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**The Meso-American Biological Corridor and Regional Sustainability: An Overview of Potential Problems and Their Policy Implications**

By

**Lucio Munoz\***

\*Qualitative Comparative Researcher/Consultant, Vancouver, BC, Canada. E-mail: [munoz@interchange.ubc.ca](mailto:munoz@interchange.ubc.ca)

**Abstract** Pressures to reduce pollution and degradation coming from development activities are leading to the planning and implementation of green programs designed to achieve responsible development and to deal with global warming issues all over the world. These programs are being implemented, consciously or not, within a new, and yet not very well understood eco-economic paradigm. The instrument being used to achieve the goal of sustainable development and the goal of reducing CentralAmerica's contribution to global warming is the Meso-American Biological Corridor (MBC). This paper is designed to highlight, using an operational system point of view, the potential impacts that the MBC Corridor and its supporting green policies may have on the internal and external dynamics of regional sustainability.

**INTRODUCTION**

**THE GREENING OF DEVELOPMENT**

The two goals of the United Nations Framework Convention on Climate Change (UNFCCC) are making sustainable development and the reduction of green house gases a reality (Rohman 1999). Within this view, these goals can be achieved through a combination of development policies that are climate change friendly. The combination of economic and green goals to induce policies with positive environmental effects by both the government and the private sector is the core of traditional sustainable development or the so called ecological modernisation (Young 2000), which in essence is eco-economic development. Since the impact of green house gases on climate change depends on their concentration and on the time they remain in the

atmosphere (Parry and Carter 1998), efficient ways need to be found to reduce both their concentration and their active time.

Hence, today's movement to make development processes greener or environmentally responsible has taken solid grounds in terms of rationality and in terms of practical implementation. The rationale for immediate environmental action is given by the threat posed by extreme changes in global and regional patterns of climatic conditions, and the practical means and bases to implement environmental policies are provided by the Kyoto Protocol process.

### ***i) The climate change program***

The rationale for unavoidable action at the global and regional level is given by the vulnerability that all countries have to extreme climate changes given usually high levels of environmental degradation that exist in most of them. This vulnerability aspect attached to climate change provides an incentive, whether limited or not, to dedicate the time and attention needed to address the global warming problem based on our current knowledge regardless of existing concerns about fairness when distributing benefits and costs, whether procedural or consequential (Toth 1999). For example, the increasing relevance attached to the threat of global warming since the early 1990s induced the European Union to seek and assess policy options and responses to this issue (Collier and Lofstedt 1997).

Just recently, climate change and natural resource management have been identified by developed countries as areas of high unsustainability risk and therefore as priority areas of action (OECD 2001). Then, it makes sense to think that if we take action now we can be capable somehow of minimizing potential negative impacts in the future. The climate change program is aimed at getting consensus on the importance of acting now in response to the challenges posed by global warming and climate change. As the experience gained through the Montreal protocol process shows, countries can choose development options that cause the least harm to the environment (De Jongh and Captain 1999) when seriously considering an issue. Since consensus seems to exist about the need to act now, the question then becomes, how can we implement green policies effectively to curve climate change and environmental decline?

### ***ii) The Kyoto Protocol***

The Kyoto program provided the initial step to establishing the practical rules about how countries can define ways that may allow the implementation of the environmental policies needed to minimize the negative consequences of climate change and global warming. There are two ways of implementing the climate change policy: direct investment to curve pollution in developing countries to compensate for pollution emissions in developed countries; and the buy and sell of environmental services.

The first way of implementation is known as joint implementation; and the second way is known as international emission trading (De Jongh and Captain 1999). These rules allow different venues to environmental policies like the buy and sell of pollution emitting and absorbing services, the buy and sell of existing pollution sinks, mitigating green funds and/or green investments to counteract negative externalities, and so on.

## **GREEN MARKET INSTRUMENTS**

In essence, the Kyoto Protocol has created, among other things, a market for environmental goods and services as well as market instruments to deal with environmental goods and services. Since the Kyoto protocol is a legally binding document of commitments targeted to reducing green house gases (Rohman 1999), these are green markets or environmental markets with legally binding structures. All these markets are expected to generate the capital needed to make environmental policies sustainable.

### ***i) Non-emission instruments***

These instruments are designed to create markets for existing forested areas, and the CO<sub>2</sub> content they have. They aim at creating a value for this CO<sub>2</sub> gas in situ as a non-emission value. In doing so we are given value to natural capital that before had no value or a negative value because they were considered barriers to traditional economic development. Notice that the sellers in these environmental markets are expected to be located in less developed countries while the buyers are said to be located in developed countries.

This is so because these markets appear to be targeted to the inter-country trading of environmental non-emission services by providing a place where countries with high CO<sub>2</sub> emissions can find countries with high non-emission services. In other words, these appear to be restricted markets designed only as a meeting place for buyers in developed countries and sellers in developing countries of non-emission services. However, see that these restrictions confuse the possibility that different stake-holders within the same countries could act as buyers or sellers carrying out internal environmental trading of emission/ non-emission services to neutralize or minimize emissions at source as much as possible.

This confusion can lead to increasing risk within these environmental markets as the implementation of concepts such as free trade and perfect market may lead to irresponsible, but rational, local behavior either on the part of developed countries or developing countries or both, as for example, the need to deal with local sources of pollution may not be taken as of high priority.

### ***ii) Agent storing instruments***

These instruments are geared at creating markets for

reforestation programs by providing a value to the potential quantity of CO2 that reforested areas may achieve over time. They aim at creating a value in situ too, but as a fixation value. In doing so we are providing value to natural capital creating programs which before had a negative expected investment value as compared to investing in the conversion of existing natural capital. Again, this is so because these other markets

appear to be targeted to inter-country trading of environmental storing services through linking countries with high CO2 emissions and countries with high CO2 fixation services.

Hence the buyers of CO2 storing services from developed countries and the sellers of these services from developing countries meet in these restricted markets. Also see that the restrictive nature of these green markets blurs the possibility that different stake-holders within the same country could act as buyers or sellers carrying out internal environmental trading of emission/fixation services to neutralize emissions at source as much as possible. Here too, the possibility exist that countries, developed or developing countries or both, may have a strong incentive to have irresponsible pollution behavior at home under perfect competition and free trade.

### ***iii) Green marketing instruments***

Once these markets are created, we need instruments to bring buyers and sellers into environmental markets. These green marketing instruments allow for different ways of linking buyers and sellers. Buyers are in the market in order to find the most economic way to offset pollution emissions and sellers are in the market in order to generate income from the sale of environmental non-emission and fixation services.

Notice that the existence of the environmental markets appear to have nothing to do with the responsibilities of the buyer to attempt to use less pollution production and consumption activities at home or the responsibilities of the seller to minimize its own emissions and to maximize its own fixation. Moreover, see that these markets do not reflect the fact that the net benefits of producing one unit of pollution is or may be higher than the cost of buying offsetting pollution units in environmental markets, which in theory may lead to a total saturation of the non-emission and fixation markets as the pollution habits of the buyer will increase as long as there is an offsetting opportunity.

And this possibility becomes more real and worrisome when it is expected that green house gas emissions will continue to be in the increasing side in OECD and non-OECD countries toward 2020 (OECD 2001). And finally, notice that these green markets could be under a lot of stress if the principle of eco-economic efficiency is suddenly strongly pursued.

In summary, the Kyoto markets appear to be designed to deal with the total CO2 emissions of developed countries and the total non-emission and fixation capacities of developing countries instead of dealing with excess country emissions, which are emissions that are beyond the over all capacity of the country to keep as protected areas and as re-forested areas.

### **THE MESO-AMERICAN BIOLOGICAL CORRIDOR AND THE GREEN INSTRUMENTS**

The Central American's response to the challenges brought forward by climate change and global warming issues is the creation of the Meso-American Biological Corridor (MBC), which extends from Panama to Belize. This program is a formal commitment aimed at showing the seriousness of all Central American governments with respect to their commitments toward the Kyoto protocol and the Climate Change Framework. This formal commitment was ratified by all Central American governments in section 12 of the Declaration of Guatemala II in October 1999. The green instruments described above are expected to be used to promote the environmental services available within the MBC Corridor in environmental markets; and to attract funds from industrial polluters.

The environmental services being marketed include the fixation services of deforested areas; and the non-emission services of existing forested areas. The funds being sought are the pollution mitigating marketing funds supplied by polluting enterprises in the region. All collections from the sale of environmental services and from industrial polluters are to be used to finance sustainable development programs within the MBC corridor. However, since the MBC corridor is a non-systematic solution to a systematic problem, even if the project is 100% successful, it may not guarantee the over all sustainability of the Central America Region. In fact, the success of the MBC program could lead to the worsening of social, economic, and environmental conditions in the areas outside protected areas, which could later jeopardize the continuing success of the MBC corridor.

### **POTENTIAL PROBLEM**

The unsystematic view under which the development plans of the MBC corridor appear to be drawn may back-fire in the long-run as it may increase the exploitation and degradation of resources within unprotected areas. Good ideas may have bad results if implemented as if the rest of the Central American natural system does not matter. This potential problem deserves careful consideration at the local and regional level.

### **THE GOALS OF THIS PAPER**

The first goal is to provide a qualitative comparative framework that allow us to link regional development dynamics in Central America. The second goal is to show how these regional dynamics can be linked with the development dynamics within the Meso-American Biological corridor(MBC). The third goal is to use this framework to indicate the possible ways in which green policies designed to support the MBC corridor may affect its internal and external dynamics. And the last goal is to provide some conclusions related to a possible mismatch between the aims of localized green policies and the aims required to achieve regional sustainability conditions.

## **METHODOLOGY**

A desirable regional development model is defined in terms of deforested area based development and forest area based development. From here, the worse and the best regional development models are derived. Then, the best regional development model is restated in terms of protected and unprotected deforested areas and forested areas. After rearranging terms, it is shown that the best regional model can be expressed in terms of the protected forest areas and deforested areas within the corridor and the remaining unprotected deforested areas and forested areas in the region. Finally, this framework is used to indicate how green policies targeted to the Meso-American Biological Corridor may affect regional sustainability.

**Table 1 Qualitative terminology used**

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DFA	=	development in deforested areas dominates
dfa	=	development in deforested areas is dominated
FA	=	development in forested areas dominates
fa	=	development in forested areas is dominated
R	=	desirable regional development
r	=	undesirable regional development

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## **REGIONAL DEVELOPMENT MODEL**

A desirable development model for the Central American region(R) can be expressed as follows:

1)  $R = DFA + FA$

The formula above points out that there can be a desirable regional model (R) when development within deforested areas (DFA) dominates or when development within forested areas (FA) dominates or when both forms of development are present in dominant form at the same time.

#### **THE WORSE REGIONAL DEVELOPMENT MODEL**

The undesirable regional development model (r) is the opposite of the above model, and it is shown below:

2)  $r = dfa.f_a$

Hence, the worse regional development model (r) is the one where both deforested area (dfa) and forested area (fa) based development are in passive or dominated form.

#### **THE BEST REGIONAL DEVELOPMENT MODEL**

The most desirable regional development model (R\*) is the one where both deforested area based development (DFA) and forest area based development (FA) are present in dominant form at the same time:

3)  $R^* = DFA.FA$

#### **THE BEST REGIONAL DEFORESTED AREA MODEL**

The model that balances development concerns within and between protected deforested areas (DFA1) and unprotected deforested areas (DFA2) is the best deforested area model (DFA) as stated below:

4)  $DFA = DFA1.DFA2$

#### **THE BEST REGIONAL FORESTED AREA MODEL**

The model that balances development concerns within and between protected forested areas (FA1) and unprotected forested areas (FA2) is the best forested area model (FA) as represented below:

5)  $FA = FA1.FA2$

#### **REDEFINING THE BEST REGIONAL DEVELOPMENT MODEL**

By substituting formula 4 and 5 in formula 3 we can restate the best regional development model as follows:

6)  $R^* = DFA1.DFA2.FA1.FA2$

Then we can reorganize terms to separate protected conditions and unprotected conditions as shown:

7)  $R^* = (DFA1.FA1) (DFA2.FA2)$

Hence, the best regional development model is made up of a protected component(DFA1.FA1) and of an unprotected component(DFA2.FA2) according to formula 7.

#### **DEFINING THE MESO-AMERICAN BIOLOGICAL CORRIDOR**

Since the MBC corridor is made up of the protected deforested areas(DFA1) and protected forested areas(FA1) in Central America it can be defined as follows:

8)  $MBC = DFA1.FA1$

#### **INSERTING THE MESO-AMERICAN BIOLOGICAL CORRIDOR**

By inserting formula 8 into formula 7 we get the following:

9)  $R^* = MBC.DFA2.FA2$

The formula above indicates that the best development model for Central America can be expressed in terms of the interaction between the protected areas within the MBC Corridor and the rest of the unprotected areas within the region.

#### **IDENTIFYING POTENTIAL PROBLEMS**

The best regional development model in formula 9 can be used to point out potential problems resulting from specific green development strategies, which are described below one by one:

##### ***i) The impact of unsystematic solutions***

Formula 9 can be used to show in simple terms the unsustainable nature of partial solutions. For example, focusing development efforts only on the Meso-American Biological Corridor(MBC) implies that we are not concerned about the impacts that changing the environmental values of goods and services within it will have on the environmental values of goods and services that exist in unprotected areas, which can be stated as follows:

10)  $R^* = MBC$  , when  $DFA2 = FA2 = 1$  = no impact on development

The model above implies that the sufficient and necessary condition for the existence of sustainable regional development in Central America is the successful implementation of the MBC corridor, which may not be true.

**ii) The impact of non-emission markets**

Formula 5 can be used to derive the impact that non-emission markets may have on forested area based development in Central America as follows:

$$FA = FA1.FA2$$

The focus of the non-emission markets only on forested areas within the MBC corridor (FA1) implies that unprotected forested areas have no value (FA2 = 1), which leads to:

12)  $FA = FA1$

The above indicates that only forested areas (FA1) within the MBC corridor matter. However, the increase in the value of forested areas (FA1) within the MBC corridor will affect the demand for forested areas (FA2) outside the corridor.

**iii) The impact of agent fixation markets**

Formula 4 can be used to derive the impact that pollution fixation markets may have on deforested area based development in Central America, as follows:

13)  $DFA = DFA1.DFA2$

The focus of the pollution fixation market only on the deforested areas (DFA1) within the MBC corridor implies that unprotected deforested areas have no value (DFA2 = 1), which leads to:

14)  $DFA = DFA1$

Again, the above implies that only deforested areas (DFA1) within the MBC corridor matter. However, the increased in value of deforested areas (DFA1) within the MBC corridor will affect the demand for deforested areas (DFA2) outside the corridor.

**iv) The impact of green marketing instruments**

The regional model stated in formula 7 and 9 can be used to show the potential impact that funds coming from green marketing instruments such as green oil or any environmental fund can have on regional development dynamics:

$$15) \quad R^* = DFA1.FA1.DFA2.FA2 = MBC.DFA2.FA2$$

If all green money is spent on the deforested areas(DFA1) and forested areas(FA1) of the MBC corridor, it means that DFA2 = FA2 = 1 since they are not considered priority. However, if all green money is spent on DFA1 only or on FA1 only or on both, the supply and demand for deforested areas(DFA2) and forested areas(FA2) outside the MBC corridor will be affected. For example, if all green money is invested in FA1, the value of FA1 will increase.

This will affect the level of deforested areas within the MBC corridor(DFA1) as well as the levels of forested areas(FA2) and deforested areas(DFA2) outside the corridor as their demand will be affected too. Under the influences of the environmental market forces, the land uses that have the highest environmental value will prevail and lead to the trend toward a dominant land use. In other words, investing in land uses within the MBC corridor will affect processes of land reversion or conversion within and outside the MBC corridor.

Under these circumstances the best we can do is to be a little more extra careful and pro-active by dealing with green markets in a short to medium term basis to create the learning curve that will be needed for making efficient future adjustments.

### **SPECIFIC CONCLUSIONS**

Some specific conclusions can be presented. One conclusion is that the qualitative framework described above provides a simple systematic way to look at development processes in Central America from the point of view of deforested area based development and forested area based development. A second conclusion is that once the land uses within the MBC corridor are linked to the regional development model it becomes easy to see the possible ways in which green policy instruments can affect regional sustainability in Central America.

A third conclusion is that focusing sustainability hopes only on the land uses within the MBC corridor may work in the short and medium term, but not in the long-term. This is because as environmental conditions within the MBC corridor improve because they are the only ones within the Kyoto markets, unsustainability conditions outside the MBC corridor will be under more stress. And the last conclusion is that given the knowledge gaps that bind the working of green markets and the unsystematic nature of the program, the MBC Corridor should be managed for now on a pro-active and short-term to medium-term basis

in order to create flexibility for future expected and unexpected regional and green market adjustments.

### **GENERAL CONCLUSION**

The general conclusion is that a partial solution to a systematic problem should not be expected to lead to sustainable outcomes in the long-run. Ways need to be found to balance environmental concerns within and outside the MBC corridor at the same time.

If this is not possible for financial and institutional reasons, the marketization of the MBC corridor's environmental goods and services must be carried out together with a very strong regulatory policy governing development in forested and deforested areas outside the MBC corridor to minimize the unsustainable consequences to be expected there. Otherwise, the good intentions and commitment shown by the implementation of the MBC corridor may be overrode by the additional pressures put on unprotected areas when opening Kyoto markets only for protected areas.

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