the result of new official colonization projects or as a consequence of increased spontaneous migration to the project's area of influence, or both, which could have additional potentially significant adverse environmental and social impacts. Even though, in this particular case, such an inflow did not ultimately occur -- at least not to the extent originally anticipated -- it is noteworthy that the Bank clearly identified this potential risk and sought to build measures into the project to control or mitigate it through PMACI, including the strengthening of ecological protected areas and indigenous peoples' reserves. The Acre Sustainable Development Project, in turn, incorporated in its basic design a series of interventions related to land tenure and sustainable use and the establishment of additional protected areas in the zone adjacent to the road segment to be improved, prior to the initiation of any new construction work. Both are examples of good practice. For these reasons also, as suggested above, before undertaking a major road improvement in such areas, it is first important to identify and understand, as fully as possible, both their existing ecological and cultural conditions and current population and

productive occupation trends and to project, as adequately as possible -- with establishment of an ongoing monitoring program to determine how the situation actually evolves in this regard -- what is likely to happen in demographic, economic, social and environmental terms once access is improved and transportation costs significantly reduced. This also means the need to understand – and monitor -- the local political economy and governance conditions in frontier areas to the extent possible and how they are likely to evolve in response to any proposed major transport improvements, especially as they tend to have very different governance characteristics and trajectories than older and more settled regions given the frequent "wild west" nature of these areas.[76]

Taking a sustainable development approach to the direct and indirect area of influence of a major rural road improvement project in a natural resource rich frontier region, especially in areas subject to the risk of significant deforestation, ecosystem destruction, and loss of biodiversity, will, as the Acre Sustainable Development Project clearly anticipated, among other precautions, necessarily involve controlling future land use in this area, particularly in zones in relatively close proximity to the trunk road itself and/or to any secondary roads that branch off from it. This, in turn, will require both increased knowledge of and control over the land tenure situation and an ability to closely monitor and limit any forest conversion to other uses that does take place, through environmental licensing, remote sensing, ground truthing, and other means. These are among the key elements that were built into the design and subsequent implementation of the Acre Sustainable Development Project along the segment of the BR-364 that was to be paved as part of this operation. As the respective PCR correctly points out, moreover, both the timing and the sequencing of these interventions is very important, with the need for the land use controls to be fully in place prior to the actual road improvement. In fact, these measures should be carried out well in advance of any such intervention to head off to the extent possible the land speculation that is likely to occur in anticipation of the nearly certain substantial increase in land values that will take place once access is improved and transport costs are lowered as a result of these investments. Creating and/or strengthening official protected areas -- including indigenous peoples' reserves, where applicable – are also an important part of this process. More generally, as the earlier Porto Velho-Rio Branco project contemplated, undertaking a participatory agro-

[76] For one interesting analysis of governance conditions in frontier regions such as the Brazilian Amazon, see Robert R. Schneider, *Government and the Economy on the Amazon Frontier,* Environment Department Paper No. 11, World Bank, Washington D.C., August 1995.

ecological (or economic-ecological) zoning exercise of the road's direct and indirect area of influence is likewise a precondition in order to determine which parts of the affected region are appropriate for what kinds of productive use and/or merit stronger protection and conservation, and, thus, should effectively be declared "off limits" for new settlement and land conversion.[77] An exercise of this sort was, in fact, carried out in Acre in 2001, which clearly identified the State's sustainable forestry vocation, together with the need for land tenure regularization "to guarantee security in rural areas and control the destiny of public lands," according to the final evaluation report for the Sustainable Development Project.[78] However, it is also important to recognize that such zoning exercises, in and of themselves, are not a panacea and that it is essential that they not be limited to a set of technical studies alone, important as they are, but that they also involve the effective participation of all affected stakeholders, both in order to better educate them about local sustainable natural resource use potentials and constraints and to obtain to the extent possible their "ownership" of the proposed land use measures and restrictions that should be the final output of such initiatives. In short, land use zoning, especially in rural frontier areas, is ultimately both a technical and political process and needs to be viewed and conducted as such.[79]

In this connection, furthermore, major road upgrading projects in natural resource rich frontier regions should not only seek to "avoid harm" to the environment and to indigenous and other vulnerable local communities in their areas of influence, but also proactively seek to "do good" by containing measures to directly strengthen and enhance these ecosystems and benefit, as well as protect, populations. Thus, they should be designed and utilized to the extent possible as broader local development undertakings, not only in terms of improving access and reducing

[77] For one general discussion in this regard with respect to the Brazilian Amazon developed jointly by the World Bank and IMAZON, an important environmental non-governmental organization in the region, see Robert R. Schneider, Eugênio Arima, Adalberto Veríssimo, Paulo Barretto and Carlos Souza, *Sustainable Amazonia: Limitations and Opportunities for Rural Development*, World Bank Technical Paper No. 515, Washington D.C., 2002. A Portuguese version of the same document was previously published as *Amazônia Sustentável: Limitantes e Oportunidades para o Desenvolvimento Rural*, World Bank/IMAZON, Brasília, 2000. On the identification of environmental and indigenous protected areas in the Amazon region in general, see: Adalberto Veríssimo, Adriana Moreira, Donald Sawyer, Iza dos Santos, and Luis Paulo Pinto (organizers) and João Paulo Ribeiro Capobianco (general coordinator), *Biodiversidade na Amazônia*: *Avalicação e Ações Prioritárias para a Conservação, Uso Sustentável e Repartição de Benefícios*, Instituto Socioambiental, São Paulo, 2001.

[78] Tellus Consultoria, *op. cit.*, pg. 6.

[79] See, for example, Dennis J. Mahar, *Agro-ecological Zoning in Rondônia, Brazil: What Are the Lessons?*, Anthony L. Hall (editor), *Amazonia at the Crossroads: the Challenge of Sustainable Development*, Institute of Latin American Studies, University of London, 2000, and Dennis J. Mahar and Cecile L. H. Ducrot, *Land-Use Zoning on Tropical Frontiers: Emerging Lessons from the Brazilian Amazon*, EDI Case Studies, World Bank, Washington D.C., 1998.

transport costs -- and, thus, indirectly stimulating new and/or enhanced local productive activities, important as these are, especially in remote regions -- but also seek to identify and promote socio-economic and other opportunities to enhance the income, employment and living conditions of resident populations, especially the poorest. As was attempted in the case of the Acre Sustainable Development Project in other words, major road improvements in frontier areas and elsewhere, should be conceived and implemented as part of more holistic spatially-defined efforts to promote and help realize long-term environmentally and socially sustainable development objectives in these regions more generally.

This also clearly points to the need for any such interventions to be as participatory as possible. Again, the lessons drawn from the Porto Velho-Rio Branco Road improvement project after the suspension of disbursements and its associated externally political and locally demand-driven decentralization, as well as the approach proposed and followed in the Acre Sustainable Development Project, were the appropriate ones in this regard. The importance of involving local stakeholders, both from the perspective of making maximum use of local -- including indigenous -- knowledge and in order to incorporate their concerns and inputs into project design and implementation in such regions and elsewhere, cannot be sufficiently emphasized. While stakeholder interests may frequently be conflicting, especially in natural resource frontier areas, as the Bank seminar held to discuss the PMACI experience in December 1994 concluded, unless these potential conflicts are explicitly recognized and addressed, major investment projects – and agro-ecological zoning exercises -- in such regions may quickly or ultimately derail and, thus, fail to meet their environmental and social – and, thus, broader sustainable development – objectives, as had previously happened in Rondônia.

Finally, while the consistent and effective application of Bank environmental and social safeguards are important in such situations, strong, consistent and demonstrated local political will and support are even more essential for such initiatives to be successful. As the PCR for the Acre Sustainable Development operation affirms, this needs to be assured up-front, and, in fact, should be a critical precondition for Bank agreement to finance major road improvement projects, especially in ecologically and/or culturally sensitive regions which require significant environmental and/or social management measures to be in place before proceeding with such investments. It is likewise important that the financing institutions both include such conditions

in project legal agreements and carefully monitor and enforce borrower compliance, as occurred, albeit with considerable outside pressure, in the case of the Porto Velho-Rio Branco operation.

In conclusion, whether their primary objective is to stimulate local development or to strengthen interregional – and, in some cases, international -- territorial and economic integration, major interurban and rural road improvements, especially in natural resource rich frontier regions, are likely to have significant direct, indirect—including induced development -- and cumulative environmental and social impacts, which need to be clearly recognized, anticipated, and adequately addressed. While each case will have distinct needs and requirements depending on the particular geographic, ecological, economic, socio-cultural, and political-institutional context involved, it is essential that these contexts be properly understood through a sufficiently comprehensive up-front environmental and social impact assessment and subsequent participatory environmental and social monitoring and management process. This process may often benefit from the use of a Strategic Environmental Assessment (SEA) that focuses on a broader set of associated development initiatives in the same region, or direct and indirect area of influence, of the major road improvement in question. More broadly, a multi-sectoral spatial – rather than sector by sector -- approach to sustainable development around the physical and economic corridor polarized by the road segment to be improved is also recommended. Building on its successful experience to date in northwest Brazil, the IDB should not only approach road improvement projects in areas having similar characteristics elsewhere in Latin America in the same comprehensive, creative and proactive fashion, but, as in Acre, it has an excellent opportunity to lead – and show -- the way with regard to the promotion of environmental and socio-cultural sustainability at the subnational level through the integration of a broader set of sustainable development interventions together with such road investments.