

BIODIVERSITY AND NATURAL RESOURCES FOR SUSTAINABILITY

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1. Introduction

There is no doubt about the importance of biodiversity and natural resources for Latin American economies. However, at the same time, it is widely known that while these activities might be associated to economic growth, they are also tied to large negative externalities that result in high environmental and social costs for their populations, especially for the communities that live close to the resources. But could it be possible that activities related to natural resources were engines of growth and at the same time promoted social, environmental and economic sustainability?

This panel revolved around an IDRC-funded research project that aims to explore transitions from the current –problematic– ways in which natural resources sectors work, towards more sustainable ones, in terms of social, environmental and economic outcomes. The project also explores how knowledge-intensive activities, that could help develop dynamic comparative advantages, might emerge from natural resources activities. The general idea is that long term and sustainable growth and development can be achieved *starting from* natural resources. They pose an *opportunity* that should be taken advantage of, rather than a *curse*.

But the panel extended beyond only this project, and consider the views of several international experts from the public and private sectors, as well as academia, in how to develop sustainable economic activities around natural resources and biodiversity.

There were three main expositions, going from general to particular. First, Joseluis Samaniego presented an overview of the situation of the region, the relevance of natural resources, the challenges ahead, and some guidelines on what should be done in the future. Then, José Miguel

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Benavente presented the theoretical framework behind the project (the “multilevel perspective” for technological transitions), discussed the different stages of the project, and briefly mentioned some of the results. The project has been conducted in parallel in Argentina (looking at soybean production), Chile (copper mining), and Brazil³, that has focused regionally on the Amazon forest, and explored more sustainable alternatives for its exploitation. Finally, Daniel Sabará, presented Beraca’s Biodiversity Enhancement Program. Beraca is a firm that has been working closely with local communities, focusing on sustainable exploitation of the resource not only in economic terms, but also social and environmental. Beraca is one of the alternatives that are being studied in Brazil.

After these three presentations, six experts discussed these ideas, as well as proposed several other dimensions that should be included in the debate. This paper presents an overview of the different concepts and ideas that were discussed in this panel.

2. Natural resources and the challenges for Latin America

The panel was opened by the presentation by Joseluis Samaniego, chief of the Sustainable Development and Human Settlements Division at ECLAC. He presented an overview of the situation of the region now, its main challenges, as well as some guidelines about how to achieve sustainability.

During the last twenty years, the world has moved through two parallel tracks: a private track of liberalization, financial capitalism, and a reduced role for the state. On the other hand, a global normative track, that has looked at issues such as women rights, social development and sustainability. The economic reality of Latin American countries is very different from then, with growth, inflation under control, and generally stable economic conditions, at least in most of the countries. At the same time, there are more progressive social policies.

There are, however, many fundamental gaps to be closed: inequality, insufficient investment, slow productivity growth, regressive and weak taxation, risk of re-primarization, and a non-sustainable development trajectory. In terms of inequality, the region is the worst in the world, catch-up in productivity does not seem possible without structural transformation, taxation is not enough to finance the necessary public policies, etc. It is *“urgent to rethink a new development agenda centered in equality and contemplating environmental sustainability”*, something that goes together with closing the different productive and social gaps.

3 The research teams are based at CENIT (Centro de Investigaciones para la transformación) in the case of Argentina, CGEE in Brazil, and Intelis (at Universidad de Chile) in Chile.

But the region does not seem to be on the right track. Some of the aspects where radical changes are needed to make this new agenda possible are international cooperation, the public-private relationship, and the management of natural resources.

The importance of natural resources for Latin, and especially South America, is uncontested. Close to half of the world's soybean production comes from the region, and Latin American countries are among the top producers of copper, silver, molybdenum and lithium, to name just a few examples.

The *governance* of natural resources is key to the future of the region, and for effectively taking advantage of natural resources as a source of sustainable growth. Governance refers to all the policies associated to "*the ownership of natural resources and the appropriation and distribution of profits from the exploitation of these resources to maximize their contribution to sustainable development*". These involve managing regulation, taxes, strategic planning, and environmental conflicts. In general, all institutions surrounding natural resources and the way they can have impacts on sustainable development. The idea is that the government should maximize the resources it can obtain from natural resources, especially in times of price booms like now, and use them to maximize social benefits for current and future generations. This includes reducing inequality problems today, but at the same time invest in productive diversification to improve long term economic perspectives.

But governments must be careful and avoid harmful effects on investments, as well as tax competition between them – here regional cooperation comes in. It could even be argued that Latin American countries could form cartels to try to set rather than take resource prices. Some instruments that can be used are public funds for savings, investment on issues such as education and innovation, and counter-cyclical macro stabilization funds.

In sum, rents should be captured by the States, and used to improve social outcomes and to induce productive structural change.

Regarding biodiversity, one of the main problems is that *its destruction is not accounted for*. Private actors tend to obtain short term benefits, and the long term negative impact of *not protecting* biodiversity are never accounted for, and the economics profession has not made much progress in this respect. The benefits of preserving biodiversity are diffuse and impossible to see on the short term. Measuring the value of biodiversity, and preserving it for future generations, is one of the main challenges faced by the region –and the world– today. We know that the Nation's wealth is being destroyed, but we don't know how much is being lost. It could be too late by the time we find out.

These valuation problems are especially acute in the case of biodiversity, but they are also there for other natural resources, including both renewable and non-renewable ones. For all of them it is necessary to internalize all costs, and to agree on standards for their valuation. There are other problems associated to measurement that need to be accounted for if the region is to achieve sustainable development. One is simply to avoid externalities. But it is also important to *measure the sustainability of development*, in general, at the country level, using an appropriate framework. Finally, synergies between different issues, such as inclusion, social protection, security, environmental protection and empowerment of citizens, are not accounted for. For example, the upcoming demographic transition in the region presents an opportunity for improving social protection and inclusion, at the same time promoting growth through the development of specialized technologies.

Besides the measurement issues, there are other important areas where the region needs to improve if it is to achieve sustainable development. Sustainable development policies need more coordination and consistency across levels of government. Statistics and information on the environment and sustainability must be produced and disseminated. Policies must be formulated through more participatory processes. Human capital for sustainability is needed, and education, culture, and S&T must be strengthened to develop this human capital. The recognition of traditional knowledge must be institutionalized. All of these country-level measures must be backed by international coordination. Governance of natural resources, the fairness of the trade system, and cooperation to improve access to new technologies are only some of the issues where international governance is lacking and affect directly the chances that countries can achieve sustainable development trajectories. But one of the most important issues, and the most direct way to put natural resources to work for development, is that the State takes for itself more of the rent that is currently being taken by private firms, and use these rents, together with appropriate macroeconomic policies, to reduce present day social and economic gaps, and to invest in structural change to make long-term and sustainable growth possible. A *better State* and an *efficient and equitable market* are needed for this.

3. Putting Natural Resources to work for sustainable development

The second exposition of the panel was by José Miguel Benavente, researcher at Universidad Adolfo Ibáñez. He discussed how the “traditional” proposal about taxing natural resources activities, and to fund with these resources the development of other sectors (notably manufactures), has not given results in the region. And considering the different resource endowment of Latin America and East Asia, it does not seem too reasonable to try to steer away forcefully from natural resources. But what if natural resources sectors could themselves

be transformed? Assuming that the best chances for the region are associated to its natural resource endowment, the project explores alternatives that completely transform the way these sectors work, improve them in non-radical but nevertheless fundamental ways, or provide opportunities to develop knowledge-intensive sectors. Natural resources sectors are highly problematic, but the view is that it is possible to improve the regimes associated to their extraction and processing in fundamentally positive ways, and use natural resources as an engine for long term and sustainable economic development, as it has been done by other countries (e.g. Finland, New Zealand).

The theoretical framework behind the project is the “multi-level perspective” used to study technological transitions. These ideas have been developed in influential works by Rip and Kemp (1998), Geels (2002), and Geels and Schot (2007), to name some. The framework was used initially to understand historical examples of transitions, but later to study transitions towards sustainable technologies in areas such as energy or housing. But the focus is not only on technologies, as these are considered to be only one dimension of the complete “socio-technical regime” that is configured at a certain point in time to solve a societal function. For example, the way in which the transport system of a country works, is the result of an evolutionary history where different actors, technologies, institutions, symbolic meanings, infrastructure, and policies, to name some, have interacted. At the same time, all of these factors, and its resulting configuration in the form of a self-reinforcing regime, are located into a broader landscape, which could either reinforce or debilitate the regime (for example, oil prices going up or down). On the other extreme, there are protected “niches” that promote alternatives to the way the regime works, and in this “protected” environment, radical innovations have space for development (*vis-à-vis* the incremental innovations that occur inside the regime, along the dominating technological trajectory). These niches might or might not be able to break into the regime and transform it, and this in great part might depend on whether the landscape is exerting pressures that increase the niche’s chances against the incumbent, self-reinforcing, locked-in regime, as well as on the regime’s internal problems. The current state of the world economy and the organization of production, technological advances, as well as social issues and their associated consumer preferences, might be providing a perfect “window of opportunity” for Latin American countries to pursue long term sustainable development strategies based on their experience and possibilities associated to natural resources (Pérez, 2008).

For this study of natural resource sectors in Latin America, there has been not only quantitative and qualitative empirical work, but also a theoretical effort at adapting this framework to the problem under study. The motivation of the project is to understand whether it is feasible to think that sustainable development for the region can stem from the natural resources processing industries, which are currently associated more to environmental and social problems than to sustainability. Also in a long-term economic view, extracting natural resources, at least

in the ways it has been done historically, will not provide our countries with the necessary technological capabilities and knowledge-intensive activities that are able to provide innovation-based growth in the long term.

It is proposed (Benavente and Marín, 2011) to consider three types of “niches” or “alternatives” that are relevant: *path-breaking*, *path-repairing*, and *path-creating* alternatives. *Path-breaking* alternatives are those that aim to replace the current regimes and differ from them in several important dimensions (e.g. organic versus intensive farming). *Path-repairing* alternatives do not have the potential to challenge the complete regime, but are still alternatives developed in somehow protected “niches”, and that are able to solve at least some of the most relevant negative impacts (whether social, environmental, or economic) of the regime. They do not chance the regime’s operating logic, but “repair” some of its negative impacts. Finally, *path-creating* alternatives are knowledge-intensive activities associated to the natural resources, that involve the development of novel knowledge and/or technologies, and contribute to economic diversification in areas with higher productivity growth potential in the long run (e.g. biotechnology), in other words, creating dynamic comparative advantages which stem out of natural resources. Previous literature using the transitions framework has been circumscribed mostly to the idea of path-breaking niches, but the project looks at a broader concept of innovation, considering that non-radical innovations could play a large role in achieving sustainable development on the basis of natural resources.

For the three cases, the interest is on the generation of variety, assuming –from an evolutionary perspective– that there will be higher chances that these alternatives end up having positive impacts on the economy as they are more and varied.

The study has been conducted in parallel in three countries: Argentina, studying soy production, Chile, looking at copper mining, and Brazil, that added a geographical dimension to the study focusing on sustainable uses of the Amazon forest. First it was necessary to choose the sectors to be studied. For this, the criteria was to look at sectors that were relevant for their countries (and the region in general), had important negative outcomes (environmental, social, or economic), but at the same time, different types of “alternatives” that could transform the system and reduce those problems existed. Then the “dominant socio-technique regimes” for these sectors were characterized (with secondary data), their problems, as well as the existing alternatives. Alternatives –*breaking, repairing and creating*– were selected to conduct detailed case studies (following a “maximum variability” approach), and at the same time quantitative work based on the theoretical framework has been conducted using innovation funds data. The case studies have involved the use of secondary as well as primary data, collected mostly through in-depth interviews with all the actors involved, including representatives from companies, government, academia, local communities and NGO’s.

Argentinean agriculture is currently dominated by the GMO-based, intensive soybean production. The sociotechnical regime is characterized by being input intensive (transgenic seeds, biocides, fertilizers), market-driven, export-oriented, and highly concentrated in terms of ownership, production, and knowledge. It creates few jobs, is environmentally damaging (deforestation, water and energy consumption, monoculture damages soil), and is associated to health risks.

Different alternatives are being studied, including the cooperatives COOPSOL (which produces organic honey and other products) and AFA (*Agricultores Federados Argentinos*). COOPSOL presents a case of *path-breaking* alternative, with its diversified production, fair trade principles, dispersed knowledge, inclusive industrial organization, and presence in a poor region. AFA presents a *path-repairing* alternative: It is a very large cooperative, differentiated from the dominant trajectory but not as much as COOPSOL. They have diversified crops and a distributed organization, but work on rich areas and their knowledge is concentrated. The other two cases studied are a seed producer and an agroecological cooperative of cotton producers. The importance is that all of these cases are creating diversity and learning possibilities, with better social and environmental outcomes than intensive production, together with reasonable economic results. Some of the barriers to the diffusion of these alternatives are the overwhelming importance of the dominant system for the Argentinean economy; the simplicity and certainty of the dominant regime's technological package; the currently existing capabilities and infrastructure; as well as current government institutions (such as regulations and subsidies) and the political power of incumbents.

In the case of Chile, copper mining is performed by small, medium, and large scale companies, but the sector is widely dominated by large-scale operations. This is the result of the need for scale to efficiently obtain minerals from low ore grade deposits, and the associated technological complexity and large investments that are necessary. The continuing decrease in ore grades means that more inputs are necessary, notably energy and water. Fresh water demand –in the dry Atacama desert– and electricity generation from coal are the two largest problems associated to mining, that have very serious environmental and social impacts (besides other sources of air, water and soil pollution). Besides this, the R&D efforts associated to the sector are not as important as in other mining countries.

It is interesting that several technological developments motivated by the technical problems that constrain production levels end up having much better environmental and social outcomes. The cases being studied are a technology to reduce water content from mining residuals, the use of seawater in the production process, the joint work between a mining company and a high-level mathematical research team, and a biotechnology startup. The first two are *path-repairing* alternatives, that do not change the core of the sociotechnical regime, but significantly reduce its negative impacts. The last two are *path-creating*: the mining sector is promoting the development

of knowledge-intensive activities that help develop domestic technological capabilities and pave the way for dynamic comparative advantages and innovation-driven growth.

In the case of Brazil, the focus has been on the regional dimension: not a particular sector, but the sustainable exploitation of the Amazonian biodiversity. The current dominant regime is characterized by high environmental impacts, low value added, weak innovation and technological efforts, as well as productive chains that are not well structured. The cases being studied in detail are forest management (three different projects) and the cosmetics industry, strongly influenced by an extractivist logic (two “alternative” companies will be studied in this sector). Natural or organic cosmetics, and in general industries based on natural components, have important potential for increasing their market shares. At the same time, they have promising perspectives, with important potential for research, adding value, distributing rents, and in general to structure themselves along economically, socially and environmentally sustainable production chains.

The next section summarizes the presentation about one of the firms that is being studied in Brazil as an example of a sustainable alternative to the way things are generally done.

4. Biodiversity enhancement and involvement with local communities

Continuing from general to particular, the third presenter in this panel was Daniel Sabará, from one of the companies that has been studied in detail in the Brazilian case: Beraca. Daniel Sabará is Corporate Director of their Health & Personal Care Division.

This company is regarded as an example of research and innovation, sustainable exploitation of Amazonian biodiversity, and sustainable and “positive-sum” relationships with local communities. Beraca is a 50-year-old company specialized on the development of technologies, solutions, and high-performance inputs especially for the cosmetics, health and nutrition industries. Beraca distributes their products, which are based on non-timber products obtained from the Brazilian biodiversity, in over 40 countries.

The exposition was focused on Beraca’s “Biodiversity Enhancement Program” and the company’s interaction with communities. This program, based at their “Health & Personal Care division” was established in 2000 to ensure sustainability and traceability of their supplies. The company works together with local communities, helping them diversify their income sources, organize themselves, promoting knowledge transfer across them, all of these while *ensuring the preservation of biodiversity*.

Beraca distinguishes between three different types of communities that are isolated from markets: those that are not organized at all, those that have some organization and business experience, but are based on monoculture and have no financial support, and finally, those which besides organization and experience, work on different cultures and have financial support (this is the smallest group). Through their Biodiversity Enhancement Program they work with the three types of communities, helping them tackle their particular issues. For example, help with organization and connection to markets, help with cash flows to finance their operations, product diversification, and finally, with the more advanced groups, they help them increase traded volumes to new markets, and give them price guarantees. Insertion into markets is a common objective that is worked with all communities.

Beraca has in this ways relationships with communities, markets, and the macro environment, something that could be mapped to the multi-level perspective's *niche, regime, and landscape* levels. With communities, Beraca attempts to respect their culture and way of life, train them in business management and forest management best practices, help them organize themselves, get certified, and transfer knowledge. All of these are related to the sustainability of the relationship with them. At the level of markets, they are worried about traceability –guaranteeing the origin of their materials–, having a certified organic portfolio, improving quality, quantity, and logistics, and accessing new species, tapping on the large Brazilian biodiversity. In terms of the socio-economic environment, they contribute to poverty eradication and regional development, while at the same time helping preserve rain forest through sustainable practices, and avoiding deforestation through the demand for seeds and fruits (instead of timber products). This can be quantified in some examples, for instance, 5 kg of *açaí* oil come from 500 kg of *açaí*, which are collected by three workers working 4 hours a day, that obtain some additional rent, and help protect 100 square meters of forest.

They highlight their technology transfer workshops, the company attempts to transfer the productive chain to communities, training them in the technologies and working methods developed by the company. But at the same time, the company learns from the communities' traditional knowledge, which is "properly remunerated". But the knowledge exchange is not only between Beraca and communities, but the company also promotes exchange *between* communities. The "Beracon" is a yearly encounter with the leaders from the many different communities they are working with. In this instance, communities can exchange knowledge and ideas independently from the firm.

Companies that choose to follow environmentally and socially sustainable practices face several important challenges. The first is that it is not easy to differentiate between these companies and those that simply to "green wash", without truly sustainable practices. In the case of Brazil, there are no incentives to promote sustainable development initiatives, it is even the case that

government's assistencialism competes with these type of practices. There are other types of problems, such as land ownership issues in the Amazon.

5. Sustainable exploitation of the Amazon forest

The experience of Beraca is one of the cases that is being studied in Brazil as part of the IDRC project on technological trajectories.

Luis Alberto Esteves, from the Federal University of Paraná (UFPR), discussed in a more general way the Brazilian experience in the project. Forest management and the cosmetics industry in the Amazon were studied. The latter was chosen as a “proxy” for several other sectors with similar characteristics, and that could provide alternative and sustainable ways of exploiting the biodiversity, such as food product or phytotherapies.

Interviews were conducted with people from firms and communities, to attempt to understand the main factors that are blocking the development of sustainable alternative ways of exploiting biodiversity to promote development. Behind issues such as achieving an efficient production scale, it was found that an important problem is lack of *organizational innovation*. Not only technological innovation, organizational innovation, such as the one shown by Beraca, is fundamental for the success of alternatives. Communities are highly heterogeneous, and it is not easy to articulate them around particular projects. And even if communities are organized, there are other problems. First of all, infrastructure: products must be collected, stored and transported without affecting their quality. As activities grow, they must go deeper in the forest and this *increases*, rather than decrease costs (as in the agricultural sector). This is one of the reasons why it is better to aim for decommoditization and value added, rather than reducing costs. However, this needs research and development and government support, institutional innovation is needed here, for example different forms of R&D joint ventures.

Fernando Castanheira, from the Undersecretariat for Sustainable Development of the Strategic Matters Secretariat, discussed policies related to forest management. He discussed about the importance of a sustainable production cycle to preserve biodiversity, and the importance of the State in preserving biodiversity and sustainability, considering that around 30% of the Amazon is owned by the government. It is also important to make the process more inclusive. At present there are actors that avoid for ideological reasons to collaborate with the private sector, for instance. There is the need for a coherent collection of policies to make viable the economy around the forests, including the exploitation of both timber and non-timber products.

6. Discussion

Besides the general overview of the problem, and the discussion related to the project on technological trajectories, there were comments by other four experts from academia and the public sector. They not only commented on previous presentations, but proposed a series of other issues that are relevant and should be accounted for when talking about natural resources, biodiversity, and sustainable development.

The first discussant, Laure Emperaire, from the Institut de Recherche pour le Développement (IRD), focused on three ideas: the elements that are at stake when thinking about economically valuing biodiversity, which instruments (that emphasize cultural and environmental parameters) are available for this, and recommendations to reinforce a qualitative change in development.

The first refers to the “megadiversity” that characterizes Brazil, both in terms of its biological and *agro-biodiversity*, created and preserved by indigenous and local populations through continuous innovation and experimentation. This agrobiodiversity is not considered under the dominant sociotechnical regime. The local character of biological and agro-biodiversity must be stressed, and the non-economic dimensions (e.g. ecological, cultural) of biodiversity should be given their proper economic value, which is currently being ignored, resulting in the destruction of both types of diversities due to territorial, ecological, and cultural reasons. With respect to specific valorization instruments, there are different possibilities: geographical indications, certifications, collective brands, recognition of immaterial heritage, and the use of short circuits around cities to preserve diversity in eating habits. Finally, there are several topics for reflexion in terms of changing the developmental model: how can local knowledge be valued and integrated in global biodiversity valuing processes? How can local and scientific knowledges interact? What will be the impact of knowledge concentration in some industries? How can the processes behind, and not only the products, be valued, and how can the diversity of uses of biodiversity be preserved? Long term sustainability is the key, rather than short term returns. A systemic view is needed to account for the complexity associated to cultural, social, and ecological dimensions of local production systems.

Lisa Hasenclever, researcher at UFRJ’s Institute of Economics and at the National Institute of Science and Technology in Public Policies, Strategies and Development (INCT/PPED), that groups researchers from several Brazilian universities, warned about the negative effects of reprimarization on biodiversity, as it poses no incentives to explore biodiversity. She also raised a series of issues related to research and innovation: it is difficult to obtain funding to scale research up to actual innovation; it is also necessary to have intermediates between the characterization of biodiversity and innovative research; the potential role for public procurement policies to promote some sectors; the relationship between biodiversity and public health policies; and the

question of how are benefits shared between traditional and scientific knowledge when both of them are applied for innovation.

Alberto Arruda, adjoint-secretary of the Brazilian State Secretariat for Science, Technology and Innovation (Secti), commented both as a government representative and as an academic. From the perspective of the government, he mentioned the inequality of government income across Brazilian States, and how it is possible that states which are among the most important commodity producers and exporters are also among the poorest ones in terms of GDP per capita. Regarding the Amazon biodiversity, the real problem is that there is no State Policy regarding this resource, it is not regarded as the important strategic issue that it is.

From an academic perspective, he focused on the problem that research cannot go beyond a certain point because of the lack of resources. There is great potential for developing medicines, for example, but academics face pressure from the government and their academic careers, pushing for publications over patents. Biodiversity is not being valued, but it definitely has potential for high economic value, if all efforts are properly coordinated and there is consciousness about the existing possibilities.

The final discussant was Carlos Eduardo Young, researcher at UFRJ's Institute of Economics and at INCT/PPED. He posed a pessimist opinion about the current situation and its perspectives, considering that neither the central nor the regional governments have political commitment towards valuing biodiversity and changing the current "predatory" regime. He also presented a critical position on other policies, such as forest management and biofuels, in sum, the main problem is the lack of a National Environmental Policy – not only for the Amazon regions. A research and innovation effort is also necessary to revert the current trend towards reprimarization, and although ideas about these issues have existed for long (e.g. sectorial funds, royalties), the necessary political will for sustainability has not existed.

7. Closing remarks

Natural resources, both renewable and non-renewable, as well as biodiversity, are key to the future of Latin America. The region faces important social, environmental and economic challenges, some of them directly associated to natural resources-related activities (notably all sorts of environmental damage), but at the same time, these resources could be fundamental in overcoming these challenges.

How are natural resources going to help the region achieve sustainable development? There are two main views: taxing them to finance education, investment, and industrial development in

other sectors. This is implicitly accepting the “curse” hypothesis but pragmatically obtaining resources from them to move away from this curse. On the other hand, an idea that has been gaining ground is that development can actually be based on natural resources. Considering on the one hand, the internal problems that the dominant exploitation systems might face, and on the other, the changing socio-political context and consumer preferences, and the expansion of knowledge intensive activities into many areas (something closely associated to ICTs, bio- and nanotechnology), there is potential for natural resources to turn towards less damaging patterns, as well as into more knowledge-intensive activities.

But even if this potential exists, the incumbent “sociotechnical regimes” usually form tight, strong and inflexible configurations, where the combination of a certain set of technologies, institutions, as well as preferences and distribution of power, acts against the fruitful development of “better” (in economic, environmental and social terms) activities. The internal and external conditions around a sector are not likely to endogenously produce successful “alternatives”, so there could be an important role for policy here. Under which conditions will alternatives succeed? This is one of the main questions that the IDRC project on technological trajectories aims to answer. In terms of policy, the approaches of “tax and invest away” and “take advantage of them” are akin to industrial policies that “defy” or “conform to” natural comparative advantages respectively, as discussed by Lin and Chang (2009).

Regarding the sustainable use of biodiversity, it poses even more challenges than other natural resources. While there are problems with valuation and long term sustainability with most natural resources, this issue is more serious in the case of biodiversity. First of all, there is not yet enough consciousness of the importance of its preservation, and its economic valuation is more difficult than with other resources, as most of its value is probably not yet exploited nor even explored. Besides the fact that its valuation is complicated, there are other issues, such as the importance –and value– of traditional knowledge, as well as that of the past innovation efforts conducted by local communities that resulted in the current, man-made agro-biodiversity. Issues of vested interests and political power asymmetries are also evident. Another dimension that is important is heterogeneity in regional realities and development strategies, an issue that is very visible in Brazil, that could provide an example in this respect to other countries.

There are other problems, present both for biodiversity-related activities and for other natural resources: coordination problems (and the related need for organizational innovation), insufficient infrastructure, cultural differences, and lack of knowledge, human capital, and financing for research (or its concentration around the dominant regime), to name some. All of these, as well as established institutions and power relationships, are among the factors that difficult the “endogenous” emergence of “better” activities, and calls for policy action. The challenge is to understand these problems, and to generate policies that can facilitate the emergence of viable

alternatives to the currently dominating regimes, alternatives with better social, environmental, and economic prospects, that could help Latin America use natural resources as its main engine for inclusive and sustainable development. But of course that political support and commitment to these ideas is fundamental to take them beyond the realm of academic speculation.

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