SERIE

125

medio ambiente y desarrollo

Agriculturalization as a syndrome: a comparative study of agriculture in Argentina and Australia

Sarah Young

NACIONES UNIDAS

CEPAL

Sustainable Development and Human Settlements Division

Santiago, Chile, May 2006

This study was undertaken as an internship at the Economic Commission for Latin America and the Caribbean as a part of a Masters degree program in Development and International Relations at Aalborg University, Denmark. The author would like to thank Gilberto Gallopín and David Manuel-Navarrete from the Division of Sustainable Development and Human Settlements for the opportunity to be involved in the ongoing research of the division and to explore the issue of agriculture from a broad, interdisciplinary perspective. In addition, the author is grateful to these researchers for the inspiration for this topic as well as their guidance and valuable comments throughout the process.

United Nations Publication
ISSN printed version 1564-4189
ISSN online version: 1680-8886

ISBN: 92-1-121587-0
LC/L.2531-P
Sales No.: E.06.II.G.58

Printed in United Nations, Santiago, Chile

Index

Index of figures

Abbreviations

ABS	Australian Bureau of Statistics
ECLAC	Economic Commission for Latin America and the Caribbean
FAO	Food and Agriculture Organization
GM	Genetically Modified
GMO	Genetically Modified Organism
SAGov	South Australian Government
TNC	Transnational Corporation
WCED	World Commission on Environment and Development
WGBU	German Advisory Council on Global Change

Abstract

The following is an extension of research in the Division of Sustainable Development and Human Settlements on sustainable development and policy in Latin America and the Caribbean. The syndrome approach to global environmental change proposed by the German Advisory Council on Global Change was previously adapted for the examination of sustainable development in the region, and a potential regional syndrome of agriculturalization in the Argentinean Pampas was proposed and explored by regional experts from an array of disciplines. The syndrome approach is meant to facilitate a transdisciplinary analysis of socio-ecological trends and the identification of patterns of sustainability of development. In order for a causal complex, such as agriculturalization, to be considered a syndrome, it must occur in multiple locations. Thus, the current study compares the process of agriculturalization as it has been described for Argentina to similar processes occurring in Australia in order to assess the utility of this causal complex as a syndrome of sustainability of development and to elucidate some of the complex socio-ecological processes and interactions that occur in agriculture in different regions of the world. A brief examination of the Australian case shows potential for the occurrence of the agriculturalization syndrome in that region and several differences between the two cases illustrate the importance of government policies in the socio-ecological processes of agriculture. In addition, positive aspects of sustainability in Argentinean and Australian agriculture are discussed.

I. Introduction

It is increasingly recognized that environmental change is greatly impacted by the activities of human beings and that society plays a critical role in both the cause and mitigation of degradation of the natural environment. This presents the scientific community with a challenge to deal with the complexities and uncertainties of this so-called 'Earth System' (Schellnhuber 1999). Traditional science, which approaches problems from the standpoint of distinct disciplines, each with their own worldviews, goals and methodologies, is often inadequate to address the highly complex and interdisciplinary issues of environmental change. Incorporating various knowledges and enhancing interparadigmatic dialogues are just some of the necessary steps toward a more transdisciplinary approach—one which moves beyond the compartmentalized nature of the scientific disciplines (Gallopín 2004). In addition, the assumed neutrality of scientific research must be reconsidered as such normative aspects as politics and social interactions are an intricate part of understanding and dealing with environmental issues and a more action-oriented approach should be embraced (Lüdeke 2004: 42).

One transdisciplinary approach that has been proposed to deal with the complexities of environmental trends is the *syndromes of global environmental change approach*. This approach, originally put forth by the German Advisory Council on Global Change (WGBU), aims to identify "functional patterns of human-nature interaction" (Lüdeke and others 2004: 42) by taking into account a broad view of important processes of global change while at the same time incorporating local and regional case studies. The underlying thesis of this approach is that "complex global environmental and development

problems can be attributed to a discrete number of environmental degradation patterns", called syndromes (WGBU 1997: 112). Syndromes are considered transsectoral in the sense that several different sectors (such as the economy, atmosphere, and social organizations) are related to environmental trends and interrelated to each other. Syndromes are globally relevant when they have a significant impact on the Earth System or when global solutions are necessary to overcome them. Because syndromes are considered distinct patterns of environmental degradation resulting from the activities and characteristics of human society, they exist and progress independently of other syndromes of global change. However, this assumption does not preclude passive or active interactions between the processes of multiple syndromes (Ibid.).

The syndrome approach offers several advantages over traditional disciplinary analyses and other systems approaches beyond its integration of disciplines. It can help in identifying regions that are vulnerable or 'predisposed' to a given syndrome by clarifying causal factors in environmental trends. Secondly, the syndrome approach allows for an improved understanding of complex environmental problems through a systemic integration of causes, mechanisms and effects. Finally, the approach leads to a way of operationalizing sustainable development by identifying limits and boundaries of environmental, social, political and economic activities demarcating sustainable and non-sustainable domains (Ibid: 114).

The WGBU originally identified 16 syndromes of global change. Since then, other research has been conducted at national and regional levels using the foundations of a syndrome approach to identify other causal complexes of environmental trends. Rabinovich and Torres (2004), from a perspective of sustainable development rather than global change, identified and described one such potential regional syndrome as that of agriculturalization. This causal complex was described as a process of agricultural expansion in the Argentinean Pampas region as a result of increases in export-oriented crop production. Resulting environmental effects include soil degradation, biodiversity loss and pollution in addition to various social consequences. This presents a possible syndrome, which may describe similar processes occurring in other regions of the world.

A. Problem formulation

One important aspect of a syndrome is that it exhibits a causal pattern that occurs in multiple locations. The current study examines the potential syndrome of agriculturalization as it occurs in Argentina and attempts to draw parallels to the case of agriculture and environmental degradation in another region of the world. Australia is taken as a comparative case to establish this syndrome's multi-regional applicability and to determine if similar environmental trends have resulted from processes comparable to those in Argentina. Several different disciplinary realms and their interactions are examined for each case and include geographic, institutional, technological, social and environmental spheres. The study attempts to address the following questions:

- How do the processes contributing to socio-ecological trends related to agriculture in Australia compare to those in the Argentinean Pampas?
- Does Australia exhibit the characteristics of an Agriculturalization Syndrome and how can these cases contribute to a broader understanding of agriculturalization as a process of global change and sustainable development?

The study will conclude with a discussion of the utility of the syndrome approach and, specifically, the implications of an Agriculturalization Syndrome in understanding the complexities of regional and global agriculture/environment interactions. In addition, aspects of sustainability and mitigating factors will be highlighted in both cases, presenting possible directions towards more sustainable agriculture in these regions.

This study was carried out as a part of an internship conducted at the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) in Santiago, Chile. It is a part of ongoing research in the Division of Sustainable Development and Human Settlements regarding effective policy implementation for sustainable development in Latin America. Within ECLAC's research, agriculturalization was identified as an important area for sustainability in the region. This study presents a possible starting point for further research on agriculturalization as a syndrome of sustainability of development.

B. Methods

This study is largely based on previous research conducted by ECLAC on sustainable development in Latin America and the Caribbean. As a part of ongoing projects on the evaluation of sustainability in the region and knowledge systems of sustainable development, interdisciplinary groups of experts were assembled to discuss issues of sustainable development. The concept of syndromes of global change introduced by the WGBU was found useful in this context and was applied to regional issues of sustainable development. The syndromes of sustainability of development differ from the concept of syndromes of global change in two respects: they are not limited to global issues but can describe regional or local processes, and they can include positive and healthy trends of sustainability rather than simply pathologies of environmental change (Manuel-Navarrete and others 2005).

The process of agriculturalization was one of the syndromes of sustainability of development identified by regional experts and was originally described by Rabinovich and Torres (2004). In order to elaborate on and to better characterize the causal complex of agriculturalization, questions were posed to elucidate the processes involved including factors affecting sustainability, the current state of knowledge regarding those factors and their interactions, and possible agendas for integrating that knowledge with policy (Manuel-Navarrete and others 2005).

In the current study, information regarding agriculturalization originates from the two recent documents published by ECLAC on the subject (Rabinovich and Torres 2004; Manuel-Navarrete and others 2005) as well as from personal communications with the primary researchers on this project in the Division of Sustainable Development and Human Settlements. Further resources for understanding agricultural issues in Argentina were provided by the researchers or identified from web-based research.

Some initial research was conducted in order to identify a suitable case study for comparison to Argentina. Australia presented the most comparable case with some clear initial similarities and interesting differences in its agricultural sector. In order to describe the state of agriculture in Australia in more detail, resources were collected from database searches and web-based research. The Food and Agriculture Organization database provided statistical data on agriculture in both countries and was useful for comparison purposes and for creating graphical representations of these comparisons.

Due to the complexity of the processes of agriculturalization, the presentation of the cases is divided for clarity into various realms including geographic, institutional, social, technological and environmental. In keeping with the transdisciplinary approach taken here, it should be understood that these realms overlap and interact in a complexity of ways and are not considered separate. A final section in each case study presents a brief introduction to the ways in which these various processes interact. In addition, the concept of a syndrome is taken here to be a constantly evolving process hinging partly on historical factors. For this reason, some historical background is presented in each case and the evolving nature of the processes is taken up in the analysis.

Finally, the Australia case presented in this study is based on very limited resources and presents only a superficial understanding of the complex processes of agriculture. Hence, this is taken to be a proposal for further research which would require collaborations of regional experts as was conducted in the Argentina case.

II. Understanding environmental changes

A. The complexity of environmental trends

Today, it is recognized that human activity plays a key role in determining the state of nature and the environment. Changes in such things as climate, biodiversity and ecosystems are largely acknowledged to be the result of human society. Not long ago, human society and nature were regarded more as separate entities with human-induced change considered negligible. However, in recent decades this understanding has drastically changed and the environment is now an issue to contend with in nearly all human endeavors.

The environment began to emerge as a topic of political interest in the 1960s and 1970s. By the late 1980s, UN conventions and international summits were devoted to the topic. The unlikely pairing of economic development and environmental health was manifest in the concept of sustainable development. Defined by the Brundtland Commission in 1987 as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987: 8), sustainable development exemplifies the interconnectedness between humans and nature. Although interpreted and used in different ways by differently motivated actors, sustainable development remains a challenge to society, governments and international institutions.

Another key challenge of sustainable development is to the scientific community. If sustainable development is to be achieved, environmental change such as mentioned above, can no longer be simply understood and dealt with in the traditional disciplinary and fragmentary fashion. Rather, a new interdisciplinary, or 'transdisciplinary', approach, which successfully integrates knowledge from various disciplines, must be employed. In addition, science must move beyond its traditionally objective, value-free approach to a more normative one, which proposes actions toward mitigating negative trends (Lüdeke and others 2004).

The idea of a non-reductionist, holistic science is not a new one. Early movements toward what is termed 'systems theory' appeared as long ago as the 1700s (Cassel-Gintz 2003: 11). The challenge in researching the 'Earth system', or the integrated system of human civilization and its environment (Schellnhuber 1999), is the crossing of boundaries between different scientific disciplines and the complexities of these interactions (Cassel-Gintz 2003: 13). Two approaches within global change research have been the use of modeling and case studies. However, both of these approaches have their shortcomings. Integrating local variables is difficult in global models. Case studies, on the other hand, are very localized making the understanding and mitigation of global processes difficult. In attempting to approach environmental issues from a broader perspective, the German Advisory Council on Global Change (WGBU) proposed the 'syndrome approach' (WGBU 1996). This approach is the basis for this study and is described in detail in the following section.

B. The syndrome approach

This approach was proposed by the WGBU to deal with problems of global change or environmental trends. Its primary objective is to identify syndromes, which can be defined as "functional patterns…[that] are unfavorable and characteristic constellations of natural and civilizational trends and their respective interaction, and [that] can be identified in many regions of the world" (Ibid: 112). An underlying thesis of the syndrome approach is that "complex global environmental and development problems can be attributed to a discrete number of environmental degradation patterns" (Ibid).

Syndromes cross sectoral boundaries resulting in causes and effects in any number of social and environmental spheres. In keeping with the medical metaphor, a syndrome represents a clinical profile of an environmental trend exhibiting particular symptoms of degradation with a given set of causes and effects. The identification of such symptoms at a local or regional level may indicate that the process of a particular syndrome is occurring. It may also help to identify regions that are vulnerable to a particular syndrome. While they are considered basically autonomous, there remains the possibility of passive overlapping or active interaction between syndromes (Ibid: 113).

For the purpose of utilizing syndromes to generate action-based knowledge, the WGBU characterizes sustainable development as an absence of syndromes of global change. Because syndromes, as defined by the WGBU, identify non-sustainable development patterns, they can provide boundaries within which society can act and human activities are sustainable. In this sense, sustainable development is operationalized (Ibid: 114). By providing a typology for environmental trends and identifying a limited number of distinct patterns, though complex, the syndrome approach attempts to provide a basis for action-oriented research (Lüdeke and others 2004).

The WGBU has identified sixteen syndromes of global change which meet the following criteria:

- They relate directly or indirectly to the environment.
- They occur in many regions of the world.

- They describe problems of environmental degradation or non-sustainable development (Ibid: 116).

Examples of agriculture-related syndromes are the Sahel Syndrome (overcultivation of marginal land), the Rural Exodus Syndrome (environmental destruction due to the abandonment of traditional agricultural practices), and the Green Revolution Syndrome (degradation due to the use of inappropriate farming methods) (Ibid).

There have been a number of critiques of the syndrome approach. First, it tends to focus on negative aspects of environmental change and non-sustainable development. It does not consider the presence of positive trends or potential for innovations and opportunities for sustainable development. In this way, the syndrome approach emphasizes the identification of problems rather than the recognition of solutions and positive social practices. While the syndrome approach provides a basis for analyzing the causes and effects of complex processes of global change and aims to produce action-oriented knowledge, it has also been criticized for being strictly analytical without aiding in the quest for mitigating solutions to the problems. Hence, it has been used in conjunction with other methods and research frameworks (Hurni and others 2002: 16).

Finally, the concept of syndromes depends to some degree on the occurrence of 'symptoms' at a given place and time. The historical evolution of these processes is not easily integrated into the syndrome concept, which tends to imply 'simultaneity, recurrence, proximity and the functional continuity of phenomena' (Barrera and others 2002: 313).

Overall, the syndrome approach provides a foundation on which to base the transdisciplinary analysis and understanding of environmental and development processes. As discussed below, the concept has been used at the UN's Economic Commission for Latin America and the Caribbean (ECLAC) to understand and describe the complexities of agriculture and socio-ecological trends in Argentina.

C. Agriculturalization as a potential syndrome

The syndrome approach has been used by ECLAC and has been adapted for the purposes of understanding sustainable development. It is noted that this differs from the original use of the concept in that the approach used by ECLAC, and in the current study, identifies syndromes of sustainability of development rather than syndromes of global change. The research conducted by ECLAC using the syndrome approach focuses on issues of regional and national significance rather than global and addresses issues of sustainability and positive environmental trends (Manuel-Navarrete and others 2005).

The adapted use of the syndrome concept by ECLAC attempts to address some of the aforementioned critiques of the approach. Rather than focusing on strictly negative environmental trends, it attempts to identify processes of sustainability within socio-ecological interactions. In addition, the syndrome approach will be used for the purpose of making policy recommendations directed toward sustainable development rather than for solely analyzing complex negative global trends. It has been a basis for bringing together regional and national experts from an array of disciplines in order to discuss the implementation of sustainable development in policy.

ECLAC located aspects of various WGBU syndromes in the Latin American region, some presenting additional regional characteristics. In addition, they described several causal complexes, which present potential for consideration as new syndromes. One of these causal complexes, and the focus of this study, is the process of agriculturalization occurring in the Argentinean Pampas.

Agriculturalization as a potential syndrome is defined by Rabinovich and Torres (2004) as "changes in agricultural land-use in order to increment crop production for exports, associated with input technologies and productive resources concentration, promoting greater degradation and pollution of the environment as well as the social exclusion of small producers" (p. 9). The following chapter describes agriculturalization in the Argentinean Pampas in more detail.

Like all syndromes, agriculturalization is a complex process with environmental consequences related to natural resource use and involves interactions between many different social and ecological spheres. However, by definition, a syndrome is more than a grouping of causal relations. Rather, these socio-ecological interactions operate according to typical patterns and are hence observed in more than one location or region of the world (WGBU 1997: 4). This characteristic allows for the diagnosis of syndromes based on 'symptom' indicators, which may lead to global and interdisciplinary actions for mitigation. The purpose of the current study is to examine a second case of environmental degradation from agricultural expansion to determine the potential for agriculturalization as a globally relevant trend. A comparison of the complex processes involved in economic, political and social spheres of a second potential case of agriculturalization can clarify some of these processes and highlight other potential symptoms leading to a better understand of the causal complex as it occurs in Argentina. In addition, it may illuminate the implications for diagnosis of agriculturalization and agricultural policy in other parts of the world.

III. Case study: agriculturalization in Argentina and Australia

A. The Argentinean Pampas

1. Geographic sphere

The Argentinean pampas region, or the humid pampas, is a vast fertile plane covering about 52 million hectares in the area around the capital city of Buenos Aires. The region consists of fine sediments carried by wind and water from the Andes, making them vulnerable to erosion (Solbrig 1996: 5). It is a heterogeneous area that can be divided into five eco-regions depending on sediment type and rainfall (Figure 1).

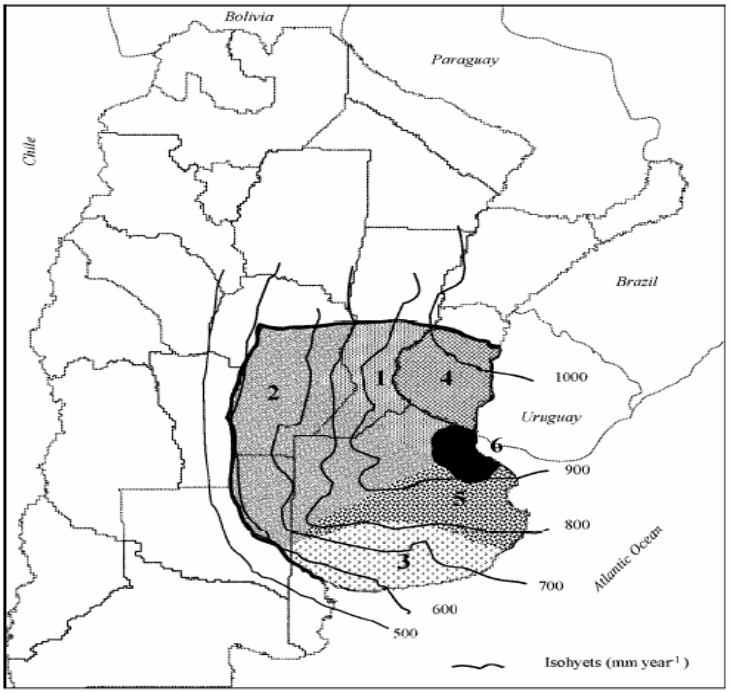
The rolling pampa is made up of fertile soil and receives sufficient rainfall to make this region one of the most agriculturally productive in Argentina. Agriculture of wheat, corn and soy dominate this region. Its proximity to the Paraná River allows the transport of goods to sea ports making the area ideal for the growth of agro-industry (Ibid: 8).

The central pampas, which can further be divided into the sub-humid and semiarid regions, is made up of deep, permeable soils, which become sandy especially to the west. Here, a tradition of cattle-agriculture rotation has been popular in which planting of annual crops such as soybean, corn and rye are rotated every few years with cattle grazing of alfalfa. This sustainable rotation system has recently been

replaced with a non-sustainable program of more years of agriculture compared to cattle grazing, as discussed further below (Ibid.).

The flooding pampa and Mesopotamian pampa both lack good agricultural soils and for this reason are mostly used for cattle raising (Viglizzo and others 2002). Finally, the Southern pampa is a region situated between mountain systems. These fertile prairie soils support an important cereal agriculture system, which has largely replaced the cattle-agriculture rotation system (Solbrig 1996: 10).

Figure 1
ECOLOGICAL REGIONS OF THE ARGENTINEAN PAMPAS



Source: Viglizzo and others 2002: 172.
1) Rolling pampas: 2) Central pampas: 3) Southern pampas; 4) Flooding pampas; 5) Mesopotamian pampas; 6) Buenos Aires metropolitan region. (Viglizzo and others 2002).

The climate of the pampas region is warm temperate with warm summers and cool winters and few days of frost. Rainfall varies throughout the year with more rain in the spring and fall with occasional summer droughts. Annual rainfall has been increasing in recent decades. In addition, recent summers have been hotter and winters wetter, possibly due to human-induced climate change. As a result of these changes, double cropping has been possible in some regions allowing the planting of two crops a year (Solbrig 1996: 32).

The population of Argentina is largely shaped by the large waves of European immigration in the 19th century (Ibid). There is low demographic growth and high levels of urbanization with about 91% of the population living in cities (UN 2004).

2. Institutional sphere

Since Spanish colonization in the 16th century, agriculture in Argentina has played an important economic role and has changed the environmental landscape. Due to an abundance of land and limited sources of labor and capital, extensive livestock raising, particularly of sheep and cattle, on large land-holdings has been historically dominant in the pampas region (Solbrig 1996;

Solbrig and Vero 2000). An initial agricultural expansion in the late 1800's took place due to a number of circumstances including a growing market for food in Europe and an influx of European immigration and foreign investment. With the resulting increase in the profitability of agriculture, land area devoted to commercial agricultural activity, particularly grains, quickly increased characterized by the expansion of agriculture into previously unused areas (Solbrig and Viglizzo 1999). Due in part to the historical presence of large land-holdings for cattle ranching and the needs of the immigrant farmer, shareholding systems were dominant and land concentration remained high (Solbrig 1996: 7).

A second wave of agricultural expansion occurred in the 1950s and 1960s, in part due to the introduction of several new technologies including hybrid maize and tractors (Solbrig and Vero 2000:7). This technological revolution was partly facilitated by public financing (Wehbe and others 2005:7). This was the beginning of the expansion that characterizes the process of 'agriculturalization' (Solbrig and Vero 2000:7). Unlike the previous expansion, it is largely characterized by the replacement of land dedicated to livestock raising and rotational agriculture, with long-term commercial agricultural enterprises (Ibid.).

Argentine agriculture experienced a transition in the 1970s and 1980s. Import-substitution policies, which had been dominant over previous decades, were replaced by export-led growth (Solbrig and Vero 2000:4). Liberal economic reforms led to further integration into international markets and more access to technologies. With this came an increase in cash crop specialization and eventually a decrease in state intervention.

In recent years, there has been a significant intensification of agriculture with a shift to soybean production for export and continued expansion of cropped surface. In addition, farm sizes continue to increase as does land concentration (Solbrig 1996:5; Solbrig and Viglizzo 1999:32). With reduced tariffs on inputs, and the cost of agrochemicals down due to competition, agricultural technologies can be more readily implemented (Chudnovsky 2004). The role of multinational agribusinesses has increased and they have largely replaced the government in terms of provision of agricultural technologies and services (Wehbe and others 2005:17). Soy, maize and wheat comprise Argentina's top three agricultural exports (FAO 2005).

3. Social sphere

The history of agriculture in Argentina has contributed to the present structure of farming in the region. As mentioned above, the early surplus of land resources and scarcity of labor and capital led to large land-holdings for ranching purposes. In order to deal with labor shortages, immigration was encouraged as was the use of laborsaving machinery (Solbrig 1996: 16). This history has contributed to the current structure of agriculture in the pampas. Many farms today are large 'capitalist agrarian firms' in which outside labor is hired to do the farming work and management is performed by the owner (Ibid.). In addition, in recent years there has been a growing number of farming 'pools' in which investment funds are used to lease many small farms which then form large contractual networks (Noe 2004: 10).

With agricultural restructuring in recent decades, there has been a loss of control over land and technology resources for small grain and livestock farmers. The shift towards economies of scale and land concentration has contributed to a reduction of rural labor and an increase in rural exodus (Solbrig and Viglizzo 1999:34). Liberal economic policies and decreases in government support have led to greater vulnerability and marginalization of small farmers.

There have also been social impacts resulting from the intensification of agriculture and wider use of agricultural technologies. Some of the technologies now in use require certain levels of knowledge and management skills as well as access to information, technical firms and

education. This can be considered a disadvantage to small and medium producers who lack such resources and, again, this trend favors the large, commercial enterprises (Solbrig 1996).

4. Technological sphere

The role of technology has been an important one in the process of agriculturalization in Argentina. The introduction of mechanization and hybrid maize in the 1950s and 1960s spurred the beginning of agricultural expansion and intensification. Fertilizer use however was limited due to high costs. It was not until recent decades that the cost of fertilizers has decreased resulting in a significant increase in their use (Solbrig 1996). However, the use of fertilizers in Argentinean agriculture remains low compared to other industrial countries (FAO 2005).

A major addition to the technological advancement of Argentine agriculture was the genetically modified (GM) soybean. The amount of land planted in GM soy has expanded rapidly and is now only second to the United States in terms of total area planted in this crop (Joensen and Semino 2004:10). This has meant an increase in the use of certain agrochemicals.

Due to the recognition of significant soil erosion, no-tillage technologies have been employed in Argentina. The reduction of import tariffs on machinery has helped make this technology more accessible (Chudnovsky 2004:19). This technology was being used in at least 30% of pampas agriculture in 2000, having likely increased since then, and has contributed to soil conservation efforts (Solbrig and Vero 2000).

5. Environmental sphere

One of the primary environmental problems resulting from agriculture in Argentina is soil erosion due to wind and water. The expansion of agriculture into marginal lands and the replacement of livestock raising and crop/livestock rotation systems with long-term cropping have contributed to this problem. While no-tillage technologies have had a positive impact on soil degradation, long-term monoculture crops tend to negatively effect the soil fertility and are considered a less sustainable system compared to rotational agriculture (Chudnovsky 2004). An increase in rainfall in recent decades has led, along with technological advances, to the possibility of double cropping (planting of two crops a year), which has also contributed to soil degradation.

The recent increase in the use of fertilizers has also had negative environmental effects, particularly an increase in soil acidification (Solbrig and Vero 2000: 18). In addition to fertilizer use, supplemental irrigation, which has been increasingly used to cope with summer droughts, may contribute to aquifer degradation. (Solbrig 1996:23). However, these inputs remain relatively scarce in comparison to other industrialized countries.

The introduction of GM soybeans may have several negative environmental impacts. In general, the increase in monoculture leads to a decrease in biodiversity and an increase in vulnerability of crops to climate change and disease. Also, the frequent application of agrochemicals with these crops can lead to the development of herbicide and pesticide resistance as well as increased pollution of water sources.

6. Interactions of the symptoms

The process of agriculturalization is a complex process in which factors from all of the above spheres interact and influence each other. The complexity of such interactions is the reason for attempting to characterize the process as a syndrome of sustainability of development. The natural fertility of the pampas region along with its demographic history has shaped the current structure of agriculture including in some ways the size of land-holdings and the importance of livestock. Climate change is contributing to changes in agricultural practices, which have an impact on the

environment. Government policies affect the use of certain technologies as well as economic aspects of the agricultural system resulting in various environmental trends as well as social consequences such as the exclusion of small farmers. International economic trends also play an important role in the ways in which agriculture is carried out and on how it impacts society and the environment. The causal complex of agriculturalization was developed and described in an attempt to better understand these interactions as they take place in Argentina and a diagram of the process is shown in Figure 5 in the following chapter.

B. Southwestern and Southern Australia

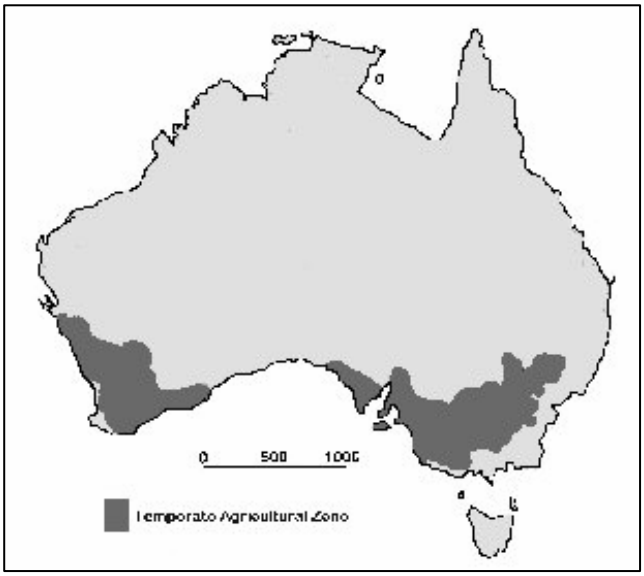
1. Geographic sphere

Australia is the world's sixth largest country and the driest continent after Antarctica, with arid and semi-arid zones covering much of the continent. However, in the southwestern and southern regions of the country, there are more temperate zones suitable for agriculture (Figure 2).

The southwestern region lies in the state of Western Australia, the largest state in the commonwealth comprising the entire western portion of the country. Like much of the country, a large percentage of the state is arid desert and sparsely inhabited. The southwestern region, however, is made up of fertile land that is largely settled. Much of the southwest is cultivated, mostly in wheat. Also, sheep grazing and other livestock is important to the area, which is known as the wheat-sheep zone (Hyberg and Pascoe 1991). The state's capital Perth lies in this region and is home to the vast majority of the state's population.

The southern agricultural region is situated in the state of South Australia and surrounds the metropolitan area of Adelaide. This region is home to the most important wheat-based agriculture in the country. In addition, sheep and cattle farming are also found here.

Figure 2
AUSTRALIAN AGRICULTURAL ZONES



Source: Map showing temperate agricultural zones of southwestern and southern Australia (Stevens 2001).

The regions are generally characterized by winter rains and summer drought. The productivity of soils depends heavily on moisture supply. Since 1960, a decrease in winter rainfall has occurred in these agriculturally important regions in addition to an increase in temperature placing even more stress on the already vulnerable water supply (ABS 2005; Pittock 2003).

The Australian population is made up mostly of descendents of European immigrants with a comparatively small population of indigenous peoples (ABS 2005). About 93% of the population lives in urban areas (UN 2004).

2. Institutional sphere

Australia has been described as "a semi-peripheral frontier nation highly dependent on the export of bulk commodity goods" (Vanclay 2003: 83). It is one of five leading exporters of wheat and its main market is in the Middle East and Asia (AAFC 2001). The main export products from the southwestern and southern regions are wheat, wool, beef and lamb.

The government has a long history of playing an important role in Australian agriculture. In the early part of the 20th century, with gold production down, high unemployment and decreased levels of food production, the government embarked on a mission to develop the agricultural sector. The strategy involved opening up the more fertile regions in the south and southwest to wheat production. Land was offered at low prices, railways were constructed for easier access and transport, and land was intensively cleared for agriculture (Beresford 2001). State and national marketing boards played an important role in offering financial security to farmers and subsidies were provided for technological inputs such as fertilizers and irrigation systems (Hyberg and Pascoe 1991). However, due to the rapidity of expansion among other factors, the result was often poorly managed farming practices resulting in a number of environmental problems as discussed further below.

In recent decades, the Australian government has shifted from a mostly Keynesian approach to agriculture to a free-market, deregulatory approach (Lawrence 1999). This has had a number of impacts, including social and environmental ones, on the agricultural sector. Medium-sized landholdings have increased their production by the acquisition of land. Transnational corporations now play an important role and trade tariffs and subsidies have largely been removed (Ibid.).

3. Social sphere

The past century of Australian agriculture has seen a number of changes. From the early part of the 20th century until about the 1980's, agriculture, specifically the wheat industry, in the south and southwestern regions grew rapidly supported by state programs and financing and a strong sense of developmentalism (Beresford 2001). The expansion of agriculture in these regions was not just for economic gain, but also tightly bound to social factors. Rural life and a frontier society had a strong appeal to the Australian population. An immense resettlement scheme after World War II demonstrates the strong state-led push for expansion of wheat agriculture. Between the years of 1945 and 1961 land under cultivation nearly doubled in the region (Ibid: 406). With huge tracts of land being cleared of the natural vegetation, it is clear that cultural attitudes toward the environment supported the developmentalist program. Nature was considered to be something to be subdued and controlled for human interests and its large-scale obliteration was accepted and encouraged (Ibid: 411).

Given that Australian agriculture had developed in such a protectionist regime, the move toward deregulation and structural adjustment in recent decades has had serious social impacts (Vanclay 2003). With the opening up of Australian markets, agriculture has become more industrialized and farmers are now more integrated into the industrial food sector. This has led to

changing class relations in which farmers are losing control of production processes to such entities as banks and transnational corporations (Lawrence 1999). Most farms are now large, owner-operated family farms and there has been a move toward contract farming, though this is less common in broadacre agriculture. This has resulted in the imposition of a more profit-driven ideology onto farming society and the undermining of traditional farming ideals (Ibid.). The response of farmers to these changes has varied depending on their different capacities to resist or respond to structural adjustment in agriculture. About ¼ of farmers have left agriculture as a result of these changes, while others have often made difficult adjustments (Vanclay 2003: 82).

At the same time, a growing awareness of environmental issues has arisen in the public as well as in agricultural society. There has been growing consumer environmentalism as well as a government movement toward a "clean and green" image. Both of these factors may have some impact on the activities of agriculture, although the deeply entrenched practices of large-scale farming are difficult to change (Lawrence 1999). With the increasing awareness of some environmental problems that impact the sustainability of agriculture, such as salinization and soil erosion, farmers and local communities have been taking steps to address these issues. One manifestation of this has been community Landcare programs, which have been heavily supported by the government. These programs have helped to bring farmers together to share knowledge, skills and information about land degradation in their communities (Cary and Webb 2001).

4. Technological sphere

Technological inputs in Australian agriculture have been largely influenced by government subsidies. Between the years of 1966 and 1984, the government provided subsidies for nitrogen and phosphate fertilizers. This led to an increased use of fertilizers beyond what farmers would have used if they had been paying full cost for such inputs. In addition, the government has sponsored a number of irrigation projects and has subsidized water costs. Irrigation entitlements and pricing schemes have resulted in inefficient use of water resources (Hyberg and Pascoe 1991).

With the recognition by the agricultural sector and the government of various problems of environmental degradation and the lack of sustainability of certain agricultural practices, some recent environmentally sound technologies have been employed in Australia. For example, certain minimum tillage and water conserving irrigation technologies have been introduced. To combat the problems of soil erosion, reduced or no-tillage technologies have been used which allow sowing of seed with minimum disturbance of the soil. One study has shown that as many as 1/3 of land managers in South Australia have used the no-tillage technology to some degree (SAGov 2003:37).

Another technological innovation to have an impact on agriculture in various parts of the world is genetically modified crops. For example, some crops, including wheat, have been genetically engineered to be resistant to certain herbicides allowing the application of these herbicides throughout the growing season. While some claim this can have the effect of decreasing chemical inputs and increasing crop yields, others argue that such technology can have the opposite effect eventually leading to herbicide-resistant weeds as well as other environmental and social consequences. Due to a growing skepticism toward genetically modified organisms (GMOs) in some markets, Australia has opted not to release GMO food crops for commercial use, though they do support some testing of GMO crops under strict controls (AAFC 2001). This may allow Australian agriculture to eventually take advantage of anti-GMO niche markets, as many other grain producers have largely adopted GMO technology.

5. Environmental sphere

A number of important environmental impacts have occurred as a result of agriculture in Australia. Some of the most important environmental constraints for agriculture in this region are soil salinization, acidification, erosion and water problems. Salinization is one of the worst problems for agriculture in the Wheatbelt (Beresford 2001). This has, in some respects, resulted from early agricultural policies, which involved rapid clearing of land of its natural vegetation for agricultural purposes. The natural characteristics of the region, including geologic and climactic conditions, predispose it to salinization problems. The clearing of the native, adapted vegetation and the introduction of irrigated agriculture has led to, among other things, increased runoff, the rise of saline water tables, and water logging with subsequent evaporation events, all contributing to a serious problem of salinization (Hatton and others 2003). Beresford (2001) has discussed the awareness of the growing problem of salinization in the scientific community over the course of the 20th century and the government's disregard for the ample evidence of the problem. This is attributed to the relentless developmentalist policies and push for agricultural expansion over the years.

Soil erosion and acidification have also been problems resulting from agriculture. The fragile soils of the region have become more vulnerable to wind and water erosion with the rapid clearing of natural vegetation, particularly in the case of extreme wind and rainfall events. While rates of soil loss have decreased in recent decades due to improved land management practices, soil erosion remains an important problem for agricultural sustainability (SAgov 2003).

Soil acidification is a problem resulting largely from the use of nitrogen and phosphate fertilizers in agriculture. Due to the large government subsidies for fertilizers from 1966 to 1984, there tended to be overuse of these inputs, which likely exacerbated the problem of acidification (Hyberg and Pascoe 1991).

Finally, problems of drought and water shortage have been ongoing problems for agriculture in this dry region. Poor management of water resources has contributed to the soil problems discussed above, in addition to draining supplies of a valuable resource. Often, shallow-rooted crops replaced the drought-resistant natural vegetation (Hyberg and Pascoe 1991). In addition, recent changes in climate patterns have led in some cases to high expectations for rainfall and hence, the expansion of croplands into drier areas (Pickup 1998). Sometimes, drought and degradation have been enough to cause the abandonment of farming altogether (Hyberg and Pascoe 1991).

With the introduction of new technologies as discussed above and the growing awareness of the importance of a healthy environment among the public, agricultural sector and government, some of these degradation patterns are being addressed. However, other forces, which continue to encourage agricultural intensification at the expense of the environment, still exist and will continue to be obstacles to sustainable agriculture.

6. Interactions of the symptoms

As in the Argentina case, the process of agriculturalization in Australia is comprised of a complex network of interactions between the various symptoms presented in each sphere and it is this interaction that is crucial to the understanding of the process. The current case study is far from an in-depth account of agricultural issues as is available for Argentina. However, from this brief introduction to agriculture in Australia, various interactions and processes are apparent. The climate of the region plays an important role in the limitations and extent of agriculture in the region, including contributing to the importance of livestock in the economy. The role of the government has been critical in pushing the expansion and intensification of agriculture, which has

led to a number of negative environmental impacts. Recent changes in government policy and the global economy have contributed to a number of social consequences including rural exodus and a decreasing role for government in agriculture. In addition, the prevalence of environmental problems have led to greater recognition by society and the government of the importance of practicing ecologically viable agriculture and hence, the use of certain environmentally friendly technologies. At the same time, the growing impact of global actors has led to further land concentration and industrialization.

The processes involved in agriculture in Australia are compared in the following chapter to the more thorough understanding of agriculturalization as it has been described for Argentina. This current description of the Australian case provides a starting point for further investigation of agriculturalization in this region.

IV. Analysis: agriculturalization as a syndrome of sustainability of development

A. A comparison of agriculture in Argentina and Australia

The cases presented of agricultural trends in Argentina and Australia exhibit a number of interesting similarities and differences. To begin, geographical and physical characteristics of the two countries result in a number of similarities and differences in their agricultural systems. While Australia is a much drier country, the fertile zones in the southern and southwestern regions have been productive areas for crops and livestock. The Argentinean Pampas is also highly fertile and productive, though less limited by rainfall, and has also been used for both crops and livestock. Both countries are among the world's biggest producers and exporters of wheat, however soy and maize are also major export crops for Argentina. Soy, in particular, has expanded in Argentinean agriculture in recent years. The differences in the limitations of rainfall and water between the two countries are important and are dealt with later in this chapter.

Both regions have been affected by climate change and changes in rainfall patterns have influenced agricultural practices in recent years. It is interesting that while Australia has suffered from drought and water shortages, there have been occasional patterns of increased rainfall, which have led to the expansion of agriculture into marginal

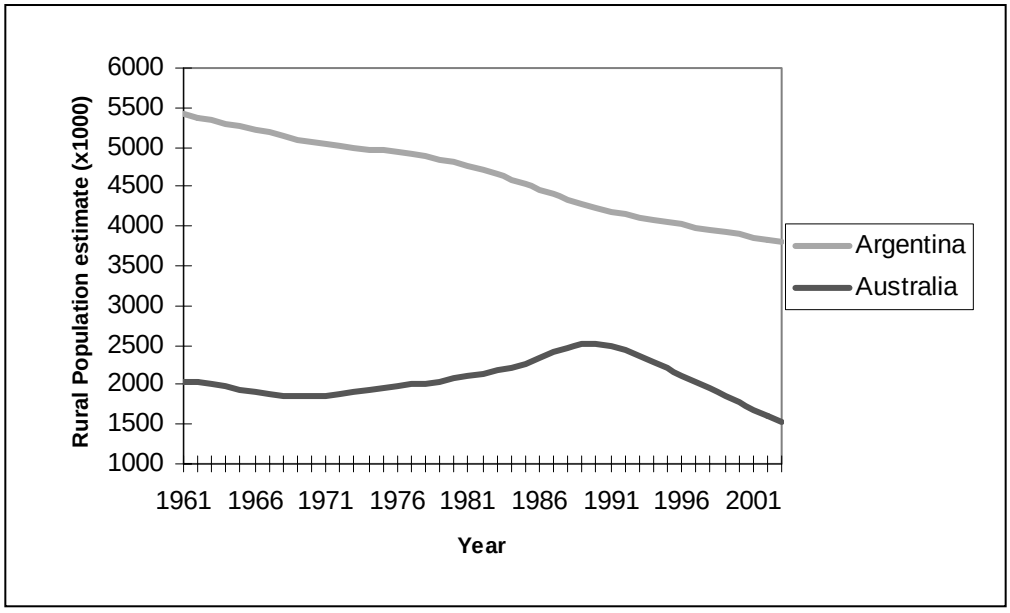
areas as discussed further below (Pickup 1998). The same has occurred in Argentina, where an increase in rainfall in the past few decades has allowed for double cropping practices and the use of more marginal land for agriculture. These expansion patterns contribute to environmental degradation.

Also in geographical terms, the situation of both countries in the southern hemisphere means that they can take advantage of off-season markets that are normally filled by producers in the northern hemisphere.

The role of government, or lack there-of, in agriculture has been important in Argentina and Australia. Agricultural expansion in Australia was strongly driven by the developmentalist policies of the government through most of the 20th century. In addition, the substantial subsidies on agricultural inputs in Australia were partly responsible for the over-use of fertilizers and other agro-chemicals (Hyberg and Pascoe 1991). This is in contrast to the situation in Argentina where the high cost of inputs and lack of government support has led to traditionally low-input agriculture. Argentina continues to use fewer agro-chemicals than other industrialized countries, including Australia, despite recent increases in inputs (FAO 2005; Solbrig 1996).

Changes in government policies toward more liberal economic reforms and privatization of agricultural support were evident in both Australia and Argentina in the 1990's. This has led to a number of social consequences including the exclusion of small farmers and an increasing role for transnational corporations. While Argentina has a significantly higher rural population that has been steadily decreasing over the past 50 years, these changes in economic policy in the 1990s spurred a rural exodus trend in Australia as well (Figure 3). There has also been an increase in land concentration in which the numbers of farms have decreased while their size has increased (Solbrig and Viglizzo 1999; CIS 1999), as well as an increase in the concentration of food production and processing (Manuel-Navarrete 2005; Lawrence 1999). Also, an increasing vulnerability to the global market has resulted from liberal economic policies, again challenging the viability of small producers.

Figure 3
RURAL EXODUS



Source: The change in the rural populations for Australia and Argentina from 1961 to 2001 (FAO 2005).

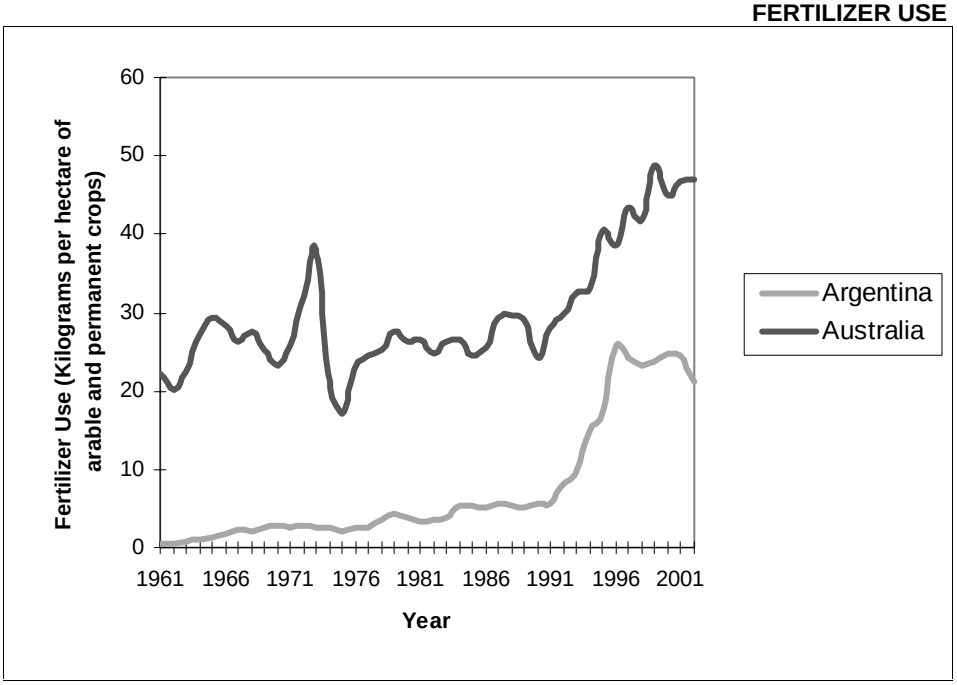
One social development that has occurred in Australia has been the increase in environmental awareness among the consumers, agricultural industry and the government. The government supported Landcare program as well as the push for a 'green' identity, including the opposition to GMOs, have played important roles in changing agricultural practices in order to better the environment (Lawrence 1999). The environmentalist discourse has perhaps manifested itself in different ways in Argentinean agriculture and is not as evident in government policy. Nonetheless, an increase in the use of environmentally beneficial technologies, such as no-tillage practices, has been apparent in both countries. Perhaps this is indicative of the profitability of such practices, which may be adapted for economic, rather than environmental, reasons.

While there exist similarities in the processes and causes of agricultural expansion and its social consequences in the two countries, there are also similarities in the environmental effects of these processes. Particularly, soil degradation, biodiversity loss and pollution and degradation of aquifers have been key environmental problems resulting from agriculture. However, the severity and importance of these environmental trends differ between the two countries. Argentina has had to address the issue of soil erosion, while salinization has been a major obstacle in Australian agriculture, partly due to a predisposition of Australian soils to this problem. As mentioned above, water shortages and aquifer degradation have presented more of a problem in the dry and drought-ridden Australian agricultural regions. Argentina has, in fact, experienced increases in rainfall, though the use of irrigation technologies and agricultural inputs may lead to aquifer degradation in this region. These effects have yet to be thoroughly assessed (Solbrig 1996).

As mentioned above, an important difference between the two countries is the difference in fertilizer use, which has contributed to the differences in the types and severity of environmental problems. The low-input agricultural systems, which have been prevalent in Argentina, have meant a lack of major agricultural pollution or acidification problems. This is in stark contrast to the high-input patterns of Australian agriculture, spurred on by excessive government subsidies, which have now led to severe acidification of the soil. The recent changes in Argentina, which are now leading to an increase in agro-chemical use, could be the beginning stages of the patterns previously seen in Australia. However, the use of fertilizer in Argentina remains low and as shown in Figure 4, has plateaued in recent years (FAO 2005). The figure in fact shows a decrease in fertilizer use in Argentina around 2001, which may be the result of the economic crisis experienced there. More recent data would be needed to determine post-crisis trends.

As mentioned above, in response to these environmental problems, both countries have employed the extensive use of no-tillage technology helping to curb the effects of agriculture on soil erosion. Another area in which Argentina had used environmentally friendly agricultural practices was in the rotation of crops with livestock. This had proven to be an environmentally sustainable agricultural system, which has more recently been replaced by the planting of permanent crops (Chudnovsky 2004). Nonetheless, it offers an example of a sustainable model of agriculture in regions that produce both crops and livestock.

Figure 4
FERTILIZER USE



Source: The differences in trends of the consumption of fertilizers (Total fertilizer consumption Kilograms) per area of arable and permanent crops (hectares) for Australia and Argentina (FAO 2005).

B. Agriculturalization and the syndrome approach

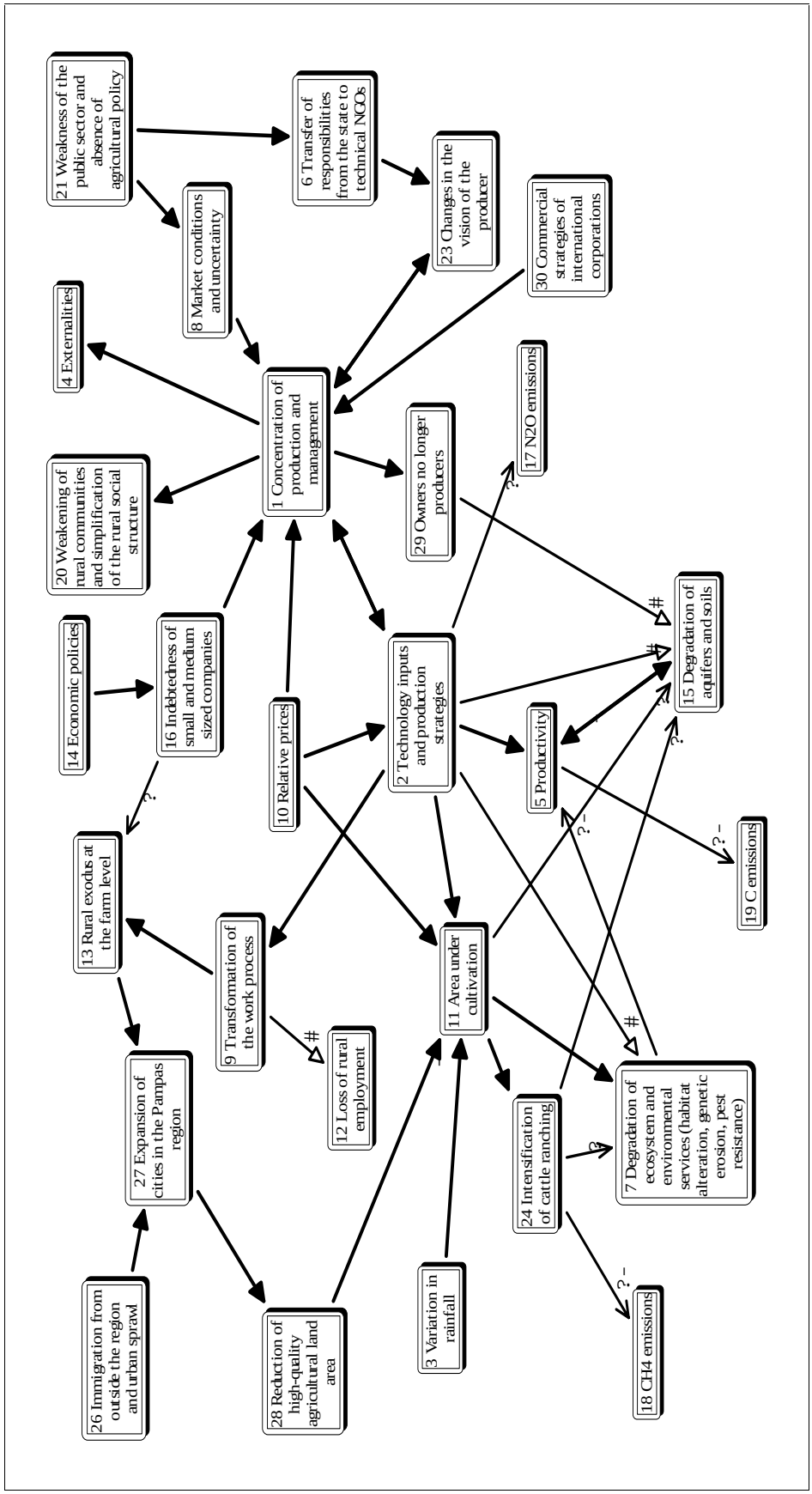
One purpose of the current study is to determine the potential of the causal complex of agriculturalization as a syndrome. A key feature of a syndrome is its presence in multiple regions of the world (WGBU 1996). In this way, a causal complex becomes a process of defined causes and effects which exhibit given 'symptoms', thus allowing the recognition of a particular process in a region, the vulnerability of a region to a process, and prescribed global solutions to these problems. Agriculturalization has been identified and described from processes occurring in Argentina. Figure 5 is a graphical representation of agriculturalization as it occurs in Argentina depicting the various symptoms and causal relationships. If similar processes within the various realms of economics, politics, society and the environment exist and interact in similar ways in another part of the world, there is potential for agriculturalization to be considered and utilized as a syndrome.

The case of Australia presents us with a possible location in which this process is occurring in similar ways. The above comparison of the two countries presents a potential case for the presence of agriculturalization in Australia, though differences do exist and a more in depth study is required. However, the case of Australia offers a possibility for further research.

Of the original 16 syndromes of global change described by WGBU, a number of them deal with environmental issues related to agriculture. It is interesting to compare them to the current subject in order to better understand the distinctive features of agriculturalization. For example, the Sahel Syndrome proposed by WGBU involves the overexploitation of marginal land and resources as the result of growing populations that exceed the ecological carrying capacity of a region. Usually occurring in subsistence economies in regions of poverty, some of the symptoms of the syndrome are soil degradation, desertification, rural exodus and threatened food security. Political and social conflicts also arise in these situations (Ibid: 117). While the trends in Argentina and Australia exhibit some of the symptoms of this syndrome and also involve to some extent, the use

of marginal land, the causal factors and effects in these regions are very different from those described in the Sahel Syndrome. The same is true with syndromes such as Overexploitation, Rural Exodus, Dust Bowl and Green Revolution. All of these syndromes involve some aspects of non-sustainable agricultural practices and exhibit some of the same environmental consequences as seen in agriculturalization (Ibid: 117-121). However, these causal complexes do not describe processes specifically of export-oriented agricultural expansion as is exhibited in the Argentinean Pampas. For this reason, agriculturalization stands apart from previously described syndromes. Additionally, as discussed in Chapter 2, its focus is on potentials for sustainable development at a regional level rather than pathologies of global change.

Figure 5
DIAGRAM OF THE AGRICULTURALIZATION SYNDROME OF SUSTAINABILITY OF DEVELOPMENT IN ARGENTINA



Source: Adopted from Manuel-Navarrete and others 2005.
Note: The lines with full arrows indicate monotonic positive relationships (in other words, if the variable of origin grows or diminishes, the recipient variable changes in the same direction). The lines with a negative sign indicate monotonic negative relationships (in other words, if the variable of origin grows or diminishes, the recipient variable changes in the opposite direction). The lines with question marks denote hypothesized causal relationships that are not confirmed. The lines with number signs denote disputed causal relationships. Each line denotes a direct effect of one variable on another, not the effects via third variables of the graph.

While the process of agriculturalization as described in Argentina is distinct, the question to be addressed here is whether this process is unique to Argentina or whether it occurs in other regions of the world. This largely depends on how agriculturalization is defined and which characteristics, processes, and symptoms are considered central to the causal complex. Agriculturalization is a process associated with changes in agricultural land use as a result of increases in export-oriented agricultural production, accompanied by a weakened public sector and a growing role for transnational corporations (TNCs) and global markets. Other symptoms defining this process include the concentration of land ownership, management and production. In Argentina, agriculturalization has also involved a replacement of crop-livestock rotation with permanent crops, and an intensification of production with the introduction of agricultural technology. These changes lead to various environmental impacts such as soil degradation, loss of habitat and loss of biodiversity. Important social impacts include the exclusion and marginalization of small farmers and rural exodus (Rabinovich and Torres 2004; Manuel-Navarrete and others 2005).

Given these processes as defining features of agriculturalization, it is possible to look at the case of agriculture in Australia's Wheatbelt as described in the previous chapter to determine if these causal processes and symptoms are present there as well. An early phase of agricultural expansion in Australia occurred from the early 1900s to the 1980s as a result of government-supported programs of increasing agricultural land for export-oriented wheat production. The recent liberalization of economic policies has had the impact of increasing agricultural exports and redirecting agricultural efforts toward large-scale production for global markets. This more recent trend exhibits similar characteristics to the processes occurring in Argentina defined as agriculturalization. The previous agricultural expansion differs from that in Argentina, in that it was heavily subsidized and pushed by government policy. The recent trend falls more into line with agriculturalization and exhibits similar effects including increased rural exodus and marginalization of small farmers, increases in the concentration of land ownership and production as well as decreases in government support and a larger role for TNCs (Lawrence 1999). In addition to these institutional and social symptoms, Australia also exhibits some of the important environmental symptoms of agriculturalization. These include soil degradation, loss of habitat and loss of biodiversity though some of these symptoms result from processes different from those described in agriculturalization.

While the main characteristics of agriculturalization are exhibited to some degree in the Australian case, there are some important differences that can help us better understand the process of agriculturalization. In general, the Australian government has historically offered more support for the agricultural sector, playing a key role in its expansion and the resulting environmental degradation (Hyberg and Pascoe 1991). Due to these differences in earlier agricultural policy, namely heavy government subsidies for agricultural inputs, there has been a prevalence of soil acidification in Australia that is not exhibited to the same degree in Argentina. This is a symptom of a process that does not occur in agriculturalization as it has been described. However, the role of the lack of subsidies in Argentina is seen as an important factor leading to the historically low-input agricultural systems of the region and contributing to agricultural sustainability. The resulting acidification, as well as pollution of water sources, that has occurred in Australia as a direct result of heavy subsidies demonstrates the importance of this aspect of agriculturalization and of the linkages between government economic policy and the environment in agriculture.

In the 1990s, the role of the governments converged as there was a move toward liberal economic policies in both Argentina and Australia, as well as in other parts of the world. This was encouraged by international financial institutions such as the World Bank and the International Monetary Fund. For Australia, this meant significant changes in the role of the government in agriculture with a decrease in government support and an increase in the role of transnational

corporations and global markets. These shifts were also evident in Argentina and contributed to an expansion of export-oriented agriculture and, to some degree, an increase in agricultural inputs due to decreases in tariffs. This liberal economic trend embodies a number of the variables involved in agriculturalization. For example, from Figure 5, a weakened public sector and absence of agricultural policy (upper right-hand corner) results in a cascade of effects including vulnerability to the uncertainty and variability of market conditions effecting the concentration of production and management leading to the weakening of rural communities and the simplification of the rural structure (Manuel-Navarrete and others 2005).

A second important difference between the two cases is the dry conditions in Australia and the exploitation of limited water resources. In Argentina, rainfall has been increasing, which has led to expansion of agriculture into more marginal areas and has contributed to double-cropping systems adding stress to cultivated land (Solbrig 1996). In Australia, there have been occasional droughts, which have led to the heavy use of irrigation contributing to aquifer degradation and soil salinization. These symptoms are not apparent in the Pampas region and are due to regional differences in climate conditions. However, Pickup (1998: 58) discussed the role of climate variability in agriculture-related environmental degradation in Australia and noted the effects of short-term trends of increasing rainfall on land use activities. While this study's focus was on cattle and sheep ranching, it was noted that there was also an expansion of cropping into dry or marginal areas as a result of unrealistically high expectations for rainfall. While this is similar to the aforementioned trend in Argentina, in Australia this unsustainable land use practice, which resulted in increasing land degradation, was often encouraged by government subsidies and drought assistance. This is another example of how government support can contribute to environmental problems. These interesting comparisons help us to better understand the complex processes that occur with the "variation of rainfall" variable as shown in Figure 5. For example, variation in rainfall in a positive sense (i.e. Increases in rainfall) can lead to changes in expectations and hence, use of marginal land for agriculture leading to an increase in degradation which can be spurred on by government policies. Variation of rainfall can also change in the negative sense leading to aquifer and soil degradation.

The primary features that differentiate the process of agriculturalization in Australia from that in Argentina could be due to a number of factors. Most likely, these differences are largely the result of contextual and local variation. Australia differs considerably from Argentina in its culture, history, economic and political structures as well as in its relationships to other countries. In addition, its geographic situation contributes to the different climatic conditions that are important factors in agricultural processes. Hence, one would expect some differences in the way the agriculturalization process is manifested in these two contexts.

A second point to consider is the possibility of a temporal dimension to the causal complex of agriculturalization. As discussed in Chapter 2, one critique of the syndrome approach is that it assumes that processes occur and reoccur in a functionally continuous and simultaneous manner without considering the evolution of processes and historical factors (Barrera and others 2002). Perhaps some of the differences seen between these two cases can be thought of as changes in the process of agriculturalization over time and different temporal relationships between processes within the causal complex. For example, the occurrence of soil acidification in Australia is an important factor in agriculture in that region due largely to over-use of fertilizers. While this can be seen as a contextual difference due to government subsidies for fertilizers, it may also be viewed as part of the same causal complex of agriculturalization in Argentina. That is to say, the lack of a role of the government in the use of agricultural inputs in the form of subsidies is perhaps a factor in the low-input agriculture in Argentina. This could change in the future leading to a large increase in the use of fertilizers, which could contribute to acidification in the Pampas. In other words, the process

of the effects of government support, or lack thereof, on input use and hence, soil status, is at work in both regions. The difference is a matter of evolution of the process and historical effects.

Finally, these differences could indicate that a different process altogether is taking place in Australia. This again depends on how agriculturalization is defined as well as at what level the process is considered. It does appear that the key processes of agriculturalization and key symptoms are present in Australian agriculture with differences occurring at a narrower or more specific level of operation. Nonetheless, the important differences noted above highlight some of the difficulties in using a syndrome approach as is discussed further below.

If agriculturalization can be considered a syndrome, there are several implications that make this understanding of the process useful. If the process as described occurs in multiple locations around the world, it could then be used to locate regions that may be prone to agriculturalization or regions in which it is already occurring. The symptoms exhibited by agriculturalization such as habitat and biodiversity loss, rural exodus and soil degradation may be easily identifiable based on current and recent statistical research around the world. If such trends are occurring in a region, it may present a possible case for further exploration in which causal processes such as expansion of export-oriented agriculture, liberal economic policies and land and production concentration can be evaluated. In addition, by reaching a better understanding of the agriculturalization process through comparative case studies, more effective global mitigation plans can be designed and implemented. Finally, in recognizing some of the potential pre-conditions for agriculturalization such as weakening government support for agriculture, it may be possible to address problems of agriculturalization before they occur, leading to a more effective treatment of the source of the problems rather than simply addressing symptoms.

The recurrence of trends of environmental degradation in different parts of the world makes clear the importance of global interconnectedness and the global nature of such processes. The similarities in economic policies from country to country that occur as a result of encouragement by international financial institutions can result in similar impacts from social to environmental levels. Many social and environmental symptoms are evermore linked to systemic problems such as unsustainable global trade and resource policies. In addition, the global nature of climate change has become apparent and there exists a global responsibility for dealing with such issues. This interconnectedness is also exhibited on the level of different disciplinary spheres. These complex processes of environmental change are inextricably linked to human society, economic policy, politics and culture. The complexity of these interactions is clearly shown with the brief examination of the two case studies in the current study. By considering such processes as syndromes, it is possible to approach solutions to these problems from a more transdisciplinary perspective by bringing together individuals from a variety of disciplines to formulate more effective policies for mitigation.

The examination of these two cases also highlights a certain level of contextual variability that cannot be ignored. To some degree, this impacts the usefulness of global approaches to problems that appear to be of a global nature. While similar processes may occur in various parts of the world, their causes and effects in a region may differ considerably depending on any number of variables. It is true that certain processes do involve global characteristics, and for this reason global approaches should be a part of the solution. However, this should not act in place of or deemphasize the importance of local solutions. This is one consideration in examining syndromes of sustainability of development as opposed to syndromes of global change. Syndromes of sustainability of development take a more regional approach to the syndrome concept. Hence, more localized processes may be distinguished and causal complexes and policy solutions can be more place-specific. In this way, the utility of the syndrome approach as a transdisciplinary methodology can be applied to issues without generalizing problems to a global level that likely have regional and local variability.

V. Conclusion

Processes of environmental change are enormously complex and in order to begin to understand them and to work toward the implementation of effective policy to combat negative trends we must utilize knowledge from a vast array of disciplines in an integrated manner. The syndrome approach presents one possible path toward this integration of knowledge.

The Division of Sustainable Development and Human Settlements at ECLAC has been working toward an interdisciplinary understanding of issues of sustainability in the Latin American region and has employed an adaptation of the WGBU's syndrome approach for this purpose. The current study has been an extension of this work and an attempt to present a possible case for further research in order to bring greater insight to the process of agriculturalization, which has been proposed as a syndrome of sustainability of development. By comparing the case of Australian agriculture to agriculturalization in the Argentinean Pampas, some of the elements of the process can be understood in a broader context and the utility of agriculturalization as a syndrome can be discussed.

Another aspect that can be drawn from this comparison is the importance of positive trends and developments that emerge within these causal complexes. Greater consideration of characteristics of sustainability has been one of ECLAC's adaptations of the approach. In terms of agriculturalization, the development of awareness of socio-ecological problems, as well as their economic impacts, within the public, agricultural sector and government can be viewed as a positive trend. This has manifested itself in Australia with the government funded Landcare program and in both countries with the increased use

of no-tillage technologies for soil conservation. Perhaps such positive trends can be the basis for the exchange of knowledge and experience between countries or regions that are undergoing similar trends of socio-ecological change.

In addition to the development of sustainable practices, it is also possible to illuminate past practices of sustainability, which have been replaced by unsustainable systems. An example of this would be the sustainable rotational agriculture systems that dominated Argentinean agriculture for many decades and the practice of low-input agriculture, which has helped to maintain relatively healthy soils in the region. A transdisciplinary understanding of how such practices contribute to sustainability can be an entry point for policy-making and mitigating actions.

To conclude, agriculturalization is changing the social, economic and natural landscape of the Argentinean Pampas and effective policy to mitigate the negative trends requires a transdisciplinary understanding of the processes. Regional efforts toward mitigation can be strengthened by global actions and international collaboration, particularly with countries that are undergoing similar processes. This study has been an effort to introduce a possible starting point for further research on the global implication of the agriculturalization syndrome.

Bibliography

AAFC (Agriculture and Agri-food Canada) (2001), "Australia: Wheat situation and outlook", in online Bi-weekly Bulletin, vol. 14, No 21, 14 December 2001, Available from <http://www.agr.gc.ca/mad-dam/e/bulletine/v14e/v14n21e.pdf> [Accessed on 27 September 2005].

ABS (Australian Bureau of Statistics) (2005), "Year Book Australia", [Online] Available from <http://www.abs.gov.au/ausstats/abs@.nsf/7884593a92027766ca2568b5007b8617/dbb1a70c2b2e0bbdca256889000e7506!OpenDocument> [Accessed 23 September 2005].

Barrera, A. and others (2002), "Key challenges of sustainable development and research priorities: Social practices as driving forces of change" in NCCR (National Centre of Competence in Research) North-South (Eds.) Research Partnerships for Mitigating Syndromes of Global Change. Berne, Switzerland, Centre for Development and Environment.

Beresford, Q. (2001), "Developmentalism and its environmental legacy: The Western Australia Wheatbelt, 1900-1990s", Australian Journal of Politics and History, vol. 47, No.3, pp. 403-414.

Cary, J. and Webb, T. (2001), "Landcare in Australia: Community participation and land management", Journal of Soil and Water Conservation, vol. 56, No. 4, pp. 274-278.

Cassel-Gintz, M. (2003), "Reflections on the syndrome approach for the NCCR North-South: The link between sustainable development, systems theory and the syndrome approach", IP1 Working Paper, [Online] Available from <http://www.nccr-north-south.unibe.ch> [Accessed on 16 September 2005].

Chudnovsky, D. (2004), "Trade, environment and development: The recent Argentine experience", Working Group on Development and the Environment in the Americas, Discussion Paper Number 3, [Online] Available from http://ase.tufts.edu/gdae/Pubs/rp/DP03ChudnovskyJuly04.pdf> [Accessed on 16 September 2005].

CIS (The Centre for Independent Studies) (1999), "Australia's prospects in the global economy", Policy, Spring, [Online] Available from <http://www.cis.org.au/Policy/Spr99/Spr99-12.pdf> [Accessed on 8 November 2005].

FAO (Food and Agriculture Organization) (2005), FAOSTAT data [Online Database] Available from <http://faostat.fao.org/> [Accessed November 2005].

Gallopín, G.C. (2004), "What kind of system of science (and technology) is needed to support the quest for sustainable development?" in Schellnhuber, H.J. and others (eds.). Earth Systems Analysis for Sustainability, Cambridge, MIT Press.

Hatton, T.J. and others (2003), "Preclearing hydrology of the Western Australia Wheatbelt: Target for the future?", Plant and Soil, vol. 257, pp. 341-356.

Hurni, H. and others (2002), "Initiating research for mitigating syndromes of global change in different contexts" in NCCR (National Centre of Competence in Research) North-South (Eds.) Research Partnerships for Mitigating Syndromes of Global Change, Berne, Switzerland, Centre for Development and Environment.

Hyberg, B. and Pascoe, S. (1991), "Australia's environmental degradation from agriculture: Lingering effects and greater visibility", World Agriculture, June, [Online] Available from <http://www.findarticles.com/p/articles/mi_m3809/is_11174328/pg_2> [Accessed on 15 September 2005].

Joensen, L. and Semino, S. (2004), "Argentina's torrid love affair with the soybean", Seedling, October 2004, pp. 5-10.

Lawrence, G. (1999), "Agri-food restructuring: A synthesis of recent Australian research", Rural Sociology, vol. 64, No. 2, pp. 186-203.

Lüdeke, M.K.B. and others (2004), "Syndromes of global change: The first panoramic view", GAIA, vol. 13, No. 1, pp. 42-49.

Manuel-Navarrete, D. and others (2005), "Análisis sistémico de la agriculturización en la pampa húmeda argentina y sus consecuencias en regions extra-pampeanas: sostenibilidad, brechas de conocimiento, e integración de políticas", Serie Medio Ambiente y Desarrollo, 118, Santiago, ECLAC.

Noe, D. (2004), Policy Implications for the Agriculturalization Syndrome in La Pampa Húmeda–Argentina, Submitted to Gilberto Gallopin, ECLAC, John F. Kennedy School of Government, Harvard University.

Rabinovich, J. and Torres, F. (2004), "Caracterización de los síndromes de sostenibilidad del desarrollo. El caso de Argentina", Serie Seminarios y Conferencias, 38, Santiago, ECLAC.

Pickup, G. (1998), "Desertification and climate change–the Australian perspective", Climate Research, vol. 11, pp. 51-63.

Pittock, B. (ed.) (2003), Climate Change–An Australian Guide to the Science and Potential Impacts, Canberra, Australian Greenhouse Office.

SAGov (South Australian Government) (2003), "State of the Environment Report for South Australia 2003–Supplementary Report", [Online] Available from <http://www.environment.sa.gov.au/soe2003/sup_report/land/soil_erosion%20.pdf> [Accessed on 15 September 2005].

Schellnhuber, H.J. (1999), "'Earth system' analysis and the second Copernican revolution", Nature, vol. 402(supp), C19-C23.

Solbrig, O.T. (1996), "Towards a sustainable Pampas agriculture: Past performance and prospective analysis", The David Rockefeller Center for Latin American Studies, Harvard University, Cambridge, Mass., paper No. 96/97-6, [Online] Available from <http://www.fas.harvard.edu/~drclas/publications/PDFs/solbrig.pdf> [Accessed 16 September 2005].

Solbrig, O.T. and Vero, R. (2000), "Impact of globalization on the grasslands in the Southern Cone of South America", The David Rockefeller Center for Latin American Studies, Harvard University, Cambridge, Mass., paper No. 00/01-2, [Online] Available from <http://www.fas.harvard.edu/~drclas/publications/PDFs/impactofglob.pdf> [Accessed 16 September 2005].

Solbrig, O.T. and Viglizzo, E. (1999), "Sustainable farming in the Argentine Pampas: History, society, economy, and ecology", The David Rockefeller Center for Latin American Studies, Harvard University, Cambridge, Mass., paper No. 99/00-1, [Online] Available from <http://www.fas.harvard.edu/~drclas/publications/PDFs/solbrig_viglizzo.pdf> [Accessed on 16 September 2005].

Stevens, W. (2001), "Declining biodiversity and unsustainable agricultural production–Common causes, common solution?", Research Paper 2 2001-02, Parliament of Australia, [Online] Available from <http://www.aph.gov.au/library/pubs/rp/2001-02/02RP02.htm> [Accessed on 23 September 2005].

UN (United Nations) (2004), World Urbanization Prospects: The 2003 Revision. Urban and Rural Areas Dataset (POP/DB/WUP/Rev.2003/Table A.7). Population Division of the Department of Economic and Social Affairs. [Online] Available from <http://www.un.org/esa/population/ordering.htm> [Accessed 15 December 2005].

Vanclay, F. (2003), "The impacts of deregulation and agricultural restructuring for rural Australia", Australian Journal of Social Issues, vol. 38, No. 1, pp. 81-94.

Viglizzo, E.F. and others (2002), "Environmental assessment of agriculture at a regional scale in the pampas of Argentina", Environmental Monitoring and Assessment, vol. 87, pp. 169-195.

WBGU (German Advisory Council on Global Change) (1997), World in Transition: The Research Challenge Annual Report 1996, Berlin, Springer-Verlag.

WCED (World Commission on Environment and Development) (1987), Our Common Future (The Brundtland Report), Oxford and New York, Oxford University Press.

Wehbe, M.B. and others (2005), "Macroeconomic reforms and agriculture policies in developing countries: Impacts on social vulnerability in the Argentinean Pampas and Mexican coffee sector", Center for International Climate and Environmental Research, Oslo, Norway, [Online] Available from <http://www.cicero.uio.no/humsec/papers/Wehbe.pdf> [Accessed on 16 September 2005].

NACIONES UNIDAS

Serie

CEPAL medio ambiente y desarrollo

Issues published*

79. Oferta de bienes y servicios ambientales para satisfacer las necesidades de micro y pequeñas empresas: el caso mexicano, David Romo (LC/L.2065-P), N° de venta: S.04.II.G.8 (US$ 10.00), enero de 2004. E-mail: mschaper@eclac.cl **www**

80. Desafíos y propuestas para la implementación más efectiva de instrumentos económicos en la gestión de América Latina y el Caribe: el caso de Perú, Raúl A. Tolmos (LC/L.2073-P), N° de venta: S.04.II.G.16 (US$ 10.00), febrero de 2004. E-mail: jacquatella@eclac.cl **www**

81. Desafíos y propuestas para la implementación más efectiva de instrumentos económicos en la gestión de América Latina y el Caribe: el caso de Argentina, Eduardo Beaumont Roveda (LC/L.2074-P), N° de venta: S.04.II.G.17 (US$ 10.00), febrero de 2004. E-mail: jacquatella@eclac.cl **www**

82. Microcrédito y gestión de servicios ambientales urbanos: casos de gestión de residuos sólidos en Argentina, Martina Chidiak y Néstor Bercovich (LC/L.2084-P), N° de venta: S.04.II.G.23 (US$ 10.00), marzo de 2004. E-mail: mailto:mschaper@eclac.cl **www**

83. El mercado de carbono en América Latina y el Caribe: balance y perspectivas, Lorenzo Eguren C. (LC/L.2085-P), N° de venta: S.04.II.G.24 (US$ 10.00), marzo de 2004. E-mail: mailto:jacquatella@eclac.cl **www**

84. Technological evaluation of biotechnology capability in Amazon institutions, Marília Coutinho (LC/L.2086-P), Sales N°: S.04.II.G.25 (US$ 10.00), March, 2004.E-mail: jgomez@eclac.cl **www**

85. Responsabilidad social corporativa en América Latina: una visión empresarial, María Emilia Correa, Sharon Flynn y Alon Amit (LC/L.2104-P), N° de venta: S.04.II.G.42 (US$ 10.00), abril de 2004. E-mail: gnunez@eclac.cl **www**

86. Urban poverty and habitat precariousness in the Caribbean, Robin Rajack and Shrikant Barhate (LC/L.2105-P), Sales Nº: E.04.II.G.43 (US$ 10.00), April, 2004. E-mail: rjordan@eclac.cl **www**

87. La distribución espacial de la pobreza en relación a los sistemas ambientales en América Latina, Andrés Ricardo Schuschny y Gilberto Carlos Gallopín (LC/L. 2157-P), N° de venta: S.04.G.85 (US$ 10.00), junio de 2004. E-mail: ggallopin@eclac.cl **www**

88. El mecanismo de desarrollo limpio en actividades de uso de la tierra, cambio de uso y forestería (LULUCF) y su potencial en la región latinoamericana, Luis Salgado. (LC/L. 2184-P), N° de venta: S.04.II.G.111 (US$ 10.00), octubre de 2004. E-mail: jacquatella@eclac.cl **www**

89. La oferta de bienes y servicios ambientales en Argentina. El papel de la Pymes, Andrés López (LC/L. 2191-P), N° de venta: S.04.II.G.118 (US$ 10.00), octubre de 2004. E-mail: jleal@eclac.cl **www**

90. Política y gestión ambiental en Argentina: gasto y financiamiento. Oscar Cetrángolo, Martina Chidiak, Javier Curcio, Verónica Guttman (LC/L. 2190-P), N° de venta: S.04.II.G.117 (US$ 10.00), octubre de 2004. E-mail: cdemiguel@eclac.cl **www**

91. La sostenibilidad ambiental del desarrollo en Argentina: tres futuros. Gilberto Carlos Gallopín (LC/L. 2197-P), N° de venta: S.04.II.G.123 (US$ 10.00), octubre de 2004. E-mail: ggallopin@eclac.cl **www**

92. A coordenação entre as políticas fiscal e ambiental no Brasil: a perspectiva dos governos estaduais. Jorge Jatobá (LC/L. 2212/Rev.1-P), N° de venta: S.04.II.G.134 (US$ 10.00), novembro de 2004. E-mail: jgomez@eclac.cl **www**

93. Identificación de areas de oportunidad en el sector ambiental de América Latina y el Caribe. Casos exitosos de colaboración entre industrias para formular alianzas. Ana María Ruz, Hernán Mladinic (LC/L.2249-P), N° de venta: S.05.II.G.7 (US$ 10.00), enero de 2005. E-mail: jleal@eclac.cl **www**

94. Políticas e instrumentos para mejorar la gestión ambiental de las pymes en Colombia y promover su oferta en materia de bienes y servicios ambientales. Bart van Hoof (LC/L.2268-P), N° de venta: S.02.II.G.21 (US$ 10.00), febrero 2005. E-mail: jleal@eclac.cl **www**

95. Políticas e instrumentos para mejorar la gestión ambiental en las pymes y promover la oferta de bienes y servicios ambientales: el caso mexicano. David Romo (LC/L.2269-P), N° de venta: S.04.II.G.22 (US$ 10.00), febrero 2005. E-mail: jleal@eclac.cl **www**

96. Políticas para mejorar la gestión ambiental en las pymes argentinas y promover su oferta de bienes y servicios ambientales. Néstor Bercovich, Andrés López (LC/L.2270-P), N° de venta: S.05.II.G.23 (US$ 10.00), febrero 2005. E-mail: jleal@eclac.cl www

97. Evolución de las emisiones industriales potenciales en América Latina, 1970-2000. Laura Ortíz M., Andrés R. Schuschny, Gilberto C. Gallopín (LC/L.2271-P), N° de venta: S.04.II.G.24 (US$ 10.00), febrero 2005. E-mail: ggallopín@eclac.cl www

98. Crédito y microcrédito a la mipyme mexicana con fines ambientales: situación y perspectivas. David Romo Murillo (LC/L.2281-P), Nº de venta: S.05.II.G.33 (US$ 10.00), abril 2005. E-mail: jose.leal@cepal.org www

99. Sustainable human settlements development in Latin America and the Caribbean. Lucy Winchester (LC/L.2287-P), Sales Nº: E.05.II-G.39 (US$10.00), February, 2005. E-mail: lucy.winchester@cepal.org www

100. Coordinación de las políticas fiscales y ambientales en la República Dominicana. Magdalena Lizardo y Rolando M. Guzmán (LC/L. 2303-P), Nº de venta: S.05.II.G.51 (US$ 10.00), marzo 2005. E-mail: jose.gomez@cepal.org www

101. Evaluación de la aplicación de los beneficios tributarios para la gestión e inversión ambiental en Colombia. Diana Ruiz Benavides, Gerardo Viña Vizcaíno, Juan David Barbosa Mariño y Alvaro Prada Lemus. (LC/L.2306-P), Nº de venta: S.05.II.G.55 (US$ 10.00), abril 2005. E-mail: jose.gomez@cepal.org www

102. Coordinación entre las políticas fiscal y ambiental en el Perú. Manuel Glave Tesino (LC/L.2327-P), Nº de venta: S.05.II.G.72 (US$ 10.00), junio 2005. E-mail: jose.gomez@cepal.org www

103. El gasto medio ambiental en Perú: exploración inicial. Javier Abugattás (LC/L.2349-P), Nº de venta: S.05.II.G.88 (US$ 10.00), agosto 2005. E-mail: carlos.demiguel@cepal.org www

104. Panorama do comportamento ambiental do setor empresarial no Brasil. Karen Pires de Oliveira (LC/L.2351-P), Nº de venta: P.05.II.G.90 (US$ 10.00), agosto 2005. E-mail: carlos.demiguel@cepal.org www

105. Ecoeficiencia: marco de análisis, indicadores y experiencias. José Leal (LC/L.2352-P), Nº de venta: S.05.II.G.91 (US$ 10.00), septiembre 2005. E-mail: jose.leal@cepal.org www

106. Gasto y desempeño ambiental del sector privado en Colombia. Carlos Manuel Herrera Santos (LC/L.2356-P), Nº de venta: S.05.II.G.94 (US$ 10.00), septiembre 2005. E-mail: carlos.demiguel@cepal.org www

107. Política fiscal para la gestión ambiental en Colombia. Mary Gómez Torres (LC/L.2357-P), Nº de venta: S.05.II.G.95 (US$ 10.00), octubre 2005. E-mail: jose.gomez@cepal.org www

108. Oportunidades para a coordenação de políticas agrícolas e ambientais no Brasil. Aércio S. Cunha (LC/L.2358-P), Nº de venta: P.05.II.G.96 (US$ 10.00), octubre 2005. E-mail: jose.gomez@cepal.org www

109. O sistema municipal e o combate à pobreza no Brasil. Beatriz Azeredo, Thereza Lobo (LC/L.2379-P), Nº de venta: P.05.II.G.123 (US$ 10.00), octubre 2005. E-mail: daniela.simioni@cepal.org www

110. El sistema municipal y la superación de la pobreza en Colombia. Alberto Maldonado (LC/L.2380-P), Nº de venta: S.05.II.G.124 (US$ 10.00), octubre 2005. E-mail: daniela.simioni@cepal.org www

111. El sistema municipal y la superación de la pobreza y precariedad urbana en Chile. Patricia Cortés (LC/L.2381-P), Nº de venta: S.05.II.G.125 (US$ 10.00), octubre 2005. E-mail: daniela.simioni@cepal.org www

112. Políticas e instrumentos para mejorar la gestión ambiental de la pyme en Chile y promover su oferta de bienes y servicios ambientales. Marcelo Sepúlveda (LC/L. 2382-P), Nº de venta: S.05.II.G.126 (US$ 10.00), octubre 2005. E-mail: jose.leal@cepal.org www

113. Revisión crítica de la experiencia chilena en materia de crédito y microcrédito aplicado a iniciativas de la microempresa y pymes para lograr mejoras en la gestión ambiental. Enrique Román (LC/L.2384-P), Nº de venta: S.05.II.G.128 (US$ 10.00), octubre 2005. E-mail: jose.leal@cepal.org www

114. El financiamiento del desarrollo sostenible en el Ecuador. Nelson Gutiérrez Endara, Sandra Jiménez Noboa (LC/L.2396-P), Nº de venta: S.05.II.G.139 (US$ 10.00), octubre 2005. E-mail: carlos.demiguel@cepal.org www

115. Fallas de coordinación: desafíos de política para el federalismo fiscal-ambiental argentino Ernesto Rezk (LC/L.2428-P), Nº de venta: S.05.II.G.175 (US$ 10.00), noviembre 2005. E-mail: jacquatella@cepal.org www

116. Coordinación de políticas públicas para el desarrollo sostenible del sector turismo en el Perú. Jorge Mario Chávez Salas (LC/L.2429-P), Nº de venta: S.05.II.G.176 (US$ 10.00), noviembre 2005. E-mail: jose.gomez@cepal.org www

117. La otra agenda urbana. Tareas, experiencias y programas para aliviar la pobreza y precariedad en las ciudades de América Latina y el Caribe. Joan Mac Donald (LC/L.2445-P), Nº de venta: S.05.II.G.192 (US$ 10.00), noviembre 2005. E-mail: daniela.simioni@cepal.org www

118. Análisis sistémico de la agriculturización en la pampa húmeda argentina y sus consecuencias en regiones extra-pampeanas: sostenibilidad, brechas de conocimiento, e integración de políticas. David Manuel Navarrete, Gilberto Gallopín y otros (LC/L.2446-P), Nº de venta: S.05.II.G.193 (US$ 10.00), diciembre 2005. E-mail: gilberto.gallopin@cepal.org www

119. Bienes y servicios ambientales en México: caracterización preliminar y sinergias entre protección ambiental, desarrollo del mercado y estrategia comercial. Carlos Muñoz Villarreal (LC/L.2463-P), Nº de venta: S.05.II.G.210 (US$ 10.00), diciembre 2005. E-mail: jose.leal@cepal.org www

120. El sistema municipal y superación de la pobreza y precariedad urbana en el Perú. Alberto Flores (LC/L.2464-P), Nº de venta: S.05.II.G.211 (US$ 10.00), diciembre 2005. E-mail: daniela.simioni@cepal.org **www**

121. El sistema municipal y superación de la pobreza y precariedad urbana en Uruguay. David Glejberman (LC/L.2465-P), Nº de venta: S.05.II.G.212 (US$ 10.00), diciembre 2005. E-mail: daniela.simioni@cepal.org **www**

122. Espacios públicos urbanos, pobreza y construcción social. Olga Segovia, Ricardo Jordán (LC/L.2466-P), Nº de venta: S.05.II.G.213 (US$ 10.00), diciembre 2005. E-mail: daniela.simioni@cepal.org **www**

123. Financiamiento municipal y reducción de la pobreza en Argentina. Javier Curcio. (LC/L.2467-P), Nº de venta: S.05.II.G.214 (US$ 10.00), diciembre 2005. E-mail: daniela.simioni@cepal.org **www**

124. Previniendo la informalidad urbana en América Latina y el Caribe. Nora Clichevsky (LC/L.2472-P), Nº de venta: S.05.II.G.218 (US$ 10.00), diciembre 2005. E-mail: daniela.simioni@cepal.org **www**

125. Agriculturalization as a syndrome: a comparative study of agriculture in Argentina and Australia. Sarah Young (LC/L.2531-P), Sales Nº: E.06.II.G.58 (US$ 10.00), May, 2006. E-mail: gilberto.gallopin@cepal.org **www**

- Readers wishing to obtain the above publications can do so by writing to: Distribution Unit, ECLAC, Casilla 179-D, Santiago, Chile, Fax (562) 210 2069, E-mail: publications@eclac.cl.

www These publications are also available on the Internet: http://www.eclac.org/ and http://www.cepal.org

Name: .....

Activity: .....

Address: .....

Postal code, city, country: .....

Tel.: ..... Fax: ..... E.mail: .....