2001
Hemispheric Social Inclusion Index (HSII)

Measuring Environmental Inclusion in the Western Hemisphere: Does Economic Growth Foster A Sustainable Environment?

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A Project of The Robarts Centre for Canadian Studies
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EXECUTIVE SUMMARY

This preliminary report presents key hemispheric environmental issues and related findings from the 2001 *Hemispheric Social Inclusion Index* (HSII). To this end, it focuses on the NAFTA nations of Canada, Mexico and the United States as well as three MERCOSUR countries, namely Argentina, Brazil and Chile. The central question to be addressed is whether the economic growth associated with intercontinental free trade fosters environmental sustainability, an important conduit of social inclusion, at national and intra-continental levels. This report is quite distinct from other discourses in neo-classical economics or political science, which have tended to view the environment as an externality to be held constant and, therefore, have not factored aspects of the physical environment into their analyses. The unique feature of this report and the HSII is that our perspective views the environment as a vibrant entity that is directly impacted by various trade effects that are often contradictory in nature. Such effects can facilitate both positive economic outcomes such as increased GDP and lead to an array of negative environmental consequences directly linked increased industrial production. Environmental hazards associated with increased industrial production include higher emissions of toxic pollutants, greater levels of hazardous waste by-products and risks to ecosystems due to mass deforestation.

This report will uncover some of the contradictory aspects associated with environmental inclusion, exclusion and the overall net effects in terms of both positive indicators of political will and negative outcome benchmark indicators. Ultimately, we will provide important policy recommendations aimed at fostering a more sustainable environment and optimizing environmental inclusion. These recommendations will

address areas of prevention, sustainability standards, accountability measures, enforceable sanctions and best practice incentives. As this report is a work in progress, at this time it is meant to illustrate the powerful analytical potential that the HSII can provide. At this point, we welcome feedback and suggestions in order to address omissions and/or shortcomings for forthcoming editions.

Daniel Drache, Executive Director
Hemispheric Social Inclusion Index

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INTRODUCTION

The purpose of this report is to identify some of the key environmental issues and principal findings revealed from the 2001 *Hemispheric Social Inclusion Index* (HSII). To this end, we will focus on the NAFTA nations of Canada, Mexico and the United States as well as three MERCOSUR countries, namely Argentina, Brazil and Chile. The central question that we will address is whether economic growth associated with intercontinental free trade fosters environmental sustainability at national and intra-continental levels.

Indeed, trade effects are often contradictory in nature. They can facilitate positive economic outcomes such as increased GDP or negative environmental challenges such as mass deforestation or increased levels of industrial pollution. When such negative environmental effects occur, policy-makers must address these situations to ensure that environmental conditions necessary for sustainable human development are ensured. This report is based on the premise that a sustainable environment is a vital factor that underlies sustainable human development. This is because factors such as population health and human well-being are themselves directly impacted by environmental variables such as the availability of safe water, clean air and adequate sanitation facilities. In areas where environmental elements can significantly threaten human sustainability such as the Canadian North, ample energy resources are critical to provide adequate heating and warmth. Moreover, in areas where there is limited freshwater availability, the necessity of irrigation is important. Thus, degrees to which human beings have access to such vital resources are directly tied to principles of *inclusion* whether social or environmental in nature (see Figure 4.1). In such contexts, the interface between social inclusion and environmental sustainability is conceived in the notion of *environmental inclusion* or the capacity of the physical environment to facilitate sustainable human development.

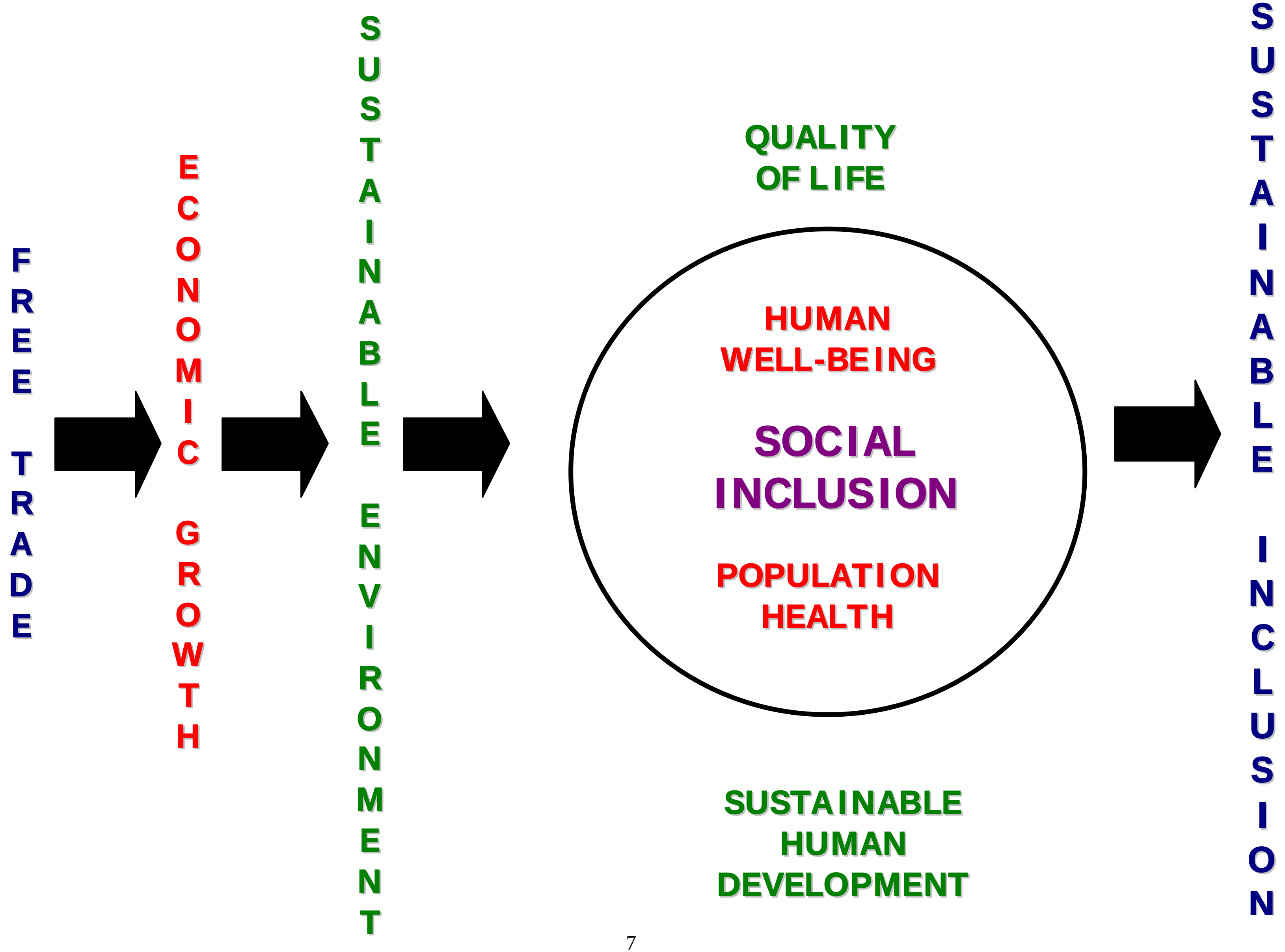
WHY THE HEMISPHERE?

To achieve the aforementioned objectives this report is divided into six sections. First, we will look at six contemporary environmental issues that are important throughout the hemisphere. Second, we will present some of the principle findings discovered in the physical environment sub-indices of the 2001 HSII. Moreover, we will present these findings in respective contexts of North and South trade blocs. Third, we address several important issues pertinent to measuring environmental inclusion. Fourth, we will present national and hemispheric findings that contributed to the respective trade region findings. Fifth, we will consider how proactive political will measures can counter structural obstacles and barriers to environmental inclusion. Last, we will offer several recommendations for policy-makers and other stakeholders aimed at fostering a more inclusive and sustainable physical environment.

Given our aforementioned outline, there is one important question that might arise before we go any further. Specifically, why are we interested in the hemisphere as an area of examination for this study? Our answer is both tempered and tentative. In short, the hemisphere has long been conceived solely as a geographic concept. Neo-classical economists and political scientists have often viewed it as an externality to be held constant in their respective analyses. However, a new idea is to think of the hemisphere as a context or forum that facilitates social inclusion. The physical environment then

Figure 4.1

A Positive Relationship Between Economic Growth, Environmental Sustainability and Social Inclusion



becomes a dynamic conduit that can influence both inclusion processes and outcomes. Indeed, economists and political theorists have long used the hemisphere to talk about trade, economic flows and free trade agreements as an area that links diversity into some coherent whole. As important as this notion is, there are other critical perspectives. One view is that the hemisphere is linked together by societal arrangements as well as other interdependencies. The environment is perhaps one of the most compelling examples.

KEY ENVIRONMENTAL ISSUES

In surveying the physical environment, there are several key issues that need to be addressed. Issues around polluted air, unsafe drinking water, hazardous or toxic waste, scarce energy resources, high trends in urbanization and mass deforestation all pose significant challenges for both human development and environmental sustainability. Moreover, while factors such as polluted air and unsafe drinking water can definitively threaten population health, risking both human well-being and quality of life, hazardous waste and mass deforestation can threaten overall environmental sustainability.

Whether environmental risks primarily threaten human or environmental sustainability, in many cases, it is a slippery slope whereby environmental degradation can facilitate deleterious consequences for humankind in long-term circumstances. For example, intergenerational trends in urban air pollution can yield greater incidences of asthma amongst city dwellers. Further, a radioactive spill from a nuclear power station could exacerbate cancer rates in proximal populations or effect high congenital defects in subsequent birth rates. The physical environment sector of the HSII examined six key issues that have been and still need to be addressed within the physical environment of both North and South America.

These issues pose real challenges for population health as well as human well-being. They likewise challenge social inclusion through an often over-looked truism. Sustainable human development can be jeopardized in jurisdictions where there is a deficit in environmental sustainability. In such contexts, inclusion becomes a critical issue to address. While this may be a notion that some policy-makers challenge, it is one that demands their unequivocal attention. Simply stated, human beings cannot indefinitely survive where they cannot live with unacceptably high levels of CO_2, contaminated water and poor sanitation facilities.

Indeed, if the survival of human beings is threatened, issues around inclusion are also compromised. For example, while issues such as urbanization and deforestation may not be inherently negative, they can indeed facilitate risks of negative outcomes for local populations. In major urban centres such as Toronto, New York, Buenos Aires or Santiago, high levels of air pollution or unsafe drinking water can threaten human development en masse if environmental standards are allowed to become or remain too lax. Likewise, in areas of mass deforestation such as the Amazon Basin, Northern Canada and the Pacific Northwest, the impact on life dependent on forest-based ecosystems could be severely harmed.

Both of these examples highlight an important aspect surrounding many issues around environmental sustainability. It is the concept that many environmental effects are spatial in nature. This means that such effects most immediately affect habitation, settlements and populations in the closest proximity to respective environmental events. It is true that such effects may then extend to outlying areas in a ripple effect similar to water rings that circle from where a stone splashes into a pond. However, in both North and South America where urbanization rates range between 75% and 90%, risks to human sustainability where environmental breakdowns occur must always be considered.

In short, the focus of the physical environment component of the HSII is a unique perspective that first looks at access issues to clean air, safe water, sustainable energy, waste management, vital living area and tenable land. The important notion here is how barriers to these common and valued resources affect both social and environmental inclusion in light of trade effects. Political will in the form of enforced environment regulations, the development of sustainability enhancing infrastructure and proactive budgetary allocations can counter negative effects associated with trade activities.

For example, increased trade often demands an increase in production including industrial production. Negative activities associated with increased industrial production such as greater energy usage, environmental dumping and toxic emissions might subsequently occur. Such effects threaten environmental sustainability. Moreover, these activities may in turn impede state citizens, in the broadest sense of the term, to share and participate in common and valued environmental resources such as clean air and safe water. In such instances, negative trade related activities can become obstacles or barriers to environmental inclusion in jurisdictions where standards and regulatory provisions are not adequately enforced by public authorities.

WHAT HAPPENS WHEN INCLUSION FAILS?

When environmental standards and practices are compromised, the effects on population health and human well-being can be severe. Spatial factors that place some people in closer proximity to environmental hazards can also place them at greater health risk than others. For example, in urban centres of production, larger numbers of people may be at greater risk than in rural areas when environmental breakdowns occur. In such cases, individuals put at risk due to effects of deleterious environmental consequences are excluded from positive quality of life experiences by having their physical well-being threatened. Table 4.1 illustrates a taxonomy of populations that may be more excluded than others from environmental inclusion and some general principles to remedy such exclusion. It illustrates that populations close to areas of high industrial production, vulnerable age groups such as children, infants and the elderly, populations with congenital or chronic ailments such as lung disease, allergies or asthma, and populations close to toxic waste sites or nuclear facilities may be at greater risk to environmental hazards than those not subject to such conditions. Poor environmental standards and practices can further impede inclusion to resources conducive to social inclusion and sustainable human development.

In contexts where a lack of political will exists, negative outcomes may be further exacerbated. Even in situations where economic growth facilitated by positive trade effects may increase aggregate fiscal prosperity, poor environmental practices and deleterious outcomes may abound. In such instances, there would be no positive correlation between economic growth and environmental sustainability. The next section presents some of the principle hemispheric trade bloc findings in each environmental sector from 1985 through 2000.

TABLE 4.1

TAXONOMY OF THE EXCLUDED

Populations at Greater Risk Due to Negative Environmental Consequences

Both environmental inclusion and social inclusion and their offsetting exclusion counterparts are points on a continuum, not absolute categories. However, some members of society tend to be closer to the 'excluded' end of the continuum than others, that is subjected to greater risk when negative environmental events occur. The following taxonomy attempts to identify some general directions that policy remedies can pursue in order to effectively counter risks of exclusion in areas access, prioritization, distribution and participation that are related to inclusion and exclusion in the physical environment.

PRIMARY POINTS WHERE EXCLUSION CAN OCCUR	Populations Close to Areas of High Industrial Production Activity	Vulnerable Age Groups Such as Children, Infants and the Elderly	People with Congenital or Chronic Ailments Such as Lung Disease, Allergies or Asthma	Populations Close to Toxic or Hazardous Waste Sites or to Nuclear Facilities
Access	Citizens need protection from dangerous contaminants and pollution in order to optimize environmental inclusion. Pollution and toxic and hazardous exposure must be restricted.			
Prioritization	Safeguard measures and standards need to be at the top of government policy agendas in areas of budgetary allocation, infrastructure development and regulatory provisions.			
Sharing	Costs of pollution and other environmentally deleterious consequences must not be treated as externalities paid for by the sate but fines or levies must be duly imposed on environmental violators.			
Participation	Social movements as well as members vulnerable to environmental exclusion must be included at policy-tables around all issues of environmental concern to be democratic counterweights to core government actors and/or state enterprises.			

PRINCIPLE HEMISPHERIC AND TRADE REGION FINDINGS

Frequently, environmental reporting looks at either negative externalities that impact the environment or progressive measures aimed at protecting it. In the HSII, we attempted to understand inclusion in a more precise way. It was to examine *both* positive and negative factors that measure sustainability and degradation as well as the net effects between the two.

THE HEMISPHERIC TREND

Between 1985 and 2000, there was a deficit in environmental sustainability with exclusion ranging between -13.0 to -9.75 on the HSII scale. While both NAFTA and MERCOSUR nations yielded environmental records with more exclusion than inclusion, the NAFTA trade bloc has remained above the hemispheric net exclusion average while the MERCOSUR region remained below (See Figure 4.2). Further, Figure 4.2 also reveals a definitive widening between the NAFTA region's exclusion level and that of the MERCOSUR. While NAFTA's net exclusion score, signifying more environmental exclusion than inclusion, slightly improved from -11.8 to -8.3, the MERCOSUR's net exclusion score failed to improve. In short, the MERCOSUR score improved by only 0.3 from 1985 to 2000 (from –14.0 to –13.7). What follows are some of the primary trends that impacted both environmental inclusion and exclusion in the respective hemispheric trade regions in the six key issue areas.

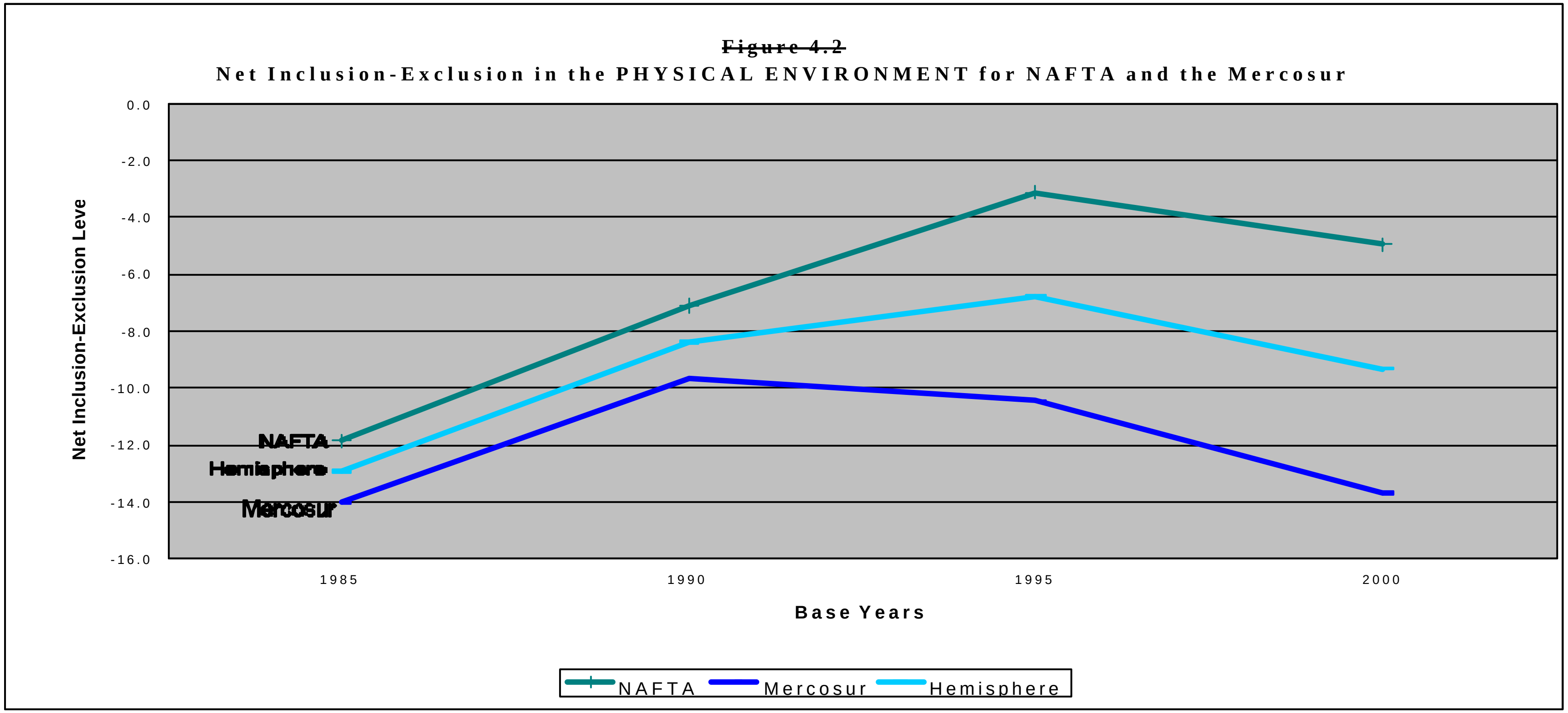


Figure 4.2 depicts the net trend lines of inclusion and exclusion effects for the hemisphere, the NAFTA trade region and the Mercosur trade region. Note that all trend lines are in negative (exclusion) territory even when inclusion forces are factored into the equation. Such findings reveal a clear deficit in both environmental inclusion and environmental sustainability between 1985 and 2000.

Source: 2001 Hemispheric Social Inclusion Index, Robarts Centre for Canadian Studies, York University

MERCOSUR TRENDS IN KEY ISSUE AREAS

Access to Clean Air

- Air is a resource that can directly impact human well-being due to its affects on population health. For example, poor air quality can exacerbate incidences of respiratory ailments. **In short, the MERCOSUR's clean air score was comparable to the poor score of the NAFTA region.** While Argentina revealed the poorest hemispheric score, Chile yielded the highest despite very poor air quality in Santiago. Chile's higher clean air score was based on a minimal degree of industrial development rather than state commitment to clean air policies.

Access to Safe Water

- Access to safe water is a condition that is essential to sustainable human development. Yet, while 90% of all households in the MERCOSUR had access to safe water, only 75% of the aggregate population had access. **This disparity is explained by the large shanty and barrios populations without access to clean water at local levels despite marked improvements in safe water infrastructure throughout Mercosur region households.**

Access to Sustainable Energy

- Ensuring sustainability of energy resources is vital if future generations are to benefit from such resources. Overall, energy production levels of MERCOSUR nations are far below those of NAFTA nations. **Thus, scarcity of energy resources in the South is not as problematic as in the North.** This is because higher industrial production in the North make Canada, Mexico and the United States are far more energy dependent than MERCOSUR nations

Access to Waste Management

- Waste management is primarily about a commitment to best practices conducive to ensuring a safe environment for sustainable human development to occur. **While 75% of the sampled MERCOSUR nation's populations revealed adequate access to sanitation, access to waste management at local levels remained primitive.**

Access to Vital Living Area

- Hemispheric urbanization trends reveal more people in the MERCOSUR have left rural areas to live in cities than in the North. On average, the MERCOSUR urbanization rate was 10% greater than in the North. **Due to spatial factors associated with negative environmental outcomes such as air pollution, population health is often at a higher risk in the MERCOSUR.** For example, in cities with larger populations more people are at risk.

Access to Tenable Land

- Land resources are important assets that must be managed prudently to ensure the intergenerational transferability of natural capital. **Mass deforestation and decreases in farmable lands has not been as significant an outcome in the South when compared to the North.** On average, Canada's trend in deforestation has been greater than Brazil's deforestation of the Amazon Basin due the sheer magnitude of the Amazon region.

NAFTA TRENDS IN KEY ISSUE AREAS

Access to Clean Air

- Overall, the NAFTA nations declined in their overall access to clean air with the United States revealing a very poor access to clean air score. Moreover, the United States' clean air score was the second worse in hemisphere after Argentina. Interestingly, While the NAFTA partners did reveal marginal improvements in clean air energy production (i.e., solar and wind sources), **Canada, Mexico and the United States all increased in their stationary or industrial-based anthropogenic emissions of CO^2**.

Access to Safe Water

- **The NAFTA region's safe water access score rated very high overall on the environmental inclusion index.** In short, Canada and the United States maintained near perfect scores while Mexico yielded a vast improvement in safe water access with a net inclusion increase from +10.3 in 1985 to +18.6 by 2000. This was primarily due to increased development in piped water infrastructure.

Access to Sustainable Energy

- In this area, all NAFTA nations markedly improved in their commitment to use alternative, renewable energy sources such as solar and wind energy. However, Canada, Mexico and the United States all remained dependent on their usage of coal-based energy production. **Overall, at best, the NAFTA nations appeared to collectively reveal a marginal commitment to improve the sustainability of energy resources.**

Access to Waste Management

- NAFTA members had room to improve in sanitation waste management with Canada leading the way at 95% access by 2000. The United States and Mexico had sanitation waste management access levels of 85% and 76% respectively. **Canada and the United States faced hazardous waste management challenges due to nuclear energy production.**

Access to Vital Living Area

- Amongst the NAFTA nations, significant proportions of national populations live in large urban centres such as Toronto, New York, Los Angeles and Mexico City. Urbanization rates in Canada, Mexico and the United States are as high as 3:1 or three urban dwellers to every one rural inhabitant. **However, while urbanization itself is not inherently negative, high rates of urbanization can increase population risks associated with spatially-based environment hazards such as air pollution or contaminated water supplies.**

Access to Tenable Land

- **The NAFTA trade region revealed a marginal decrease in access to tenable land primarily due to mass deforestation practices in Northern Canada and in the Pacific Northwest as well as decreases in farmable lands across the American Midwest.** While the decline in access to tenable land was not as significant an environmental issue as other environmental issues amongst NAFTA members, it remained an important area of environmental concern.

BEHIND THE TRADE REGION FINDINGS: "POLITICAL WILL A SCARCE COMMODITY?"

While the aforementioned findings are important in light of what they reveal about environmental inclusion and exclusion, they do not tell the whole story. Indeed, there has been much environmental degradation. However, there have also been many marked improvements as well. For example, while anthropogenic CO_2 emissions have increased on the whole, there has been much political activity aimed at diminishing such outcomes as evidenced by the recent Earth Summit and the Kyoto Accord. Yet state commitments aimed at effectively redressing negative environmental consequences often lag behind conditions that already exist. Consider the pressure to produce more efficient energy through the use of nuclear-based technology.

While nuclear energy has indeed become a public mainstay, there are still long-term challenges of what do with nuclear waste by-products. Thus, a much broader discussion that goes beyond the scope of this report is needed to effectively address the flow activity that is constantly occurring between inclusion and exclusion forces. After all, while these respective forces may cancel out one another out to a zero-sum outcome such a scenario is by no means a win-win situation. In such instances, political will may be envisioned as a major determinant for testing and understanding inclusion and in facilitating the removal of structural obstacles and barriers to access. As such, political will needs to be both proactive and actively enforced if sustainable outcomes are to be actualized within the physical environment.

MEASURING ENVIRONMENTAL INCLUSION

Similar to social inclusion, the HSII methodology used in measuring environmental inclusion as both a process and an outcome was based on the four factors of inclusion, namely *access*, *prioritization*, *sharing* and *participation*. Access is the opportunity or availability of a respective resource that can provide value-added meaning for sustainable human development such as safe water or clean air. Prioritization or the setting of public and state priorities is directly tied to political will. In short, political will refers to state commitments or the public authority required to ensure that structural barriers and obstacles are diminished or removed to facilitate adequate access, sharing and participation. Sharing is the actual distribution or dispersion of the valued resource in a fair and equitable manner across a respective population. For example, in a large urban centre one section might be more polluted than another meaning that some people have cleaner air to breathe than their cross-town counterparts. Participation is the actual number of people or population rates who actually benefit from the valued resource. This may be the number of people in a geographic locale who actually consume safe water or breath clean air.

In the HSII, the inclusion factors of *access* and *prioritization* were measured by political will indicators whereas exclusion factors such as a lack of *sharing* or *participation* (or barriers to access) were measured as negative outcome benchmark indicators. The intention of each respective proxy was to gauge the relationship between an environment conducive to social inclusion and one that perpetuated factors of exclusion. In other words, respective indicators revealed either political will or barriers to access, sharing and participation. A final exercise in operationalizing respective areas of the physical environment pertained to the weighting of the six environmental areas relative to their prevalence in affecting environmental inclusion.

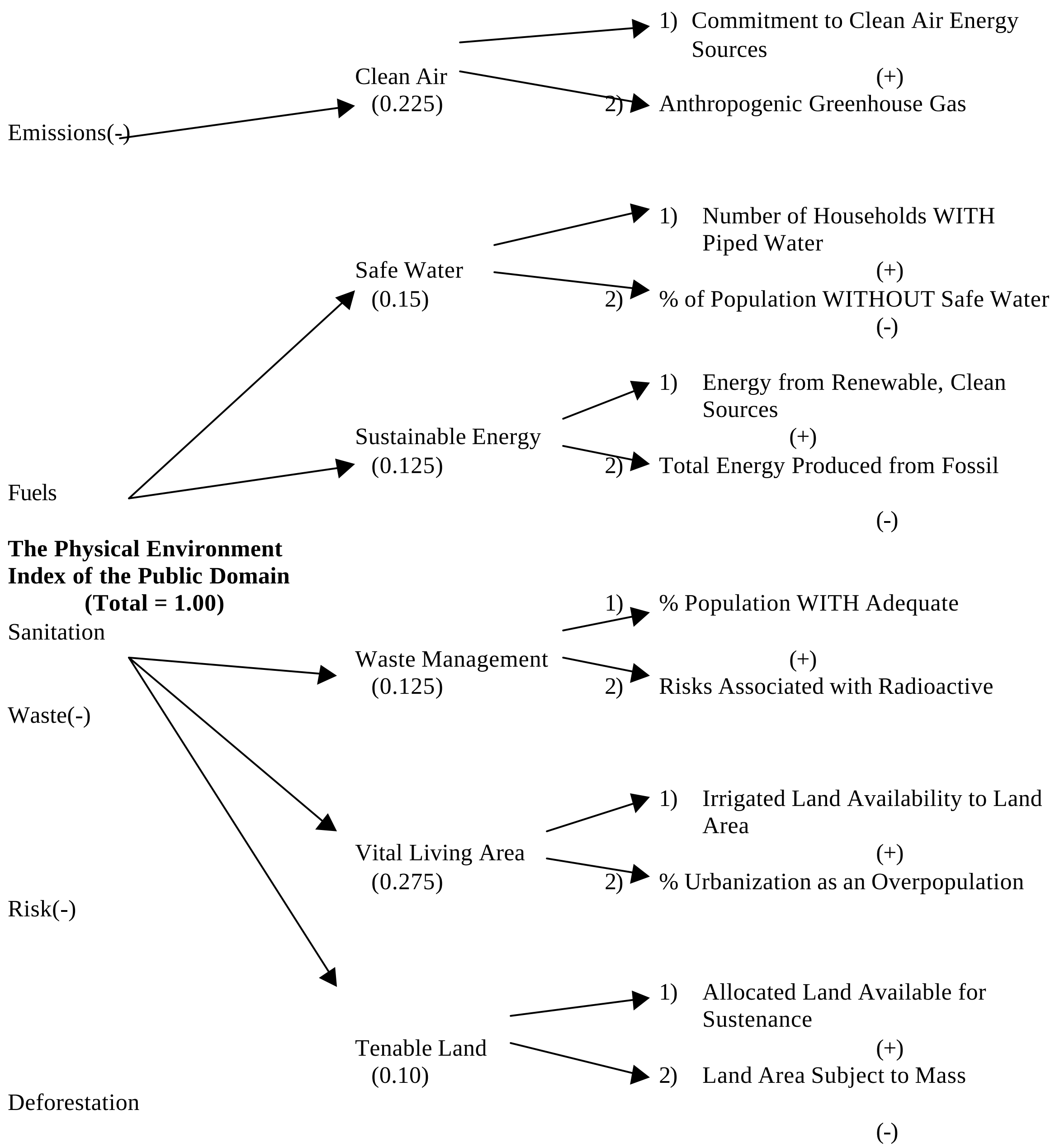
BENCHMARKING THE PHYSICAL ENVIRONMENT

The process of operationalizing and weighting each sector of the physical environment was a complex and demanding process. Figure 4.3 reveals how each sector of the physical environment was weighted and duly operationalized. It demonstrates how each sub-sector of the physical environment was categorized as either positive political will indicators or negative outcome benchmark indicators depending upon their respective environmental impacts.

Figure 4.3

BENCHMARKING THE PHYSICAL ENVIRONMENT

1) PRIORITIZATION INDICATORS THAT MEASURE POLITICAL WILL
2) BENCHMARK INDICATORS MEASURING NEGATIVE OUTCOMES



Environmental Inclusion = The Sum Total of Access to (Clean Air + Safe Water + Sustainable Energy + Waste Management + Vital Living Area + Tenable Land)

NOTES :

Positive Political Will Indicators	Political Will Is Often Reactive And Slow To Implement And May Be Further Complicated By Inconsistencies Due To Changes In Political Ideologies Or Political Parties
Negative Outcome Benchmark Indicators	Negative Environmental Consequences Are Often Very Severe And Take Significant Time And Resources To Redress

Each indicator is a dynamic and robust that measures or gauges the effects of inclusion as well as the forces of exclusion. The uniqueness of the overall index in measuring environmental inclusion is that it also examines the dynamic net effects that occur between inclusion and exclusion polarities beyond static unidirectional outcomes. Thus, the first step in operationalizing the physical environment was to divide it into several primary sectors to clearly conceptualize the physical environment in measurable terms. Thus, air, water, energy, waste, land, and actual living space were the six target areas that the HSII was most interested in examining as primary environmental sectors. Moreover, each of these areas intersected with sustainable human development as essential factors conducive to such development.

Further, the balancing of positive and negative indicators also addressed a secondary issue. Specifically, political will indicators captured the notion that political will is often reactive and slow to implement and may be further complicated by inconsistencies due to changes in political ideologies or political parties. Conversely, negative outcome benchmark indicators captured the reality that negative environmental consequences are often very severe and take significant time and resources to redress. Next, questions were asked about what would be other important factors in these six areas to facilitate sustainable human development. To this end, questions were raised about the importance of social inclusion in contributing to other meaningful human experiences such as population health, well-being and quality of life.

Table 4.2 presents a summary chart of the definitions, rationales and data sources of the physical environment indicators used in the HSII environmental inclusion sub-indices. Summarily, air corresponded to clean air, water corresponded to safe water, energy corresponded to sustainable energy, waste corresponded to waste management, land corresponded to tenable land, and living space corresponded to vital living area.

Subsequently, each of these concepts was further refined. For example, political will was then demonstrated to further facilitate or ameliorate access to each of these key areas. Conversely, a lack of political will - as evidenced by negative outcome indicators - could then be shown to impede inclusion factors of access, sharing and participation to these respective areas. Below are summary definitions of each of the six respective environmental sectors.

Access to Clean Air

- Adequate availability of air that is conducive to sustainable human development. For example, air that is relatively free from toxic or anthropogenic factors. Such air would be free of pollution, carcinogens or other noxious substances harmful to human beings. Clean air can contribute to better population health, human well-being and positive quality of life.

Access to Safe Water

- Adequate availability of water that is necessary to ensure human survival. Such water would be as pure as possible and devoid of harmful bacteria or other noxious substances that might pose a risk to population health or human well-being and subsequently deleteriously affect quality of life and sustainable human development.

Access to Sustainable Energy

- Adequate supplies of energy that are safe, renewable (that is environmentally sustainable) and clean (that is create a minimum of harmful by-products such as pollution). Adequate conservation of energy sources is very important in terms of intergenerational transferability.

Access to Waste Management

- Adequate availability of best practices waste management in key areas of sanitation and hazardous waste. Poor sanitation and hazardous waste management practices could pose grave risks for human development especially if other areas needed for sustainable human development become contaminated due to breakdowns or shortfalls in waste management.

Table 4.2
Summary Overview of Physical Environment Indicators

Within the public domain, the physical environment has several key areas that are essential to human well-being and developmental sustainability. Environmental policies and practices that guard the sustainability of air, water, energy and land and ensure safe waste management are essential to human life and population health. The following proxies (indicators) cover six areas of environmental inclusion that need to be addressed.

Index of Environmental Inclusion = 1.00						
Indicator	**Definition**	**Weight**	**Balance**	**Rationale**	**Relevance**	**Data Source**
Access to Clean Air	Ratio of Clean Energy Produced to Consumption of Fossil Fuels	0.225	Positive (+)	Measurement of **Prioritization** in Sustainable Human Development	**Political Will** indicator of commitment to facilitate a sustainable environment	US Dept of Energy (2001)
	Total CO_2 Emissions from Consumption of Fossil Fuels (Metric Tons Per 100 Pop.)		Negative (-)	Measurement of Risk to Population Health as a **Barrier to Participation**	**Negative Outcome Benchmark** indicator to denote structural barriers to environmental inclusion	US Dept of Energy (2001)
Access to Safe Water	% Total Households With Piped Water	0.15	Positive (+)	Measurement of **Prioritization and Access** to Quality of Life and Well-Being	**Political Will** indicator of commitment to facilitate a sustainable environment	WHO (2001) and UNCHS (2001)
	% Total Population Without Safe Water		Negative (-)	Measurement of Risk to Population Health as a **Barrier to Access and Sharing**	**Negative Outcome Benchmark** indicator to denote structural barriers to environmental inclusion	WHO (2001) and UNCHS (2001)
Access to Sustainable Energy	Energy Produced from Alternative Energy Sources (Kw Hrs per Capita)	0.125	Positive (+)	Measurement of **Prioritization** in Environmental Sustainability	**Political Will** indicator of commitment to facilitate a sustainable environment	US Dept of Energy (2001)
	Energy Produced from Fossil Fuels (Short Tons of Coal Per 100 Pop.)		Negative (-)	Measurement of Risk to Social Inclusion as a **Barrier to Sharing and Participation**	**Negative Outcome Benchmark** indicator to denote structural barriers to environmental inclusion	US Dept of Energy (2001)
Access to Waste Management	% of Total Population With Adequate Sanitation Facilities	0.125	Positive (+)	Measurement of **Access and Prioritization** to Population Health	**Political Will** indicator of commitment to facilitate a sustainable environment	WHO (2001) and UNCHS (2001)
	Risks of Hazardous Waste as a Nuclear Energy By-Product (Kw Hrs Per Capita)		Negative (-)	Measurement of Risk to Sustainable Human Development as an **Obstacle to Sharing**	**Negative Outcome Benchmark** indicator to denote structural barriers to environmental inclusion	US Dept of Energy (2001)
Access to Vital Living Area	Ratio of Irrigated Land to Total Land Area	0.275	Positive (+)	Measurement of **Prioritization** in Environmental Inclusion	**Political Will** indicator of commitment to facilitate a sustainable environment	FAO (2001)
	% Urbanization aas a Risk of Exposure to Other Environmental Hazards		Negative (-)	Measurement of Risk to Quality of Life as a **Barrier to Access and Prioritization**	**Negative Outcome Benchmark** indicator to denote structural barriers to environmental inclusion	FAO (2001) and UNCHS (2001)
Access to Tenable Land	Arable Land and Land Under Permanent Crops (ha Per 100 Pop.)	0.10	Positive (+)	Measurement of **Prioritization** to Sustainable Human Development	**Political Will** indicator of commitment to facilitate a sustainable environment	FAO (2001)
	Mass Deforestation as Decreases in Forest and Woodland Areas (ha Per Capita)		Negative (-)	Measurement of Risk to Intergenerational Transferability as an **Obstacle to Sharing**	**Negative Outcome Benchmark** indicator to denote structural barriers to environmental inclusion	UNCHS (2001)

Access to Vital Living Area

- Adequate temporal spaces for sustainable human development to occur. While urbanization, in and of itself, is not inherently negative, it can put more people at risk due the spatial nature of many deleterious environmental consequences such as polluted air, unsafe water or exposure to hazardous waste. Vital living area should likewise provide adequate resources for human development to occur including the shoring up of population health as well as human well-being and quality of life.

Access to Tenable Land

- Adequate sustainability of valuable land resources that are especially important in the intergenerational transferability of natural capital. If such resources are depleted in current generations, the long-term sustainability of human development and quality of life could be compromised. Thus, a conservation principle is important here similar to the energy sector.

How to weight each area was the second most challenging task in benchmarking the physical environment. Since we are talking about inclusion, we would first have to begin by addressing where and how people would be most impacted by negative environmental consequences. After all, these are the primary forces that pose the greatest risks to inclusion. Arguably, due to the immense spatial nature of many negative environmental events, areas of mass population could be seen as putting human beings at the greater risk of negative effects such as air pollution, unsafe water or poor waste management on mass. Next, air and water are essential to the very existence of human beings so they had to be weighted accordingly. While waste management and sustainable energy are likewise important, they are perhaps secondary concerns after air and water. Further, these sectors are more or less important in respective jurisdictions compared to water and air, which are always important. Finally, while tenable land is indeed important, in a worst case scenario, economic trading of agricultural and other land related assets can redress some shortfalls in this area. In short, the weighting of each category was as follows - given that the total sum of the physical environment was set at 1.00 (or 100%):

▪ Vital Living Area	0.275	(or 27.5%)
▪ Clean Air	0.225	(or 22.5%)
▪ Safe Water	0.15	(or 15%)
▪ Waste Management	0.125	(or 12.5%)
▪ Sustainable Energy	0.125	(or 12.5%)
▪ Tenable Land	0.10	(or 10%)

The last two steps in completing the physical environment weighting tree were the operationalization of each sector into positive political will indicators as measures of inclusion and negative outcome benchmark indicators as measures of exclusion. Table 4.1 reveals this operationalization process and Appendix I reveals the in-depth development and definitions for each indicator used in the physical environment sub-index. Conceptually, political was developed in terms of inputs, processes and outcomes in areas of infrastructure development, state spending or best practices committed to environmentally sustainable initiatives. Such initiatives might include progressive waste management strategies, prudent land use policies, energy conservation standards, clean air and safe water measures as well as proactive urban planning to ensure sustainability of vital living areas. Conversely, negative outcomes could impede such inputs, processes and outcomes and thereby threaten sustainable inclusion. In such instances, the role of public authorities in monitoring and ensuring compliance with best practice standards is a role that is equally important in ensuring environmental sustainability.

CLOSING THOUGHTS ON MEASURING ENVIRONMENTAL INCLUSION

The three physical environment sub-indices of the HSII – the *Physical Environment Inclusion Index*, the *Physical Environment Exclusion Index* and the *Net Effects Index of Inclusion and Exclusion in the Physical Environment* – attempted to empirically gauge each of the six environmental areas. Collectively, these indices attempted to capture where potential and actual risks of inclusion and risks of exclusion existed. While, the overall aim of the HSII was to measure social inclusion and exclusion in the hemisphere, measuring such effects in the physical environment was an equally arduous task. This is because there is always a human element at the core of all inclusion and exclusion discourses. After all, findings are ultimately about human sustainability and not about quantitative output. To this end, measuring inclusion and exclusion effects in the physical environment differed from measuring such phenomena in human services, human security and social regulation, and public information and space spheres. In short, there was an intergenerational factor that distinguished the physical environment from its hemispheric counterparts. This was the notion of the intergenerational transferability of natural capital. As alluded to earlier, this concept denotes that negative impacts made by current generations on the environment can have long-lasting consequences for future generations.

As such, events such as deforestation, urbanization, radioactive spills, greenhouse gas emissions, energy resource depletion or water pollution can yield negative environmental outcomes that are significantly difficult to reverse or redress. This is especially true in comparison to negative policy-based outcomes in other quadrants of the public domain. Indeed, negative benchmarks in human services, human security and social regulation, and public information and space can be easier ameliorated at the stroke of a pen, on the strength of a parliamentary vote, in response to public opinion or through greater fiscal investment than negative environmental consequences. Further, ensuring that natural capital is transferable to future generations would be contingent on an environment that once harmed could be returned to a habitable state within a reasonable intra-generational time frame.

Finally, while inclusion scores in each sector ranged from 0.00 to +100.00, exclusion scores ranged from 0.00 to –100.00. Net effects of inclusion and exclusion for each sector were determined by offsetting respective sector scores against one another. Higher positive scores demonstrated more inclusion while greater negative scores inferred more exclusion. As net effects regressed closer to zero, the reality of inclusion and exclusion forces canceling out one another was a possibility. However, such scenarios were undesirable in that while political will or access may be revealed to exist, it would not be strong enough to ensure sustainability.

The next section of this report will focus on some of the key trends that occurred within the six countries examined in this study. Data used determine these findings was produced by reliable and reputable sources such as: Food and Agricultural Organization of the United Nations (FAO), United Nations Centre for Human Settlements (UNCHS), United Nations Environmental Programme (UNEP), United Nations Framework Convention on Climate Change (UNFCCC), United States Department of Energy (USDE) and World Health Organization (WHO).

PRINCIPLE FINDINGS BY COUNTRY

Over the fifteen-year period examined, all nations studied had net effects that revealed more exclusion than inclusion within their respective physical environments (See Figure 4.4). By 2000, Argentina, Brazil, Canada, Chile and the United States all had increasing net exclusion trends with only Mexico showing a net effects decrease in exclusion (See Figure 4.5). Only Canada and Chile remained above the hemispheric average from 1985 to 2000. While the United States was just above the hemispheric average in 1985, by 2000 the United States had fallen below this trend line. Conversely, while Mexico began below the hemispheric average in 1985, by 2000 Mexico demonstrated marked improvements in environmental inclusion. Canada had the least net exclusion (mean = -2.0) and Argentina had the highest net exclusion (mean = -22.3). It is important to realize that the aforementioned findings are by no means static. It must be remembered that within each net score inclusion and exclusion forces were in constant activity.

ARGENTINA

Since 1985, inclusion in Argentina ranged between +37.2 and +41.5 with a 15-year mean score of +39.3. Highlights included improving inclusion in areas of access to safe water and the sustainability of tenable land resources (despite a low inclusion rating in this latter area). Overall, Argentina's inclusion trend line was similar to that of Chile. On the other side, Argentina revealed the most exclusion in the hemisphere over the past 15 years with a mean score of -61.5. Its increases in CO_2 emissions from fossil fuel energy production increased from -12.4 in 1985 to -14.0 in 2000. Argentina consistently yielded the highest rates of urbanization in the hemisphere followed close behind by Chile. Overall, Argentina had the highest net effects exclusion score in the hemisphere (mean = -22.3) since 1985. It had the highest levels of urbanization as well as the highest net exclusion scores around access to clean air compared to other nations.

Figure 4.4

Net Inclusion-Exclusion in the PHYSICAL ENVIRONMENT for Argentina, Brazil, Canada, Chile, Mexico and USA

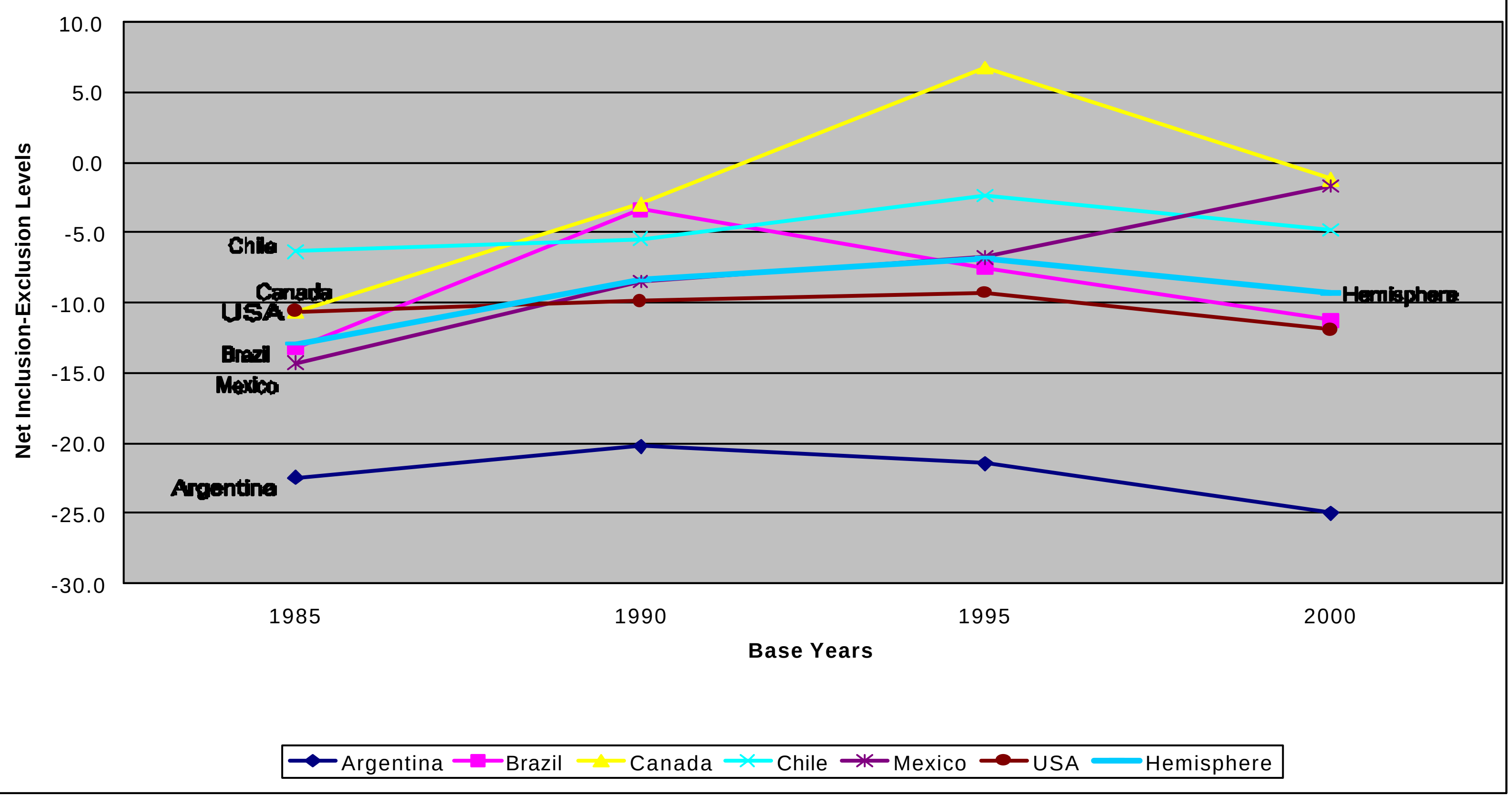


Figure 4.4 depicts the net trend lines of inclusion and exclusion effects of the six countries examined in this study as well as the hemispheric average. Note that between 1985 and 2000 only Canada, in 1995, managed to yield net effects in the area of environmental inclusion or environmental sustainability. By 2000, only Mexico appeared to be improving in its environmental record when compared to the other nations.

Source: 2001 Hemispheric Social Inclusion Index, Robarts Centre for Canadian Studies, York University

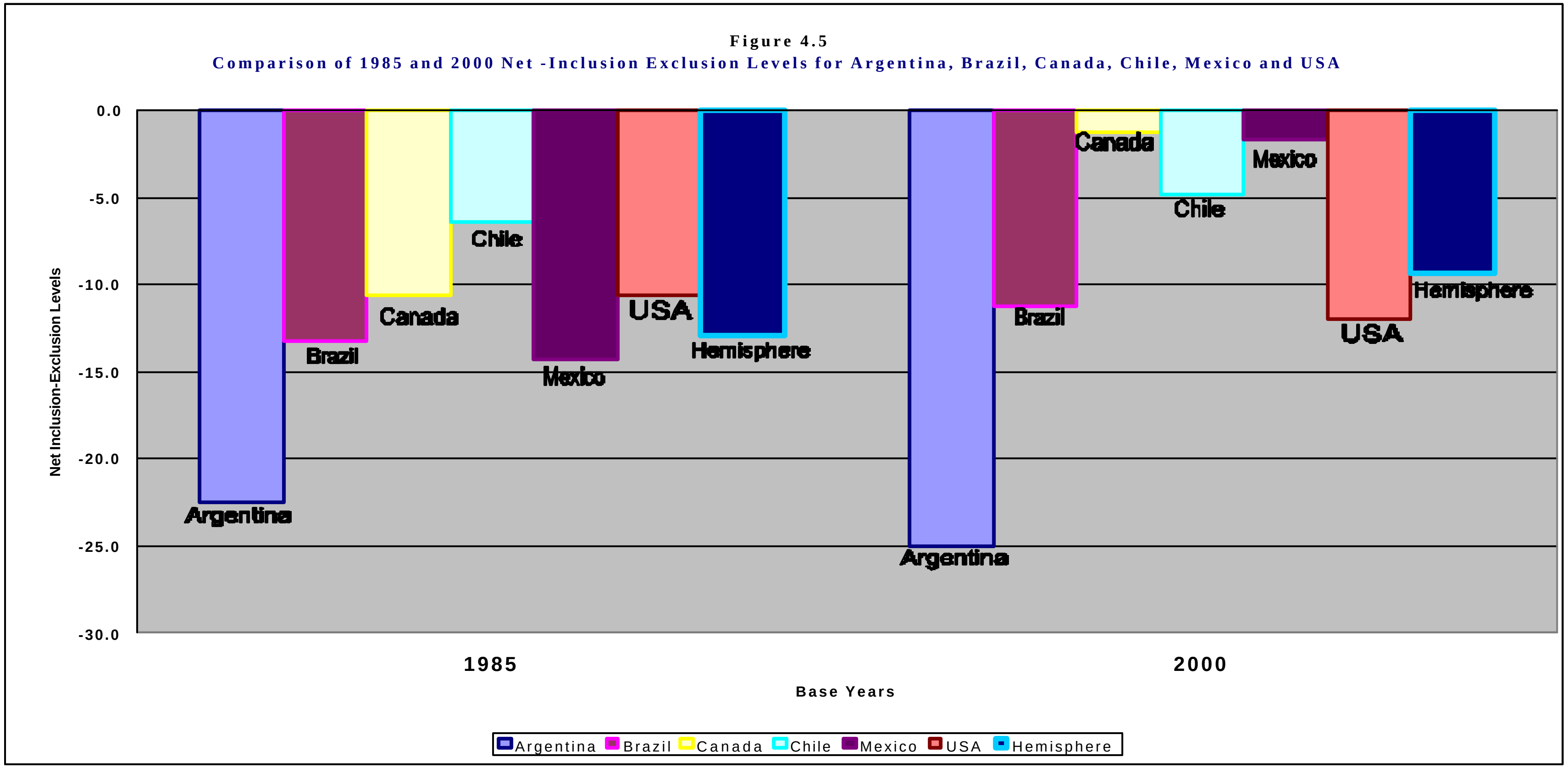


Figure 4.5 depicts 1985 and 2000 net inclusion and exclusion levels for each of the six countries examined in this study as well as the hemispheric averages for these same years. Note that that there is a mixed effect of NAFTA and Mercosur nations improving the hemispheric environmental inclusion record, namely Canada, Mexico, Brazil and Chile. Argentina and the United States are the two nations that have decreased in their overall environmental record since 1985.

Source: 2001 Hemispheric Social Inclusion Index, Robarts Centre for Canadian Studies, York University

BRAZIL

Since 1985, inclusion in Brazil ranged between +31.5 and +42.1 and sustained at +41.0 from 1995. The most dramatic inclusion factor occurred between 1985 and 1990 with vast improvements in sanitation waste management. Yet, Brazil trailed other countries in its commitment to safe water access issues and in its commitment to clean air practices. Brazil had stark increases in exclusion (-44.7 to -52.2) over the past 15 years. This outcome was driven by significant increases in CO_2 emissions from fossil fuel energy production (-5.7 in 1985 to -7.9 in 2000). Also, while the number of households with access to safe water increased, overall access to safe water decreased. Further, Brazil's decline in clean air practices over the past 15 years is disconcerting. A 1985 high of +5.0 to a 2000 low of -0.5 revealed a lack of political will to effectively address this area. Finally, the massive deforestation of the Amazon basin continues to be an area of environmental concern and one in which little progress has been made.

CANADA

Since 1985, Canada made dramatic increases in inclusion with a 2000 score of +56.2. Canada continued to be committed to a high degree of access to safe water as well as improvements in sanitation waste management. Canada led other countries in access to tenable land despite much deforestation in Northern Canada. Canada had the third highest exclusion score (-52.9) in the hemisphere due to increased CO_2 emissions as Canada remained dependent on fossil fuel energy production. Canada is one of the biggest producers of nuclear energy and, as such, must face the challenges associated with disposing radioactive waste. While Canada had the lowest net effects score (mean = -2.0) of the six countries examined, it could achieve a more desirable environmental record with improvements in its clean air and deforestation practices and more proactive measures in energy and nuclear waste management.

CHILE

The inclusion trend in Chile is comparable to that of Argentina with a 15-year mean score of +39.6. Notably, Chile made good improvements in its commitment to safe water access. While Chile had marked declines in its commitment to clean air access, it remained ahead of other nations including Argentina, Mexico and the United States. While, Chile had the second lowest exclusion score (mean = -44.4) following Mexico (mean = -40.0), it had problems with high rates of urbanization (second after Argentina). While increasing exclusion associated with CO_2 emissions from fossil fuel energy production were a significant issue in Chile, the aggregated nature of the HSII did not capture the pronounced severity of pollution levels and air toxicity in Santiago due from mining operations and unregulated automobile emissions. Chile had the second lowest hemispheric net exclusion score (mean = -4.7). Improvements in waste management, safe water access, relatively low fossil fuel energy production and an absence of nuclear energy production contributed to Chile's low score. It is important to note that Chile's score is shored up by the fact that Chile does not have nuclear capacity and, as such, radioactive waste is not a problem.

MEXICO

Mexico made good progress in its inclusion score from +25.5 in 1985 to +37.9 in 2000. These increases were primarily driven by increased commitments in access to safe water and in sanitation waste management. Mexico remained very weak in its commitment to clean air access trailing all countries examined except the United States.

Mexico revealed both the lowest degree of exclusion (-40.0) in the hemisphere as well as the least variance ($s^2 = 0.25$). Despite having the second smallest land area (191 million hectares) and the third largest population base (99 million people), Mexico had the lowest urbanization rates amongst the six countries examined. Mexico had significant decreases in its net exclusion score (from -14.3 in 1985 to -1.7 in 2000). Of the six countries, only Mexico appeared to reveal a positive correlation between economic growth and a sustainable environment. However, this finding cannot be taken at face value, as much legislation aimed at protecting the environment is frequently not enforced in the industrial north and in Mexico City. Moreover, throughout Mexico pollution, poor water quality and inadequate sanitary conditions are readily observable. As such, more disaggregated data is needed to gauge with greater accuracy the balance between inclusion and exclusion in Mexico.

UNITED STATES

In 1985, the United States had the highest inclusion score. However, by 2000 it was second behind Canada. While strong in its commitment to safe water access and an increased commitment to renewable energy sources, the United States still had the poorest hemispheric record in its commitment to clean air access. It also declined in its commitment to sanitation waste management despite being a world leader in both GDP and GNP. Further, the United States had the second highest exclusion score (mean = -57.2) following the lowest ranked hemispheric nation, namely Argentina (mean = -61.5).

As an energy dependent nation, high CO_2 emissions from fossil fuel energy production continued to increase. The American abandonment of the Kyoto Accord blatantly placed industrial profit margins ahead of environmental concerns. Moreover, a marginal decrease in population access to safe water and challenges surrounding the management of radioactive waste from nuclear energy production all contributed to a high mean exclusion score for the United States. After Argentina (-22.4), the United States had the second highest net exclusion score of the six countries (-10.4). A lack of commitment to progressive clean air practices and high deforestation trends also contributed to its poor score.

CONCLUSION: DOES ECONOMIC GROWTH FOSTER A SUSTAINABLE ENVIRONMENT?

In the hemisphere, trade blocs have grown in importance. The NAFTA bloc's GDP growth rate averaged 3.6% since 1993. Moreover, GDP on the Mercosur region averaged approximately 9.0% per annum over the same period with increased foreign trade activity of over 141%. However, while countries are indeed trading more goods and services, their integration into hemispheric life is sharply contrasting. Despite is increased trade there is little evidence of convergence or harmonization in environmental policies. The overall findings in this study revealed that during the same period in which economic growth associated free trade occurred, positive environmental outcomes did not follow. Moreover, exclusion forces associated with trade activities such as increased production, industrial deregulation, an absence of environmental accountability and audit measures, mass-scale privatization, and an absence of non-compliance sanctions were significant findings in this report.

This study underlined the fact that both inclusion and exclusion forces occur simultaneous to trade flows. However, there appeared to be no evidence that a positive relationship existed between economic growth and a sustainable environment. An argument could be made economic growth appears to have some relationship with factors consistent with an unsustainable environment such as increased industrial anthropogenic emissions, increased consumption of non-renewable energy resources and imprudent land use strategies. Yet whatever relationship exists between economic growth and environmental sustainability is a complex one. To this end, political will is the vital factor that must be proactively engaged, implemented, monitored and enforced if environmental sustainability is to be realized. Subsequently, we will conclude this report with policy recommendations in each of the key environmental areas examined that may be offered to policy-makers in light of our aforementioned conclusions.

POLICY RECOMMENDATIONS

For a quarter of a century, the policy community has continually addressed the need for environmental best practices as the most effective ways to ameliorate environmental degradation. Such approaches have attempted to strategically balance short-term effects with long-term systemic issues such as changing governments and subsequent environmental policy shifts. In all cases, policy mixes will differ and the role of voluntary and non-voluntary compliance will vary from one jurisdiction to the other. As such, strong public authorities are required to ensure environmental safeguards regardless of the controversial nature of enforcement measures. Based on the principle findings revealed in this report, there are five aspects surrounding policy recommendations in each of the six environmental areas. These recommendations have the ultimate objective of facilitating a sustainable environment that would be conducive to inclusion.

To these degrees, each recommendation is intended to be primarily proactive versus reactive in nature to avoid the significant complications that occur once a negative environmental event takes place. Each recommendation must set definitive standards aimed at optimizing environmental sustainability. Each recommendation outcome is to be measurable to allow for adequate audit and accountability assessments. Each policy must include enforceable sanction provisions that may be executed when environmental standards and practices are not adhered to or met. Each recommendation must provide progressive incentive schemes aimed at rewarding nations that demonstrate leadership in environmental best practices. Finally, it is important to note that each of the following recommendations provide a generic framework to be used in developed proactive environmental policies for each nation studied in this report. While it is acknowledged that there are fiscal and infrastructure constraints in the development and implementation of any new policy, these recommendations herald a reasonable starting point.

CLEAN AIR

Proactive Components:	Public authorities must address two primary objectives to be proactive in ensuring clean air. First, state policies must limit aggregate anthropogenic emissions to sustainable levels based on independent, impartial environmental assessments. Second, polices must ensure all agents of emission use effective control devices to temper emission levels.
Sustainability Standards:	Sustainability targets should be more than minimum guidelines. Emission levels should be lower than recommended guidelines to ensure the intergenerational transferability of this resource. Nations should aspire to exceed minimum standards whenever possible to optimize the overall intergenerational transferability effects.
Accountability Measures:	Each nation should set up strategic monitoring sites to measure and gauge air quality and emission levels on a regular basis. Reporting should occur on a regular basis at random intervals. Inspections and audits should be conducted by an appointed international agent (such as UNEP), a national public authority or a combination.

Enforceable Sanctions:	Definitive time limits to redress shortfalls in standards must be unequivocally denoted. Parties that that do not comply or habitually fail to meet minimum standards should pay state fines or levies into an international arbiter (i.e., UNEP) and/or have trade privileges tied to international agreements suspended. Parties that do not agree to be subject to such criteria should be limited in their abilities engage in unfettered trade.
Best Practices Incentives:	Parties that demonstrate leadership in environmental best practices should be offered tax credits and be tangibly rewarded from some form of segregated fund from dues paid into a governing body such as a state environmental ministry. Such an incentive would be awarded to leading parties based on multi-year performance reviews as determined by governing councils. Such rewards would not exceed a set maximum proportion of aggregate dues.

SAFE WATER

Proactive Components:	Public authorities must address three primary objectives to be proactive in ensuring safe water. First, state policies must ensure that all watersheds are protected from any forms of contaminants. Second, water treatment facilities must be regularly maintained to ensure safe water standards. Third, adequate infrastructure must be in place to facilitate adequate access to this vital resource.
Sustainability Standards:	Similar to clean air, sustainability targets should strive to exceed minimum guidelines. Quality and purity levels should reflect the intergenerational transferability of water resources and not merely use for contemporary populations. Minimum guidelines should likewise reflect effects of intergenerational transferability.
Accountability Measures:	Each nation should ensure that water-monitoring facilities are fully supported in ensuring and gauging water supply and quality. Reporting should occur on a regular basis at random intervals and be reported to both state citizens and public organizations. Independent inspections and audits should be conducted by certified agents. This agent would in turn report to the public or a designated public body as well as to state environmental ministries.
Enforceable Sanctions:	Parties that contravene set environmental standards should be immediately fined and be put on an offender watchlist.

Subsequent infractions should lead to suspension of trade privileges until it can be certified that offending parties are in compliance with standards.

Best Practices Incentives: Parties that demonstrate leadership in sustainable best practices must be offered given tax credits tiered to significant performance that exceeds minimum criteria. New technology that is aimed at making water supplies safer and more accessible must be the forefront of technology development and be generously funded.

SUSTAINABLE ENERGY

Proactive Components: Energy conservation must be a state priority. Sustainable policies must address issues that threaten the intergenerational transferability of natural energy resources. Further commitments to research and development of alternative renewable or cleaner energy sources must likewise be a state priority.

Sustainability Standards: There must be maximum limits placed on energy consumption levels when using non-renewable or highly polluting energy sources. The focus here need be on production or the supply side of energy but rather on the end user who must demonstrate a willingness to participate and comply with conservation standards.

Accountability Measures: Public authorities must complete regular but random energy consumption audits to ensure compliance with set regulations and allowable consumption levels. Self-reporting would be a good avenue to pursue as long as such reports are compared to reports completed by competing yet similar parties (i.e., the energy consumption levels of two automobile manufacturing plants).

Enforceable Sanctions: Parties that exceed consumption standards should be assessed levies or premiums on the excess difference. In circumstances where there are habitual or excessively high consumption patterns exist, offending parties must be duly fined and/or have their trade privileges suspended unless they can demonstrate compliance.

Best Practices Incentives: Parties that employ progressive energy management practices should be offered significant tax credits tiered to decreases in energy consumption patterns. As well, organizations committed to developing more feasible and sustainable sources of energy must be generously supported by the state.

WASTE MANAGEMENT

Proactive Components: Waste management policies should focus on immediate public safety, long-term capacity to meet growing population need and the development of reliable long-term reliable infrastructure. Comprehensive risk analysis must be conducted to ensure that any threats to sustainable human development are absolutely minimal.

Sustainability Standards: Due to the potential trauma that could be effected on sustainable human development and/or on environmental sustainability by even modest breakdowns in waste management or shortfalls in capacity or infrastructure planning standards must be absolute.

Accountability Measures: Regulatory bodies must conduct regular yet random audits aimed beyond mere compliance. Such audits must focus on risk identification and analysis to adequately address the tremendous harm that could occur in the event of a breakdown in waste management such as the leakage of nuclear waste or the contamination of public water reservoirs by bacteria or excrement.

Enforceable Sanctions: Parties that reveal significant risk should have their operations immediately suspended until corrective measures are taken and such risks minimized or eliminated. There must be a zero-tolerance policy placed on parties that knowingly or willingly engage in harmful risk management practices such as burying hazardous waste in unapproved areas. The freezing of party assets would not be an unreasonable measure in light of severe infractions.

Best Practices Incentives: Parties that demonstrate leadership in risk management must be duly fund in research and development. Parties that promote recycle and re-use strategies must be granted adequate support to ensure that their ideas are not overlooked. The importance of ensuring safe waste management practices must be an area at the forefront of state environmental policies.

VITAL LIVING AREA

Proactive Components: Urban planners must address the various environmental hazards that face populations in large urban centres. Limits must be placed on urban development where capacity is limited.

Sustainability Standards: In areas where population density might compromise population health and well-being, limits on urban development must put into place to ensure the further risks to populations are minimized.

Accountability Measures: Ratios of population density and urbanization rates must be considered in light of environmental hazards that could threaten urban populations. In instances where unfavourable relationships are demonstrated actions must be taken to address such situations.

Enforceable Sanctions: There are really no significant sanctions to be placed on urban populations in this sector.

Best Practices Incentives: In non-urban areas, parties that operate in contexts where there is less risk due to over-development, tax relief incentives might be offered to facilitate more tempered patterns of human settlement.

TENABLE LAND

Proactive Components: Conservation practices are perhaps the most effective proactive stance to be preserved in ensuring the intergenerational transferability of natural capital.

Sustainability Standards: Regulations and standards around deforestation and land use (especially the protection of arable and farmable land) must be stringent with no room for flexibility in these set standards.

Accountability Measures: Regular and random audits must be conducted to demonstrate compliance with state standards. Measures must take into account dynamics of depletion and regeneration in their assessments.

Enforceable Sanctions: Parties that contravene or violate state standards or to show records of non-compliance with regulations must be duly fined and/or have their trade privileges suspended. In instances where illegal land use practices area revealed, offending parties should have their assets frozen and individuals should be held accountable to state laws.

Best Practices Incentives:	Parties that demonstrate viable and proactive practices in land use, conservation and regeneration practices should be duly recognized and rewarded based on their contributions to environmental sustainability. Contributions should identify how such proactive measures contribute and facilitate intergenerational transferability.

CLOSING REMARKS

Indeed there are constant relationships between the effects of trade and the physical environment. Some of these effects are positive while others are negative. Perhaps the most significant challenge for policy-makers is to strike an ideal balance that could satisfy both economic and environmental communities. However, the fact of the matter is that the time is short and the hour is now to act. Issues around social and environmental inclusion are pressing concerns that should be top of policy agendas across the hemisphere and throughout the world.

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METHODOLOGY APPENDICES:

2001 HSII REPORT

APPENDIX I:

PHYSICAL ENVIRONMENT INDICATORS

APPENDIX I

PHYSICAL ENVIRONMENT INDICATORS

Environmental Sector: Air

Environmental Variable: "Access to Clean Air" **Sector Weighting:** 22.5%

Political Will Indicator (+): **"Ratio of Clean Energy Produced to Consumption of Fossil Fuels"**

Definition: This indicator reflects an availability of air conducive to sustainable human development. Such air should be relatively free from toxic or anthropogenic contaminants. It would be free of pollution, carcinogens or other noxious substances harmful to human beings. Clean air can contribute to better population health, human well-being and quality of life.

Rationale: It is a measurement of prioritization in or commitment to sustainable development.

Relevance: It is likewise a political will indicator of a commitment to a sustainable environment.

Data Source: US Dept of Energy (2001).

Limitations: This is an inferential indicator that assumes energy produced by clean and renewable sources such as hydro, wind and the sun when offset against historically more polluting sources such as fossil fuels can yield a positive impact on environmental sustainability. All 2000 data was extrapolated.

Inferential Procedures: All 2000 data was held constant from 1999.

Calculation of Inclusion Score: **Ratio of Clean Energy Production to Fossil Fuel Consumption** x **X**

10

30

Negative Outcome Indicator (-): **"Total CO_2 Emissions from Consumption of Fossil Fuels"**

Definition: This indicator reflects air quality that is anthropogenic (harmful to sustainable human development) in nature. Such air can pose significant risks to population health and human well-being especially in local jurisdictions where poor air quality is intense.

Rationale: It is a measurement of risk to population health, which is a barrier to participation.

Relevance: It is a negative outcome benchmark indicator that denotes a significant barrier to environmental inclusion.

Limitations: This is an inferential indicator that anticipates that industrial CO_2 emissions from the consumption of fossil fuel indeed threaten sustainable human development in accordance with anthropogenic emissions criteria. All 2000 data was extrapolated.

Data Source: US Dept of Energy (2001)

Inferential Procedures: All 2000 data was held constant from 1999.

Calculation of Score: **Total Fossil Fuel Consumption CO_2 Emissions (Metric Tons/100 Pop.) x X**

1000

15

Environmental Sector: Water

Environmental Variable: "Access to Safe Water" **Sector Weighting:** 15%

Positive Political Will Indicator (+): "Percentage Total Households with Piped Water"

Definition: This indicator represents an adequate availability of water that is necessary to ensure human survival. Such water would be as pure as possible from harmful bacteria or other noxious substances that might pose a risk to population health or human well-being. It would be conducive to a positive quality of life and sustainable human development.

Rationale: It is a measurement of prioritization and access to quality of life and human well-being.

Relevance: It is a political will indicator of a commitment to facilitate a sustainable environment.

Limitations: This indicator is an average of WHO and UNCHS data that was, at times, quite disparate. Total households do not include shelter type housing such as shanties, barrios dwellings or squatter-type abodes. Some data was not available and was, subsequently, interpolated and extrapolated based on pre and post 5-year averages.

Data Source: WHO (2001) and UNCHS (2001)

Inferential Procedures: In years where data was not available, pre and post 5-year averages were used both to interpolate and extrapolate data figures.

Calculation of Score: **% of Total Households with Piped Water x X**
20

Negative Outcome Benchmark Indicator (-): "Percentage Total Population without Safe Water"

Definition: This indicator represents the proportion of the total population that does not have adequate access to safe water resources based on temporal spatial barriers to such access.

Rationale: It is a measurement of risk to population health as a barrier to access and sharing.

Relevance: It is a negative outcome benchmark indicator that denotes a barrier to environmental inclusion.

Limitations: This indicator is an average of WHO and UNCHS data that was, at times, quite disparate. The definitions of safe (or potable) water was based on the definitions provided by the WHO and the UNCHS which were, for the most part, quite similar.

Data Source: WHO (2001) and UNCHS (2001)

Inferential Procedures: All data was available for this indicator, no inference was required..

Calculation of Score: **% of Total Population without Access to Safe Water** x **X / 10**

Environmental Sector: Energy

Environmental Variable: "Access to Sustainable Energy" **Sector Weighting:** 12.5%

Positive Political Will Indicator (+): "Energy Produced from Alternative Energy Sources"

Definition: This indicator reflects supplies of energy that are safe, renewable (that is environmentally sustainable) and clean (that is creates a minimum of harmful by-products such as pollution). Adequate conservation of such energy sources is very important in terms of the intergenerational transferability of natural capital.

Rationale: It is a measurement of prioritization in environmental sustainability.

Relevance: It is a political will indicator of a commitment to facilitate a sustainable environment.

Limitations: This is an inferential indicator that is aimed at reflecting political will. It sums the total kilowatt hours of energy production from geothermal, solar, wind, wood and waste energy and collectively identifies them as "alternative sources" compared to more traditional non-renewable sources such as fossil fuels. All 2000 data was extrapolated.

Data Source: US Dept of Energy (2001)

Inferential Procedures: All 2000 data was held constant from 1999.

Calculation of Score: **Energy Produced from Alternative Energy Sources (Kw Hrs/Capita) / 500** **x X / 15**

Negative Outcome Benchmark Indicator (-): "Energy Produced from Fossil Fuels"

Definition: This indicator represents energy produced from a depletable, that is non-renewable, energy resource - coal - that once exhausted could threaten the intergenerational transferability of this natural capital.

Rationale: It is a measurement of risk to social inclusion as a barrier to sharing and participation.

Relevance: It is a negative outcome benchmark indicator that denotes structural barriers to environmental inclusion

Limitations: This indicator includes only one form of non-renewable source of energy - coal production - to represent fossil fuels as a whole. There is no reflection of the use of other important fossil fuels such as oil or natural gas. All 2000 data was extrapolated.

Data Source: US Dept of Energy (2001)

Inferential Procedures: All 2000 data was held constant from 1999.

Calculation of Score: **Energy Produced from Fossil Fuels (Short Tons of Coal per 100 Pop.) x X**

500

10

Environmental Sector: Waste

Environmental Variable: "Access to Waste Management" **Sector Weighting:** 12.5%

Positive Political Will Indicator (+): "% of Total Population with Adequate Sanitation Facilities"

Definition: This indicator reflects the availability of and accessibility to best practices in sanitation waste management. Poor sanitation waste management practices could pose grave risks for human development especially if areas needed for sustainable human development become contaminated due to breakdowns or shortfalls in waste management practices.

Rationale: It is a measurement of access and prioritization to population health and well-being.

Relevance: It is a political will indicator of a commitment to facilitate a sustainable environment.

Limitations: This indicator is an average of WHO and UNCHS data that was, at times, quite disparate. The definitions of adequate access to sanitation facilities was based on definitions from the WHO and the UNCHS which were quite similar. Some data was not available and was, subsequently, interpolated and extrapolated based on pre and post 5-year averages.

Data Source: WHO (2001) and UNCHS (2001)

Inferential Procedures: In years where data was not available, pre and post 5-year averages were used both to interpolate and extrapolate data values.

Calculation of Score: **% of Total Population with Access to Sanitation Facilities x X**

20

Negative Outcome Benchmark Indicator (-): "Risks from Hazardous Waste"

Definition: This indicator represents the sum of nuclear energy produced in kilowatt hours is closely correlated to amounts of radioactive by-product of such production. Such by-product can in turn pose varying degrees of risk to surrounding populations.

Rationale: It is a measurement of risk to sustainable human development as an obstacle to sharing.

Relevance: It is a negative outcome benchmark indicator that denotes structural barriers to environmental inclusion

Limitations: This is an inferential indicator that anticipates that there is a significant correlational risk between nuclear energy produced and amounts of radioactive by-product. This indicator also assumes that the are real and notable risks associated with levels of radioactive waste produced for populations in jurisdictions close to where nuclear energy is produced. All 2000 data was extrapolated.

Data Source: US Dept of Energy (2001)

Inferential Procedures: All 2000 data was held constant from 1999.

Calculation of Score: $\frac{\textbf{Kw Hrs of Nuclear Energy Produced per Capita}}{\textbf{5000}} \times \frac{\textbf{X}}{\textbf{5}}$

Environmental Sector: Living Space

Environmental Variable: "Access to Vital Living Area" **Sector Weighting:** 27.5%

Positive Political Will Indicator (+): "Ratio of Irrigated Land to Total Land Area"

Definition: This indicator reflects dry land area that was irrigated to facilitate access to water resources. Such provision broadens land capacity to be more valuable to life enhancing endeavours such as cultivation or access to potable water resources.

Rationale: It is a measurement of prioritization in environmental inclusion.

Relevance: It is a political will indicator of a commitment to facilitate a sustainable environment.

Limitations: This indicator is based on the assumption that areas previously not irrigated were not as valuable to human development compared to the same area after irrigation. All 2000 data was extrapolated.

Data Source: FAO (2001)

Inferential Procedures: All 2000 data was held constant from 1999.

Calculation of Score: $\frac{\textbf{Ratio of Irrigated Land to Total Land Area}}{\textbf{500}} \times \frac{\textbf{X}}{\textbf{5}}$

Negative Outcome Benchmark Indicator (-): "% Urbanization as Risk to Environment Hazards"

Definition: This indicator represents space conducive for sustainable human development to occur. Urbanization rates reveal migration patterns from rural to urban areas or national averages of population density that contrasts urban-rural splits. While urbanization, in and of itself, is not inherently negative, it can put more people at risk where there is a spatial dimension to deleterious environmental consequences such as polluted air, unsafe water or exposure to hazardous waste. Safe living areas can provide a context where sustainable human development can occur and support population health and well-being.

Rationale: It is a measurement of risk to quality of life as a barrier to both access and prioritization.

Relevance: It is a negative outcome benchmark indicator that denotes structural barriers to environmental inclusion.

Limitations: This is the heaviest weighted indicator aimed at gauging environmental inclusion with a focus on population density. Its underlying assumption is that urban centres are more likely to put significantly a greater number of people of risk from environmental hazards compared to those who reside in rural areas. This indicator is an average of FAO and UNCHS data that was for the most part consistent. All 2000 data was extrapolated.

Data Source: FAO (2001) and UNCHS (2001)

Inferential Procedures: All 2000 data was held constant from 1999.

Calculation of Score: **% Urbanization Level x** $\frac{X}{50}$

Environmental Sector: Land

Environmental Variable: "Access to Tenable Land" **Sector Weighting:** 10%

Positive Political Will Indicator (+): "Arable Land and Land Under Permanent Crops"

Definition: This indicator reflects the sustainability of valuable arable and farmable land resources that are important in the intergenerational transfer of natural capital. If such resources are depleted in current generations, the long-term sustainability of human development and quality of life could be compromised. Thus, a conservation principle is very important in this sector comparable to conservation in the energy sector.

Rationale: It is a measurement of prioritization to sustainable human development.

Relevance: It is a political will indicator of a commitment to facilitate a sustainable environment.

Limitations: This indicator assumes the preservation and/or conservation of valuable arable and farmable land area is a valid indicator of political will that demonstrates a commitment to preserve and/or guard such land area. All 2000 data was extrapolated.

Data Source: FAO (2001)

Inferential Procedures: All 2000 data was held constant from 1999.

Calculation of Score: **<u>Arable Land and Land Under Permanent Crops (ha Per 100 Pop.)</u>** **x** **<u>X</u>**

500

10

Negative Outcome Benchmark Indicator (-): "Mass Deforestation of Forest and Woodland Areas"

Definition: This indicator represents the active depletion of valuable forest and woodland resources. Such deforestation anticipates a risk to the intergenerational transfer of natural capital. If such resources are depleted in current generations, the long-term sustainability of such resources to benefit future generations could be compromised. Thus, a conservation principle is very important in this sector comparable to the energy sector.

Rationale: It is a measurement of risk to intergenerational transferability as an obstacle to sharing.

Relevance: It is a negative outcome benchmark indicator that denotes structural barriers to environmental inclusion.

Limitations: This indicator assumes that deforestation is a valid indicator of a risk to the intergenerational transferability of forest and woodland areas. All 1985 and 2000 data was interpolated or extrapolated based on pre and post 5-year averages.

Data Source: UNCHS (2001)

Inferential Procedures: All 1985 and 2000 data was based on pre and post 5-year averages were used both to interpolate and extrapolate data figures.

Calculation of Score: **<u>Deforested Forest and Woodland Areas (ha Per Capita)</u>** **x** **<u>X</u>**

5

10

APPENDIX VII:
DATA TABLES

Social Inclusion In The PHYSICAL ENVIRONMENT Indicators Data Table

INDICATOR	SOURCE	YEAR	ARGENTINA	BRAZIL	CANADA	CHILE	MEXICO	UNITED STATES	MAX
ACCESS TO CLEAN AIR: (22.5% Weighting)									
POLITICAL WILL INDICATOR: "*Commitment to Clean Air Energy*" (+) Ratio of Clean Energy Produced (Hydro+Alternative) to Consumption of Fossil Fuels **RCEP**	US Dept of Energy (2001)	1985	0.82	3.54	2.53	1.94	0.38	0.24	10
		1990	0.71	3.35	2.33	1.38	0.28	0.26	
		1995	1.01	3.51	2.50	1.68	0.40	0.27	
		2000	0.69	2.43	2.30	0.64	0.34	0.26	
NEGATIVE OUTCOME BENCHMARK: "*Anthropogenic Greenhouse Emissions*" (-) Total CO_2 Emissions from Consumptions of Fossil Fuels (Metric Tons per 100 Pop.) **CO2**	US Dept of Energy (2001)	1985	824	378	458	45	96	516	1000
		1990	673	423	459	66	101	533	
		1995	956	463	459	76	96	536	
		2000	931	525	492	104	102	547	
ACCESS TO SAFE WATER: (15% Weighting)									
POLITICAL WILL INDICATOR: "*Households WITH Piped Water*" (+) % of Total Population **PW**	WHO (2001a) UNCHS (2001)	1985	90.3	71.0	99.9	81.4	66.8	99.7	100
		1990	92.6	76.8	99.9	84.8	76.4	99.7	
		1995	94.7	82.6	99.9	88.1	86.1	99.7	
		2000	96.9	88.4	99.9	91.5	95.7	99.6	
NEGATIVE OUTCOME BENCHMARK: "*Population WITHOUT Safe Water*" (-) % of Total Population **SW**	WHO (2001a) UNCHS (2001)	1985	44.0	27.0	1.7	15.0	31.0	0.0	100
		1990	36.0	8.5	0.0	14.0	25.2	10.0	
		1995	36.0	18.0	0.0	14.0	17.0	10.0	
		2000	35.0	31.0	1.0	9.0	5.0	27.0	
ACCESS TO SUSTAINABLE ENERGY: (12.5% Weighting)									
POLITICAL WILL INDICATOR: "*Energy Produced from Alternative*" (+) Geothermal+Solar+Wind+Wood+Waste Energy Production (Kw Hrs per Capita) **AEP**	US Dept of Energy (2001)	1985	0	35	0	0	21	44	500
		1990	3	33	133	23	59	259	
		1995	3	47	180	49	59	296	
		2000	5	59	244	99	54	299	
NEGATIVE OUTCOME BENCHMARK: "*Energy Produced from Fossil Fuels*" (-) Coal Energy Production (Short Tons per 100 Pop.) **CEP**	US Dept of Energy (2001)	1985	0	7	258	17	12	366	500
		1990	1	3	271	18	10	406	
		1995	1	3	281	8	11	387	
		2000	1	3	260	4	11	396	
ACCESS TO WASTE MANAGEMENT: (12.5% Weighting)									
POLITICAL WILL INDICATOR: "*Sanitation (Excreta-Disposal) Facilities*" (+) % Population **WITH** Adequate Sanitation (Excreta-Disposal) Facilities **ASF**	WHO (2001a) UNCHS (2001)	1985	74.0	24.0	60.0	73.5	47.0	98.2	100
		1990	89.0	74.5	85.0	83.0	67.1	85.0	
		1995	69.0	58.5	85.0	63.0	61.0	85.0	
		2000	75.0	67.0	95.0	81.0	76.0	85.0	
NEGATIVE OUTCOME BENCHMARK: "*Risks from Hazardous Waste*" (-) Risk of Hazardous Waste as a By-Product of Nuclear Energy (Kw Hrs per Capita) **RHW**	US Dept of Energy (2001)	1985	178	21	2,201	0	0	1,586	5000
		1990	215	13	2,490	0	34	2,271	
		1995	204	15	3,163	0	88	2,521	
		2000	181	22	2,275	0	96	2,621	
ACCESS TO VITAL LIVING AREA: (27.5% Weighting)									
POLITICAL WILL INDICATOR: "*Irrigated Land Availability*" (+) Ratio of Irrigated Land to Total Land Area **IL**	FAO (2001)	1985	5.70	2.48	0.81	18.03	27.69	21.65	500
		1990	5.70	3.19	0.78	21.37	29.34	22.82	
		1995	5.70	3.14	0.78	24.04	33.53	23.80	
		2000	5.70	3.43	0.78	24.04	34.05	24.46	
NEGATIVE OUTCOME BENCHMARK: "*Risk of Area Overpopulation*" (-) % Urbanization Level **UL**	FAO (2001) UNCHS (2001)	1985	84.8	70.7	76.4	82.6	69.6	74.5	100
		1990	86.5	74.7	76.6	83.3	72.5	75.2	
		1995	88.1	78.4	76.7	83.9	73.4	76.2	
		2000	89.4	81.3	77.1	84.6	74.4	77.2	
ACCESS TO TENABLE LAND: (10% Weighting)									
POLITICAL WILL INDICATOR: "*Land Available for Sustenance*" (+) Arable Land & Land Under Permanent Crops (ha per 100 Pop.) **ALPC**	FAO (2001)	1985	90	39	177	30	33	78	500
		1990	84	38	165	23	31	74	
		1995	78	41	155	17	30	67	
		2000	73	39	149	15	28	64	
NEGATIVE OUTCOME BENCHMARK: "*Land Subject to Mass Deforestation*" (-) Decreases in Forest and Woodland Areas (ha per Capita) **DFWA**	UNCHS (2001)	1985	0.16	0.41	0.57	0.06	0.09	0.06	5
		1990	0.16	0.41	0.57	0.06	0.09	0.06	
		1995	0.36	0.26	-3.88	-0.49	-0.02	0.05	
		2000	0.36	0.26	1.94	0.25	0.01	0.05	

POPULATIONS	1985	1990	1995	2000
ARGENTINA	30,305,000	32,527,000	34,768,000	37,032,000
BRAZIL	135,224,000	148,002,000	159,015,000	169,202,000
CANADA	25,942,000	27,791,000	29,402,000	30,679,000
CHILE	12,047,000	13,099,000	14,210,000	15,211,000
MEXICO	75,465,000	83,226,000	91,145,000	98,881,000
USA	241,855,000	254,106,000	267,115,000	277,825,000

- 1991 Data
- 1992 Data
- 1993 Data
- 1994 Data
- 1996 Data
- 1997 Data
- 1998 Data
- 1999 Data
- Inferred from Pre- and Post- 5 Yr Avges

APPENDIX VIII:
INDEX TABLES

Physical Environment NET EFFECTS OF INCLUSION-EXCLUSION Sub-Index								
	Clean Air 22.5% Net Weight	Safe Water 15% Net Weight	Sustain Energy 12.5% Net Weight	Waste Mgmt 12.5% Net Weight	Vital Living Area 27.5% Net Weight	Tenable Land 10% Net Weight	Total NET Score	
ARGENTINA								Mean Score
1985	-9.9	13.7	0.0	14.6	-42.3	1.5	**-22.5**	**-22.3**
1990	-11.0	14.9	0.1	17.6	-43.2	1.4	**-20.2**	**Standard**
1995	-11.3	15.3	0.1	17.6	-44.0	0.8	**-21.5**	**Deviation**
2000	-11.9	15.9	0.1	14.8	-44.6	0.7	**-25.0**	**2.01**
BRAZIL								**Mean Score**
1985	5.0	11.5	0.9	4.8	-35.3	0.0	**-13.2**	**-8.8**
1990	3.7	14.5	0.9	14.9	-37.3	-0.1	**-3.3**	**Standard**
1995	3.6	14.7	1.4	11.7	-39.2	0.3	**-7.5**	**Deviation**
2000	-0.6	14.6	1.7	13.4	-40.6	0.3	**-11.3**	**4.36**
CANADA								**Mean Score**
1985	0.7	19.8	-5.2	9.8	-38.2	2.4	**-10.6**	**-2.0**
1990	0.1	20.0	-1.4	14.5	-38.3	2.2	**-3.0**	**Standard**
1995	0.6	20.0	-0.2	13.8	-38.3	10.9	**6.7**	**Deviation**
2000	-0.5	19.9	2.1	16.7	-38.5	-0.9	**-1.2**	**7.12**
CHILE								**Mean Score**
1985	5.1	14.8	-0.3	14.7	-41.1	0.5	**-6.4**	**-4.7**
1990	3.2	15.6	0.3	16.6	-41.4	0.3	**-5.5**	**Standard**
1995	3.9	16.2	1.3	16.6	-41.7	1.3	**-2.4**	**Deviation**
2000	1.0	17.4	2.9	16.2	-42.1	-0.2	**-4.8**	**1.71**
MEXICO								**Mean Score**
1985	-0.3	10.3	0.4	9.4	-34.5	0.5	**-14.3**	**-7.8**
1990	-0.7	12.8	1.6	13.4	-36.0	0.4	**-8.5**	**Standard**
1995	-0.2	15.5	1.6	12.1	-36.4	0.6	**-6.8**	**Deviation**
2000	-0.5	18.6	1.4	15.1	-36.9	0.5	**-1.7**	**5.20**
UNITED STATES								**Mean Score**
1985	-7.0	19.9	-6.0	18.1	-37.0	1.4	**-10.6**	**-10.4**
1990	-7.2	18.9	-0.3	14.7	-37.4	1.4	**-9.9**	**Standard**
1995	-7.2	18.9	1.1	14.5	-37.9	1.2	**-9.3**	**Deviation**
2000	-7.4	17.2	1.1	14.4	-38.4	1.2	**-12.0**	**1.14**

Physical Environment INCLUSION Sub-Index

	Clean Air	Safe Water	Sustainable Energy	Waste Management	Vital Living Area	Tenable Land	Total INCLUSION Score	
ARGENTINA	**30**	**20**	**15**	**20**	**5**	**10**		**Mean Score**
1985	2.5	18.1	0.0	14.8	0.1	1.8	**37.2**	**39.3**
1990	2.1	18.5	0.1	17.8	0.1	1.7	**40.3**	**Standard**
1995	3.0	18.9	0.1	17.8	0.1	1.6	**41.5**	**Deviation**
2000	2.1	19.4	0.2	15.0	0.1	1.5	**38.1**	**1.96**
BRAZIL								**Mean Score**
1985	10.6	14.2	1.1	4.8	0.0	0.8	**31.5**	**38.9**
1990	10.1	15.4	1.0	14.9	0.0	0.8	**42.1**	**Standard**
1995	10.5	16.5	1.4	11.7	0.0	0.8	**41.0**	**Deviation**
2000	7.3	17.7	1.8	13.4	0.0	0.8	**41.0**	**4.97**
CANADA								**Mean Score**
1985	7.6	20.0	0.0	12.0	0.0	3.5	**43.1**	**50.9**
1990	7.0	20.0	4.0	17.0	0.0	3.3	**51.3**	**Standard**
1995	7.5	20.0	5.4	17.0	0.0	3.1	**53.0**	**Deviation**
2000	6.9	20.0	7.3	19.0	0.0	3.0	**56.2**	**5.57**
CHILE								**Mean Score**
1985	5.8	16.3	0.0	14.7	0.2	0.6	**37.6**	**39.6**
1990	4.1	17.0	0.7	16.6	0.2	0.5	**39.1**	**Standard**
1995	5.0	17.6	1.5	16.6	0.2	0.3	**41.3**	**Deviation**
2000	2.5	18.3	3.0	16.2	0.2	0.3	**40.5**	**1.65**
MEXICO								**Mean Score**
1985	1.1	13.4	0.6	9.4	0.3	0.7	**25.5**	**32.2**
1990	0.8	16.3	1.8	13.4	0.3	0.6	**32.2**	**Standard**
1995	1.2	17.2	1.8	12.2	0.3	0.6	**33.3**	**Deviation**
2000	1.0	19.1	1.6	15.2	0.3	0.6	**37.9**	**5.13**
UNITED STATES								**Mean Score**
1985	0.7	19.9	1.3	19.6	0.2	1.6	**43.4**	**46.7**
1990	0.8	19.9	7.8	17.0	0.2	1.5	**47.2**	**Standard**
1995	0.8	19.9	8.9	17.0	0.2	1.3	**48.2**	**Deviation**
2000	0.8	19.9	9.0	17.0	0.2	1.3	**48.2**	**2.28**

Physical Environment EXCLUSION Sub-Index

	Clean Air	Safe Water	Sustainable Energy	Waste Management	Vital Living Area	Tenable Land	Total EXCLUSION Score	
ARGENTINA	**15**	**10**	**10**	**5**	**50**	**10**		**Mean Score**
1985	12.4	4.4	0.0	0.2	42.4	0.3	**59.6**	**61.5**
1990	13.1	3.6	0.0	0.2	43.3	0.3	**60.5**	**Standard**
1995	14.3	3.6	0.0	0.2	44.1	0.7	**62.9**	**Deviation**
2000	14.0	3.5	0.0	0.2	44.7	0.7	**63.1**	**1.74**
BRAZIL								**Mean Score**
1985	5.7	2.7	0.1	0.0	35.4	0.8	**44.7**	**47.7**
1990	6.3	0.9	0.1	0.0	37.4	0.8	**45.4**	**Standard**
1995	6.9	1.8	0.1	0.0	39.2	0.5	**48.5**	**Deviation**
2000	7.9	3.1	0.1	0.0	40.7	0.5	**52.2**	**3.43**
CANADA								**Mean Score**
1985	6.9	0.2	5.2	2.2	38.2	1.1	**53.7**	**52.9**
1990	6.9	0.0	5.4	2.5	38.3	1.1	**54.2**	**Standard**
1995	6.9	0.0	5.6	3.2	38.4	-7.8	**46.3**	**Deviation**
2000	7.4	0.1	5.2	2.3	38.6	3.9	**57.4**	**4.72**
CHILE								**Mean Score**
1985	0.7	1.5	0.3	0.0	41.3	0.1	**43.9**	**44.4**
1990	1.0	1.4	0.4	0.0	41.7	0.1	**44.5**	**Standard**
1995	1.1	1.4	0.2	0.0	42.0	-1.0	**43.7**	**Deviation**
2000	1.6	0.9	0.1	0.0	42.3	0.5	**45.3**	**0.74**
MEXICO								**Mean Score**
1985	1.4	3.1	0.2	0.0	34.8	0.2	**39.8**	**40.0**
1990	1.5	2.5	0.2	0.0	36.3	0.2	**40.7**	**Standard**
1995	1.4	1.7	0.2	0.1	36.7	0.0	**40.1**	**Deviation**
2000	1.6	0.5	0.2	0.1	37.2	0.0	**39.6**	**0.50**
UNITED STATES								**Mean Score**
1985	7.7	0.0	7.3	1.6	37.3	0.1	**54.0**	**57.2**
1990	8.0	1.0	8.1	2.3	37.6	0.1	**57.1**	**Standard**
1995	8.0	1.0	7.7	2.5	38.1	0.1	**57.5**	**Deviation**
2000	8.2	2.7	7.9	2.6	38.6	0.1	**60.1**	**2.51**