

**INFRASTRUCTURE FOR DEEPER INTEGRATION IN SOUTH AMERICA:  
IIRSA**

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## **INFRASTRUCTURE FOR DEEPER INTEGRATION IN SOUTH AMERICA: IIRSA**

### **Summary**

The paper studies the rationale and main economic features of the Iniciativa para la Integración de la Infraestructura Regional Suramericana/The Initiative for Regional Infrastructure Integration in South America (IIRSA), and attempts at classifying the potential effect of this major region-wide initiative. The initiative was taken on 31 August-1 September 2000 in Brasilia by the heads of state of 12 South American countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela. In support of deeper regional integration and enhanced insertion in international markets, IIRSA identifies three priorities: coordination of infrastructural plans and investment; harmonization of regulatory and institutional frameworks in the areas of transport, energy, and telecommunications; and the introduction of innovative financial mechanisms. The Initiative aims particularly at improving the interconnections among the national road networks in the countries in the region, and at improving strategic waterways and railways, related border-crossing facilities, ports and airports, as well as telecommunications and energy facilities. As of now, the IIRSA Strategic Vision 2020 distinguishes ten hubs, as shown in Map 1: (1) Mercosur-Chile hub; (2) Andean hub; (3) Central Oceanic hub; (4) Amazon hub; (5) Escudo Guyanese hub; (6) Peru-Brasil-Bolivia hub; (7) Capricorn hub; (8) Southern hub; (9) Paraguay-Paraná waterway hub; (10) Souther Andean hub.

Map 1. The IIRSA hubs.



By April 2005, the countries have reached consensus on an implementation agenda for the period 2005-2010, involving 31 projects related to these hubs. As the paper shows, IIRSA is unique in its size and concept as a region-wide integrated infrastructural plan, to be implemented by an organisational and financial structure involving 12 governments, regional development banks (IDB, CAF and FONPLATA), as well as other regional financial institutions like the European Investment Bank (EIB), and probably public-private partnerships (PPP).

So far hardly any academic research has been published on the potential impact of IIRSA on economic growth and on the environment. The paper argues that the potential impact of the plan on the region's economic geography may be significant through its stimulus to investment, production and trade, and may stimulate the rise of new centres of economic gravity in South America. At the same time, IIRSA may speed up the transformation of land use in South America and threaten the existence of ecosystems and with it the public goods these system deliver to the local, regional and global community, including the function as a habitat for indigeneous peoples, animals and plant species. To stimulate the potential welfare-enhancing effects of IIRSA and reduce its negative side-effects on the environment and human welfare, appropriate frameworks are required to integrate in an effective and efficient manner economic instruments.

To put the Initiative in perspective and clarify its rationale, the paper starts by focusing on the changing position of Latin America in the international economy and the changing direction of major trade flows. Trade with countries in the South has increased significantly, particularly with East Asia. Trade among countries in Latin America has become significant as a proportion of total trade in Latin America as a whole, and particularly when excluding Mexico, but showed less dynamism during the period under investigation (1997-2003). The new context of open regionalism, new preferential trade agreement (PTAs) with the European Union (EU) and USA, and comprehensive concessions to

cut most-favoured-nation (MFN) tariffs in the World Trade Organization (WTO), in combination with delays in infrastructural investments over some decades, provide the rationale for IIRSA.

Subsequently, the paper presents an overview of the most significant dimensions of the IIRSA project. It is argued that in view of the sheer size and scope of most of the individual road projects included in IIRSA, an assessment of its probable economic and non-economic impacts exceeds by far the traditional framework for project assessments and evaluations, as provided by costs-benefit analysis. Essentially, a comprehensive *ex-ante* assessment would require a regional general equilibrium model which would allow simulation runs. It should be noted, however, that the capability to simulate or generate the real-world dynamics of such a major investment programme in selected regions has strict limits. Moreover, the time span of such models does not allow for inclusion of environmental effects and their (second round) economic repercussions. At this stage such such model studies have not been prepared in the context of IIRSA. The final section of the paper attempts at classifying the potential economic, ecological and social impact roads may have, and attempts at identifying approaches to maximize the contribution of roads to welfare and limit negative side-effects.

## **INFRASTRUCTURE FOR DEEPER INTEGRATION IN SOUTH AMERICA: IIRSA**

### **1. Introduction**

The paper studies the rationale and main economic features of the Iniciativa para la Integración de la Infraestructura Regional Suramericana/The Initiative for Regional Infrastructure Integration in South America (IIRSA), and attempts at classifying the potential effect of this major region-wide initiative. The initiative was taken on 31 August-1 September 2000 in Brasilia by the heads of state of 12 South American countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela. The Initiative aims at contributing to the integration of infrastructure in the region in support of the region-wide strategy of so-called open regionalism, and in support of a comprehensive insertion of Latin America in world markets.

IIRSA identifies three priorities: coordination of infrastructural plans and investment; harmonization of regulatory and institutional frameworks in the areas of transport, energy, and telecommunications, and the introduction of innovative financial mechanisms. The Initiative aims particularly at improving the interconnections among the national road networks in the countries in the region, improvement of strategic waterways and railways, related border-crossing facilities, ports and airports, as well as telecommunications and energy facilities. As of now, the IIRSA Strategic Vision 2020 distinguishes ten hubs, as shown in Map 1:

- (1) Mercosur-Chile hub;
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By April 2005, the countries have reached consensus on an implementation agenda for the period 2005-2010 involving 31 projects related to these hubs.

IIRSA is unique in its size and concept as a region-wide integrated infrastructural plan, to be implemented by an organisational and financial structure involving 12 governments, regional development banks: the Inter-American Development Bank (IDB), the Andean Development Corporation (CAF) and the Financial Fund for the Development of the Rio de la Plata Basin (FONPLATA). Moreover, the European Investment Bank (EIB) will be involved in view of its particular expertise in the areas of cross-border financial and legal institutional cooperation, financial constructions and related legislation. All this does not exclude that at a later stage other official financial flows will be involved generated by governments outside Latin America. Clearly, co-financing arrangements are actively pursued and so are public-private partnership (PPP) arrangements.

Given the new economic context in which Latin American countries have been operating since the introduction of the neo-liberal model, and in view of the sheer size of the IIRSA programme as laid down in Strategic Vision 2020, the paper argues that the potential impact of the plan on the region's economic geography may be significant through its stimulus to investment, production and trade, and may stimulate the rise of new centres of economic gravity in South America. At the same time, IIRSA may speed up the transformation of land use in South America and threaten the existence of ecosystems and with it the public goods these systems deliver to the local, regional and global community, including the function as a habitat for indigenous peoples, animals and plant species. To stimulate the potential welfare-enhancing effects of IIRSA and reduce its negative side-effects on the environment and human welfare, appropriate frameworks are required to integrate in an effective and efficient manner economic instruments.

Section 2 of the paper focuses on the changing position of Latin America in the international economy and particularly on the rapidly increasing orientation of the countries in the region towards regional and world markets of goods, services and capital. Section 3 analyses the need to deepen integration and develop trade-related infrastructure in the new context. Section 4 presents an overview of the most significant dimensions of the IIRSA project, and gives a brief classification of the potential economic and environmental impact roads may have, and attempts at identifying approaches to maximize the contribution of roads to welfare and limit negative side-effects.

## **2. The integration of Latin America in the world economy**

The world economic system is moving rapidly away from a system that was strongly dominated for several decades by two major actors, the USA and the EU that are more or less equal in size when measured according to gross national product (GNP) at purchasing power parity (PPP). Moreover, both economic actors play a dominant role in world trade flows, and the bilateral trade flow that links them still is the largest interregional trade flow in the world economy as illustrated in Figure 2. A multipolar economic system is emerging as reflected by the size of the economies in Asia, particularly of the three regional economic superpowers China, Japan, and India, as well as by the size of the trade flows between these economies. Moreover, in Latin America Brazil and Mexico are emerging as two

regional economic superpowers, be it of significantly less economic weight and showing much less dynamism than the emerging economies in East and Southeast Asia do.

Gravity models of international trade, that were introduced in the 1960s and are actually enjoying a revival in economic literature and particularly in studies on the impact of regional integration on bilateral trade flows, explain the size of bilateral trade flows by the size of the related economies measured by their overall purchasing power, levels of income per capita, barriers to enter markets such as tariff rates and non-tariff barriers (NTBs) to trade, the tariff equivalent of transportation costs. Some models include variables reflecting similarity in import demand and export supply of trade partners. The inclusion of barriers to enter the market of the exporting economy reflects the bias against exports in the incentive structure of the exporting economy, which impact negatively on the size of the country's export flows (Linnemann *et al.*1992). Hence, the most important factors in explaining the direction of trade flows are the size of markets and income levels, with trade policy and infrastructure as complementary variables. Using this model as a starting point of our analysis of the changing position of Latin America in the international economy, we may distinguish the following long-term changes (Van Dijck and Faber 2006).

The first worldwide trend affecting significantly the world trading system and particularly the position of developing regions is the liberalization of domestic markets and international transactions, including trade in goods and services, financial transactions and foreign direct investment (FDI). In its most dramatic and radical form, this transition has taken place in Eastern Europe and in the former Soviet Union, resulting in the comprehensive transformation of the national economic policy system as well as the regional trade-regulating mechanism of Comecon. A number of these countries has subsequently been integrated into the EU in May 2004, and some more will become member of the EU in the years ahead. The new insertion of these countries in the world economy, which has been locked in by WTO membership of most of them, creates new trade opportunities but also new competition for developing countries. From the perspective of Latin America, this holds particularly for markets of non-tropical agricultural products, like wheat and meat, and for a range of manufactured goods characterized by the application of mature or standardized technology.

China and Vietnam are two more cases in which systemic reform has taken place, contributing not only to overall growth of the domestic economy but also to a radical strengthening of these countries' positions in international trade. Not unlikely, India may be the next in line where systemic transition may contribute to a radical shift in international performance.

Although the process of liberalization in the rest of Asia and in most countries in Latin America has been far less dramatic and comprehensive than was the case in the former socialist regimes, the implications for their insertion in world markets have nevertheless been profound. In the course of the 1980s, many countries in both regions acceded to the General Agreement on Tariffs and Trade (GATT), and subsequently to the WTO, binding their tariff rates at levels much higher than the levels at which they actually apply import tariffs, thus creating a substantial tariff overhang in their trade system. Moreover, liberalization measures have been locked in by intraregional and interregional PTAs.

The second of these trends is the worldwide spread of industries and service providers producing for international markets, thus transforming radically the traditional division of labour between developed and developing countries, and by consequence international trade flows. Most notably from the 1970s onwards, an increasing number of countries in the Pacific Rim as well as some countries in Latin America have started to penetrate world markets in a broadening range of labour-intensive manufactured products or goods produced with a standardized 'mature' technology. China in particular has become a new motor in the world economy, stimulating trade flows with countries in all regions of the world. As a consequence North-South trade has become more diverse, and both North-South and South-South trade have been strongly dynamized, contributing more significantly to world trade than in earlier decades. Moreover, a growing number of developing countries is involved in the international supply of services by means of cross-border trade and outsourcing related activities, and through the international movement of natural persons.

The third trend is the growing role of PTAs the world all over. While the external trade policy of the EU has traditionally been based on a regional and a multilateral pillar, the USA has more recently engaged itself in such a dual approach. Multilateralism, not regionalism used to be the approach of choice for the USA up to the formation of the Canada-US Free Trade Area (CUSFTA) in 1989. Since then, the USA has pursued this new strategy vigorously towards Latin America and some countries in the Pacific Rim. The new approach enables the USA to serve its priorities by negotiating in an

interactive way at the regional and multilateral levels. Reluctantly and at a more limited scale, Japan has diversified its strategy as well.

While Latin America was involved in the establishment of a large number of PTAs already in the 1960s, we may now notice a new momentum in regionalism in all developing regions including Asia. Modern PTAs tend to include a broad range of trade-related issues such as competition policy, investment regulation and government procurement. This makes strict application of GATT Article XXIV, Territorial Application – Frontier Traffic – Customs Unions and Free-Trade Areas, all the more urgent. More generally, this trend could contribute to the need for a comprehensive regulation of such trade-related issues at the multilateral level, to avoid regional rather than multilateral rules becoming predominant in the world trading system. Put differently, by excluding these issues from further negotiations on the Doha Development Agenda (DDA) of the WTO, as happened during the Ministerial Conference at Cancun in September 2003, international regulation of such issues is left for regional negotiations, in which developing countries may have less bargaining power than would have been the case if broad South-South co-operation along the lines of the G-20 would have been pursued further in multilateral negotiations on such issues.

Finally an alarming trend, related to the marginalization of Sub-Saharan Africa in the world economy. Over the years 1990-2003, average annual population growth (2.5 per cent) almost equalled growth of GDP (2.7 per cent). Notwithstanding a large number of PTAs linking African countries with each other as well as with the rest of the world, the share of Sub-Saharan Africa in world trade has fallen to an all-time low of 1.5 per cent. The region is still highly dependent on commodity exports, despite the various non-reciprocal preferential systems and other initiatives to stimulate non-traditional exports.

Focusing now specifically on the position of Latin America in the world trading system, we notice wide differences in trade performance and regional orientation between the two largest trading nations in the region, Mexico and Brazil. Although the size of Mexico's economy is about 70 per cent of Brazil's GNP at PPP (2003 data), Mexico's exports of 165 billion US dollars exceed by far Brazil's

exports of 78 billion US dollars. Put together, the two countries generate 60 per cent of total exports and 54 per cent of total imports of Latin America and the Caribbean.

Traditionally, Mexico's economy has been linked strongly with the US economy through trade and FDI flows, be it that this was limited in the era of import-substitution policies by high import tariffs, frequent use of non-tariff barriers (NTBs) and strict investment regulations. However, integration has progressed rapidly since Mexico's liberalization in the mid-1980s and more specifically as a consequence of NAFTA. Further reduction of applied MFN rates in a DDA will consequently result in significant preference erosion for Mexico, as simulation of the effects of several packages of liberalisation measures – presented as possible outcomes of the negotiations on the DDA - show (Anderson *et al.* 2006). Although Mexico has attempted to diversify its trade and investment position by signing PTAs with the EU and other trade partners in Latin America and East Asia its orientation towards the USA is still extremely strong.

Many small economies in Central America and the Caribbean also show a strong trade orientation towards the USA, and this holds to a lesser extent for Colombia and Venezuela. As many of these economies enjoy preferential access to the US economy, they will suffer from preference erosion in case of significant MFN tariff cuts in the WTO. This holds also for the preferences of Caribbean ACP countries in the EU market, be it that the future value of such preferences has already been reduced by WTO rulings on the EU regimes for sugar and bananas.

As compared to Mexico, Brazil, shows a more balanced distribution of trade among its partners in Latin America, the USA and the EU. Remarkably, notwithstanding the creation of Mercosur operating *de facto* as a CU Brazil's trade with Argentina has declined significantly since 1997 (Van Dijck 2002b).

All the rest of Latin America shows a significantly stronger orientation towards the region than Mexico does. However, it is remarkable that notwithstanding a spaghetti bowl of numerous PTAs and

bilateral investment treaties among the countries in the region, regional trade in Latin America, both including and excluding Mexico, has not increased but stagnated in absolute terms during the period under investigation (1997-2003), and even declined in relative terms from 29.9 per cent of total exports of Latin America excluding Mexico in 1997 to 20.9 per cent in 2003. A similar declining trend is noticeable in the case of Brazil, the great promoter of integration in the region.

As compared to many countries in East and Southeast Asia, Latin America does not seem to be strongly orientated towards its own region, as shown also in Tables X and Y and Figure Z..

Figure X. Latin America in South-South trade, in billions of US dollars, 1997-2003.

*Note:* developing countries including Latin America, Africa and Asia and excluding developing Europe.

*Source:* IMF (2004) *Direction of Trade Statistics, Yearbook 2004*, Washington, D.C.

This need not come as a surprise as the export performance of most countries in Latin America is strongly dominated by commodities, shipped particularly towards the markets of developed countries, with Mexico being the most significant exception.

Trade with Asia, and particularly with China is dynamic, but still rather limited in size. This holds for Brazil and other countries in Latin America such as Argentina and Chile. Rapidly rising demand in China for natural resources for its industry, and for food and food products including soya is directly stimulating trade between Latin America and China, and contributes indirectly to welfare in the region through an upward impact on commodity prices in international markets and consequently an upward terms-of-trade effect, contributing to overall welfare in the region.

The growing significance of China as an importer of Latin American commodities is also reflected by Brazil's initiatives to strengthen cooperation with China. This would fit in with Brazil's broader policy

stance, which goes back already for several decades, to promote regional cooperation in order to reduce dependence on the North. Cases in point are Brazil's efforts to create a regionwide PTA in Latin America, its recent initiative to strengthen the functioning of the G-20 in the WTO negotiations, and its initiatives to foster special and preferential bilateral relations with several countries in the South including South Africa and India (Morais 2002). The rise of China, however, not only contributes to Brazil's export potential but may also jeopardize Brazil's aspirations of becoming a platform for automobile assembly for the international market. Indeed, IIRSA's plans for the construction of several transcontinental roads, linking the Atlantic side of the region with the Pacific, the so-called bioceánicas, not only facilitates Latin America's export drive but may also contribute to competition in the regional market by emerging Asian exporting industries.

Reviewing fundamental changes in Latin America's positioning in the world economy since the last decade of the 1980s, we find that renewed economic growth, unilateral trade liberalization as part of structural reform, the lock in effect of accession to the General Agreement on Tariffs and Trade (GATT) and subsequent WTO membership, and the establishment of a spaghetti bowl of PTAs among the countries in the region have greatly contributed to the economic integration of the region and stimulated intra-regional trade. The share of intraregional trade in the overall export performance increased significantly during the 1990s. This holds particularly for trade among the member countries of Mercosur and the Andean Community, but not for the CACM group of countries. At the same time, many Latin American countries have been involved in the establishment of special and preferential trade relations with their two traditional major trading partners, the USA and the EU, as well as with the emerging economies of East Asia. Among the major initiatives in this respect are the formation of NAFTA, the continued process of establishing an FTAA, the EU-Mexico PTA as well as the EU-Chile PTA, the retarded process of establishing an EU-Mercosur PTA, the plans to establish a PTA between the EU and the Andean Community, and between the EU and the CACM countries at a later stage, and finally the process of transforming the Cotonou Arrangement between the EU and the Caribbean countries that used to participate in the ACP group. Mexico, Peru and Chile have become members of the APEC which was initiated primarily as an open economic association to exchange information and facilitate policy co-ordination and harmonization among its members, not so much to liberalize trade in a coordinated fashion, left alone to create trade preferences. Open regionalism, as the predominant

approach towards trade liberalization, has distinguished APEC so far from the other trade arrangements listed above.

Hence, so far APEC aims at concerted, unilateral trade liberalization on an MFN basis (Drysdale *et al.*, 1998, p.6). However, the USA has pushed strongly for trade and investment liberalization in APEC economies and managed to get the objective of free trade by the year 2010 for industrialized countries, and by 2020 for the rest of APEC, accepted and included in the Bogor Declaration of November 1994. The achievement of region-wide free trade or the establishment of a WTO-consistent PTA among APEC member countries may even be more complicated than the realisation of other interregional PTAs such as the FTAA and the EU-Mercosur PTA, for two reasons: first, the extremely wide differences among APEC countries in levels of economic development, forms of economic organization and degrees of competitiveness; and second, the considerable differences among APEC members in their appreciation of the implications of open regionalism, which reflect in part differences in trade interests and strategic objectives

More generally it may be inferred from the experience so far that the establishment of the new 'mega' PTAs involves complexities that may retard the realization of their stated objectives. Most of these initiatives involve fairly large numbers of countries at widely different levels of development and with different economic systems and priorities. Moreover, the negotiations on the proposed PTAs are taking place simultaneously, and parallel with multilateral negotiations in the WTO on rules and concessions in the same economic sectors such as agriculture and services, and with respect to similar dimensions of the level playing field such as competition policies, government procurement regulations, and technical, social and environmental standards. Delays and stalemates are noticeable in most areas.

As follows from the above, Latin American countries and the region as a whole, are involved in a series of recent initiatives aiming at strengthening their economic relations and improving market accessibility. These initiatives, if successful, will increase and lock-in openness of the region, create some preferential margins in major export markets, and thus contribute to a new

insertion of the region in international markets. Such a new context requires further initiatives to deepen integration, facilitate international transactions and increase competitiveness. IIRSA and related infrastructural projects are cases in point.

### **3. The quest for deeper integration: creating a level playing field**

Harmonization of regulatory and institutional frameworks in the areas of transport, energy and telecommunications is among the three IIRSA priorities distinguished earlier. Some observations are in place pertaining to the potential role of harmonization in the context of trade and integration. In contrast with shallow integration, which is limited to trade liberalization only, deeper integration may be conceived of as integration that moves beyond the removal of border barriers (Lawrence 1996) In the new liberalized context, elimination of non-border barriers to trade is becoming a new focal points of policies to deepen integration and strengthen insertion in international markets. Deepening of integration has progressed particularly in the context of PTAs. This includes dealing with differences in national regulations and with inadequate infrastructure. So far, negotiations on reduction of a wide range of non-border measures that retard trade and specialisation have been slow and achievements have been limited as compared to negotiations on barriers to trade in manufactures. This holds for regional as well as multilateral negotiations.

At the national level, standardization has been a key element in the promotion of economic development and industrialization. However, differences between national standards may either stimulate or hamper regional integration and welfare at the regional level through its impact on potential trade creation and diversion. These complications are increasingly recognized in multilateral and regional negotiations on economic rule systems such as the WTO, the EU and the PTAs, in which Latin American countries have been involved.

Differences in national standards are being reduced with the implementation of the GATT/WTO provisions and rules as laid down in the Final Act Embodying the Results of the Uruguay Round and annexes. Regarding the treatment of standards, two approaches may be distinguished in negotiations

on PTAs presently going on in Latin America. Harmonization of standards and technical regulations seems to be the preferred approach in customs unions such as Mercosur and the Andean Group and may also be the preferred avenue for Caricom and the CACM. In FTAs such as NAFTA, the G-3 and the bilateral arrangement between Mexico and Chile, the aim is compatibility (Stephenson, 1999, pp. 297-298).

When analysing the rationale and potential impact of deeper integration, the preliminary question is this: what is the optimal level where a regulatory regime or a rule systems should be located and maintained? There are no a priori reasons why independent nations should be the optimal providers of these public goods under all circumstances but this holds as well for potential providers at the regional or multilateral levels. In this context, the principle of subsidiarity may be helpful in determining the optimal policy level to provide institutions and regimes as will be argued below.

Standards may be conceived as a kind of public good since these rules and regulations are established for the purpose of supporting the welfare of society at large. This holds true of standards pertaining to product quality, industry-specific technical regulations and standards for production processes, including regulations pertaining to the limitation of negative external effects of production processes. If generated in an optimal manner, standards and measures reflect the preferences and endowments of society at large. Unsurprisingly though, national standards are not always set for the sake of society at large but to serve special interests of industries by increasing the costs of market access to foreign producers. In that way they may contribute to the rent of domestic producers at the expense of domestic consumers and foreign producers.

In the context of a PTA, differences between domestic standards, technical regulations and measures among the member countries may result in a sub-optimal allocation of economic activities and have a trade-distorting effect. Differences in technical barriers may inflict several types of costs upon producers and society at large, including expenses on research and development, reduced options to exploit potential economies of scale and the related loss of cost competitiveness in regional and world markets as well as higher inventory and distribution costs. Consumers may suffer from higher production costs that have been passed on to them, and from less competition in the domestic market. The public sector may suffer from additional complications related to the multitude of requirements. Harmonization of standards in a PTA may then have an effect on allocation equivalent to the reduction of policy-induced market distortions at the border

Improvement of customs procedures and other forms of trade facilitation, as well as trade-related physical infrastructure may play a crucial role in the process of deepening integration and enhancing the capability of nations to exploit trade opportunities. Indeed, the issue of trade facilitation has

traditionally been a key component of enlargement schemes of the European Union with structural funds and regional funds contributing to the improvement of physical infrastructure in relative backward areas. Recently, the issue of trade facilitation for least developed and other African countries in particular has become a crucial factor in the negotiations on the DDA in the WTO.

#### **4. The potential of IIRSA: opportunities and risks**

The first priority in IIRSA is coordination of infrastructure plans and investments. Infrastructure, defined broadly, plays a key role in stimulating economic growth by facilitating production and trade, thus generating income and employment. The concept of infrastructure is somewhat ambiguous. The World Bank defined infrastructure as 'long lived engineered structures, equipment and facilities, and the services they provide that are used in economic production and by households'(World Bank 1994). Other definitions include institutional arrangements, and the availability of financial, intellectual and legal services that are required for production to be efficient.

As indicated in Section 2 of this paper, unilateral and groupwise liberalisation has stimulated integration among countries in the region as reflected by the increasing values of trade flows among countries. At the same time trade with other regions in the world economy has been stimulated by reduction of applied MFN rates and interregional PTAs. Rising demand for food products and minerals has boosted particularly export to the Pacific Rim. As scenario studies of liberalisation packages in the DDA show, comprehensive liberalisation of markets of agricultural products may stimulate particularly export volumes from Latin America and, moreover, improve the region's terms of trade. In the near future, increased demand for alternative energy sources may boost biomass exports. Although changes in trade flows as measured in monetary values do not necessarily correspond with changes in volumes of goods to be transported by the road, demand for infrastructural services is increasing with the growth of bulk exports.

The process of identification priority trajectories, the so-called development hubs or *ejes de desarrollo*, has so far resulted in the identification of 10 trajectories as illustrated in Maps X and Y, and Tables X and Y. The actual state of trajectories as well as their envisaged future functioning differs widely among the hubs. Many parts of most trajectories already exist as unpaved or paved road, but need improvement, reconstruction, or additional infrastructural works such as bridges, border crossings, and international connections. In many cases, IIRSA's contribution is particularly in making or improving the cross-border linkages between already existing national road systems.

The major hub in terms of transport flows and traffic is the Mercosur-Chile hub, which links the industrial and economic centres of South America. Apart from the metropolises, the hub connects the industrial area in the south of Brazil and the north of Argentina, the development of which has particularly been stimulated by the formation of Mercosur. Several other proposed hubs also link the Atlantic with the Pacific Oceans: in the north the Amazon hub, linking Colombia, Ecuador, Peru and Brazil; the Peru-Brazil-Bolivia hub; further to the south, the Central Interoceanic hub, linking the north of Chile with Bolivia, Paraguay and Brazil; the Southern Andean hub, through the south of Argentina and Chile. Other hubs aim at integrating countries in the northwest of the continent, the Andean hub, in the northeast, the Escudo Guyanese hub, or in the south, the Capricorn hub. Although the envisaged hubs link existing infrastructure, the precise trajectories are in most cases not yet determined but are being investigated or negotiated among interested parties.

It should be noted that apart from IIRSA other transnational road projects are under construction that may or may not link up with IIRSA trajectories in the region. Case in point is the so-called Arco Norte road project designed and created by Brazil, linking the northern part of Brazil with the three Guianas: Guyana, Suriname and French Guyana, and with the

Caribbean Sea.. The road is under construction, be it that the link along the coast between Georgetown, Paramaribo and Cayenne exists already for a long time and has partly been repaired fairly recently. The road project is part of a larger programme to integrate the state of Roraima with Guyana through the construction of a deep-water port , a hydro-electricity facility in Guyana and the development of high-speed dependable communications systems in the region. Transmission lines will follow the course of the new road and so will the fibre optic cable that will link Boa Vista, and at a later stage Manaus, with the intercontinental fibre optic cable, which passes north of Georgetown. Improved infrastructure is expected to contribute to investment in the region in food crops, the tourism sector and particularly in the development of an industrial zone in Boa Vista.

## IIRSA - AGENDA DE IMPLEMENTACIÓN CONSENSUADA 2005 - 2010

Proyectos Estratégicos de los Ejes de Integración y Desarrollo y  
Proyectos del Proceso Sectorial de Tecnologías de la Información y Comunicación

Nº	Proyectos	EJE	US\$ millones
17	Centro de Frontera Desaguadero	Andino	
18	Paso de Frontera Cúcuta - San Antonio del Tachira	Andino	
19	Recuperación de la navegabilidad del Río Meta	Andino	1
20	Carretera Pasto-Mocoa	Amazonas	7
21	Carretera Paita-Yurimaguas, Hidrovía Huallaga, Puertos y Centros Logísticos de Paita, Yurimaguas y de Iquitos (incluye proyecto-ancla y proyectos vinculados)	Amazonas	24
22	Carretera Lima-Tingo María-Pucallpa, Puerto y Centro Logístico de Pucallpa y modernización del Puerto del Callao -1a. Etapa (incluye proyecto-ancla y proyectos vinculados)	Amazonas	29
23	Puerto Francisco de Orellana	Amazonas	2
24	Pavimentación Iñapari - Puerto Maldonado - Inambari, Inambari - Juliaca / Inambari - Cusco	PE-BR-BO	70
25	Puente sobre el Río Acre	PE-BR-BO	1
26	Carretera Boa Vista-Bonfim-Lethem-Georgetown (I Etapa: estudios de factibilidad y ambientales)	Escudo Guayanés	
27	Puente sobre el Río Itakutu	Escudo Guayanés	1
28	Carretera Venezuela (Ciudad Guyana)- Guyana (Georgetown) - Surinam (Paramaribo) - I Etapa: estudios de factibilidad y ambientales	Escudo Guayanés	
29	Mejorías en la vía Nieuw Nickerie-Paramaribo-Albina y Puente Internacional sobre el Río Marowijna	Escudo Guayanés	9
30	Exportación por Envios Postales para PYMES	TICs	
31	Implementación de Acuerdo de Roaming en América del Sur	TICs	
	<b>Subtotal</b>		<b>1,47</b>
	<b>TOTAL</b>		<b>4,31</b>





IIRSA - AGENDA DE IMPLEMENTACIÓN CONSENSUADA 2005 - 2010		
Proyectos Estratégicos de los Ejes de Integración y Desarrollo y		
Proyectos del Proceso Sectorial de Tecnologías de la Información y Comunicación		
Nº	Proyectos	EJE
1	Duplicación Ruta 14	MERC-Chile
2	Adecuación Corredor Río Branco-Montevideo-Colonia	MERC-Chile
3	Construcción Puente Yaguarón-Río Branco	MERC-Chile
4	Duplicación Palhoça-Osório (Rodovia Mercosur)	MERC-Chile
5	Proyecto Ferroviario Los Andes-Mendoza	MERC-Chile
6	Concesión Ruta 60 Valparaíso-Los Andes	MERC-Chile
7	Gasoducto del Noreste	MERC-Chile
8	Construcción Puente Salvador Maza-Yacuiba	Capricornio
9	Nuevo Puente Presidente Franco-Porto Meira	Capricornio
10	Construcción Carretera Pailón-Puerto Suárez	Interoceánico
11	Anillo Ferroviario de Sao Paulo	Interoceánico
12	Paso de Frontera Cañada Oruro - Infante Rivarola	Interoceánico
13	Construcción de la Carretera Cañada Oruro - Villamontes - Tarija - Estación Abaroa (I Etapa: Villamontes - Cañada Oruro)	Interoceánico
14	Carretera Toledo-Pisiga	Interoceánico
15	Rehabilitación Carretera Colchane-Iquique	Interoceánico
16	Rehabilitación del Tramo El Sillar	Interoceánico
Subtotal		

All IIRSA hubs have in common that they are transnational, and financed through regional financial institutions: IDB, CAF and FONPLATA.

Transnational roads are a form of transnational public goods. More specifically, the roads as envisaged by IIRSA may be identified as regional public goods as benefits are expected to accrue particularly to countries in the region. Hence, regional public goods such as the IIRSA trajectories generate positive and negative spill-over effects or externalities in a specific regional context, be it that the distribution of these welfare effects may differ widely among the countries in the region. Moreover, third countries that are not partners of the regional association, may nevertheless benefit significantly from such public goods. This may even create a condition in which the outsider may be interested in co-financing the regional public good to speed up or facilitate its realisation. Essentially, the concept of coordination of infrastructural plans and investments includes the possibility for financial institutions involved to attract foreign financial flows through more or less innovative financial mechanisms.

Pure public goods are characterized by non-rivalry of benefits and non-excludability of users. In the case of roads, waterways and other forms of infrastructure, relevant in the context of IIRSA, benefits may rival in case of congestion, and users may be excluded by applying a toll system. IIRSA roads may be considered 'regional club goods' when exclusion is relatively easy and costless and use can be monitored and controlled (Sandler 2002)

Public investment in infrastructure may trigger private investment in directly productive activities, thus generating a crowding-in effect. Essentially, when constructing roads in economically underdeveloped regions, this external effect may be the principle objective of investing in roads. This holds particularly for paved roads in areas where alternative means of transportation are of significantly less economic significance, as is the case when only unpaved roads are alternatively available. In such circumstances, the financial revenues generated by the road through incomes from tolls do not fully reflect the economic benefits of the roads. By penetrating underdeveloped regions, roads make land more accessible, hence cheaper, and link far away production sites to markets.

At the same time, however, roads may also generate negative external effects resulting in a loss of welfare. Cases in point are air pollution and noise, particularly when roads pass through urbanized areas, or loss of environmental services, particularly when roads pass through environmental 'hot spots'. The latter case essentially refers to a situation in which a public good, or club good, a regional road, traverses an area generating public goods. Hence, such areas often produce environmental services as joint products. Put differently, it is typical of the multifunctional character of such areas that they provide a combination of global or regional pure or unpure public goods or club goods. Consequently, negative external effects of infrastructural works may not be confined to the local or regional level, but may also affect welfare at the global level. This may specifically be the case with roads penetrating pristine and highly vulnerable eco-systems that contribute significantly to the world's stock of genetic resources and to the sequestration of carbon. The extent to what this is relevant in the case of IIRSA projects depends, of course, primarily on the specific location of the trajectory, and on the degree of change of the environment induced by the future road.

Building new roads and moving the geographical frontier of economic activity, particularly in pristine forests, may have a lowering impact on land prices by making new land available, hence stimulates colonisation, while, on the contrary, improvement of existing roads may increase land prices by stimulating intensification of land use (Andersen *et al.*, 2002, pp. 145-147). Thus, investment in network expansion results in more deforestation than investment in network improvement as the former type of infrastructural investment will enhance the likelihood of deeper penetration into the forest (Gascon, 2001, p. 25). Statistical studies of deforestation in Amazonia show a high concentration along the expanding road network. In the period 1991-95, 33 per cent of deforestation was concentrated in an area within 50 kilometers of the eastern road network, 24 per cent within 50

kilometers of the central road network, and 17 per cent within 50 kilometers of the western road network. All together, 74 per cent of deforestation was concentrated within a range of 50 kilometers around roads, creating long corridors through the forest. Most new clearing takes place in areas adjacent to areas already cleared, on a moving agricultural frontier, often according to a so-called fish bone pattern (Alvers 2002, Andersen *et al.*, 2002, p. 55).

To make a comprehensive assessment of the welfare effects of a road, all costs and benefits need to be included fully. In view of the sheer size and scope of the road projects, an assessment of its probable economic and non-economic impacts exceeds by far the traditional framework for project assessments and evaluations, as provided by costs-benefit analysis. Essentially, a comprehensive ex-ante assessment would require a regional computable general equilibrium model which would allow simulation runs. It should be noted, however, that the capability to simulate or generate the real-world dynamics of such a major investment programme in selected regions has strict limits. Moreover, the time span of such models does not allow for inclusion of environmental effects and their (second round) economic repercussions. At this stage such such model studies have not been prepared in the context of IIRSA.

Environmental assessments, as made for World Bank projects since 1989, suffer from limitation in case of economy-wide or region-wide infrastructural projects. To correct for these inadequacies, so-called Strategic Environmental Assessments (SEA) were introduced, but experience with the application of the new methodology by multilateral financial institutions in developing countries so far is limited (World Bank 2002). A comprehensive assessment of the economic value of the environment is required not only in investment procedures, but also as a base for a regional or global payments system for the collective goods a region provides. This requires a comprehensive inventory of the many different functions of the forest including the array of direct and indirect use values as well as optional and existence values of the environment. However, methodological problems make it very hard to assess accurately the positive and negative welfare effects of interventions.

To start with, many of the markets involved are imperfect, and for many of the eco-services provided markets do not even exist. The problems of the non-existence of markets is particularly urgent when dealing with the economic valuation of biodiversity. These complications must be tackled in order to make a comprehensive valuation of alternative options for the exploitation of the forest. Moreover, longer-term forecasting of variations in direct and indirect use values, resulting from future patterns of demand and supply in markets of natural resources and ecological services, are hard to make (Trindade de Almeida and Uhl, 1999; Van Beukering and Van Heeren, 2003).

Second, the economic response of subjects to new opportunities, created by, for instance, improved access to a region, in terms of investment and expansion of economic activity such as nutrient mining and mineral mining, and the implications of such activity for the region's ecology, depends on a large number of interrelated and geographically dispersed factors, which are very hard to integrate in a regional development model with economic and environmental dimensions. For further discussion of these and related methodological problems see May (ed), 1999. For a review of potential effects of road construction in forest areas see Andersen *et al.*, 2002.

Third, the measurement of deforestation, fragmentation, and edge effects, which are due to improved area access and to investment in economic activity, may, in itself, be complicated and expensive. The Sistema de Vigilância Ambiental (Sivam) may be useful in the future for monitoring changes in forest coverage. However, combining information from satellite images with land surveys may be complicated. However, at least some of these complications must be tackled in order to design rational payment systems, based on some sort of costs-benefit analysis related to the eco-services that are provided by northern Amazonia and the Guiana Shield.

In view of the methodological problems referred to above, one may question whether there are alternatives available for applying the economic principles and more specifically the price mechanism

in order to come to a rational way of exploiting an environment. An alternative may be discretionary decision making applied in the context of a zoning policy. The concept of zoning was introduced in Brazil in 1990 by presidential decree. National and state-wise zoning commissions were installed but these have been largely inactive (Hall, 2000). Thus, so far zoning has offered little in terms of an optimal use of areas of high ecological value. Zoning as such does not solve the problem stated above if it is not based on a rational assessment of alternative values of regions. Mahar (2000) has shown how zoning in Rondonia, which was introduced to protect specific regions with high ecological values, was opposed by farmers, ranchers and loggers, who could not find compensation for lost opportunities, while the positive income effects of zoning were restricted to civil servants and others in charge of implementing and maintaining the zoning policy. Obviously, there were too few local winners while the losers were not compensated by offering them alternative opportunities. Following Schneider (1995, p. 27) zoning will only be of little use if at the same time accessibility to land is improved and land development is stimulated by complementary government policies.

Moreover, the political economy of decision-making complicates an optimal use of natural resources.. Interest groups and politicians at the local level usually prefer exploitation of direct use values and improved links with markets. To tip the local decision-making process in favour of sustainable development and protection of an environment, will require another balance between economic gains and costs, and the creation of winners at the local level. Introduction of the market mechanism to the extent possible, including payments for environmental services and taxes on negative external effects of specific economic activities, and provision of incentives at the local level may contribute to a more accurate assessment of the welfare effects of different options for the functioning of land areas that are traversed by the development hubs that are envisaged.

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