Global Environmental Change, Globalization and Food Systems

IAI-IHDP Global Environmental Change Training Institute on Globalization and Food Systems - Scientific Workshop (October 24 - November 6, 2004, Nicoya, Costa Rica) and Science-Policy Forum (November 5, 2004, San Jose, Costa Rica)

SCIENCE-POLICY FORUM PROCEEDINGS

Ave. dos Astronautas, 1758
12227-010 São José dos Campos, SP, Brazil
Tel. (55) 12 3945 6855
Fax (55) 12 3941 4410
www.iai.int

Walter-Flex-Strasse 3
D-53113 Bonn, Germany
Tel. (49) 228 73 4957
Fax (49) 228 73 9054
www.ihdp.org

San Isidro de Coronado, San José, Costa Rica
Tel. (506) 216 0222
Fax (506) 216 0239
www.iica.int

Table of Contents

I. Foreword

Foreword

Gustavo V. Necco[1]

Global environmental change is one of the major challenges that humanity is facing. The effects of human activities, including those related to food, are increasingly recognized to be partly responsible for climate change and other global and regional environmental alterations. At the same time, there is growing concern that the ability to provide food will be further complicated by the effects of globalization, and that meeting the growing societal demand for food will lead to further environmental degradation.

The Inter-American Institute for Global Change Research (IAI) and the International Human Dimensions Programme on Global Environmental Change (IHDP), in cooperation with a pool of institutions from Costa Rica, which also composed the Forum Organizing Committee, and the Inter-American Institute for Cooperation on Agriculture (IICA), jointly organized a one-day Science-Policy Forum associated with the IAI-IHDP Training Institute on Global Environmental Change, Globalization and Food Systems. The aim of the Forum was to explore, in a regional context, the critical interactions between the transformation of food systems in a globalizing world and global environmental change, and its implications for food security.

The major presentations and the results of the deliberations are summarized in this publication where several issues and associated challenges are presented and discussed. The different views, analyses and discussions offered in the Proceedings will no doubt provide a sound basis for those interested in the fundamental issue of how to cope with the impacts of global environmental change on food systems in the region.

We are very grateful to the IHDP for its interest and commitment in jointly organizing the Training Institute, to the Mesoamerican Institute of the National University of Costa Rica (CEMEDE/UNA) for hosting the IAI-IHDP Scientific Workshop, to IICA for the generous financial support making possible the production of the Proceedings, and to all Costa Rican institutions for their contribution to the success of the event. In addition, I wish to commend the efforts of the Forum Organizing Committee members and their institutions: Edgar Gutierrez, Development Observatory (OdD) of the University of Costa Rica (UCR); Patricia Ramirez, Regional Committee for Water Resources (CRRH); Pedro Leon, National Environmental Forum (NEF) of the National Center of Advanced Technology (CENAT) of Costa Rica; Adrian G. Rodriguez, Inter-American Institute for Cooperation on Agriculture (IICA); Walter Fernandez, National Academy of Sciences of Costa Rica; Karen O´Brien, University of Oslo, Norway; Valerie Schulz, International Human Dimensions Programme

[1]*Gustavo V. Necco was director of the Inter-American Institute for Global Change Research (IAI) from 2002 to 2004.*

(IHDP); Marcella Ohira, Claudia Fernandez and Gicela Zambon, Inter-American Institute for Global Change Research (IAI).

I would also like to thank the editors of this publication Man Yu Chang and Marie Rarieya for their hard work, a very special thanks to Karen O´Brien and Robin Leichenko for their editorial contributions and review, and to Celine Demaret for her tireless efforts in helping with the production of this publication.

We are particularly thankful to all lecturers and participants for their engagement and enthusiasm, leading to a very productive and fruitful event.

II. INTRODUCTION

SCIENTIFIC WORKSHOP AND SCIENCE-POLICY FORUM ON GLOBAL ENVIRONMENTAL CHANGE, GLOBALIZATION AND FOOD SYSTEMS

Introduction

Karen O'Brien and Robin Leichenko

It is becoming increasingly clear from scientific research that global environmental change such as climate change, ozone depletion, land use changes and biodiversity loss are influencing both natural and human systems in ways that are unprecedented in recent human history. Although environmental changes are not new, the rate and magnitude of these changes are expected to challenge both coping and adaptive capacities of these systems in the present and in the future, and although the impacts will be widespread, food systems in particular, are likely to undergo dramatic changes.

Some region's sectors, ecosystems and social groups are likely to be more affected than others by these global environmental changes, in part because their ability to tolerate or respond to changes is lower. Over the past years, issues of vulnerability and equity have emerged as important cross-cutting themes in human dimensions of global environmental change research. But environmental change is not the only process that is occurring at a global scale: globalization, which is often described as a movement towards greater economic, political and cultural integration, is also creating rapid and dramatic economic, social, cultural and environmental changes. It is leading to changes in both the production and consumption of foods, as well as access and availability of food. Advances in biotechnology, transportation and communication, coupled to the expansion of neo-liberal policies such as trade liberalization, privatization, decentralization and increased foreign direct investment are changing global food systems. But like global environmental change, the impacts of these changes are uneven. Although globalization creates many benefits and opportunities, it also creates negative outcomes for some regions and for some social groups, so vulnerability and equity are again emerging as critical issues in debates about globalization and food security.

It's important to emphasize that both of these global processes are occurring simultaneously, not in isolation, so there are important intersections and interactions at all levels of analyses. The processes, outcomes and responses are linked in both direct and indirect ways. For example, the increase of trade of foods contributes directly to greenhouse gas emissions; and trade liberalization indirectly influences the abilities of some farmers to adapt to changing environmental conditions by destroying markets for traditional crops that have been adapted to climate variability.

Changing trade patterns also create new pressures on land such as deforestation, as is the case with increased soybean cultivation in the Amazon region. On the other hand, climate change and increasing scarcity of water in some regions influences the ability to adapt to changing economic conditions, particularly when it comes to the production of water-intensive export crops and vegetables.

To understand global environmental change, including vulnerability and equity issues, it's becoming increasingly clear that research needs to consider global environmental change

within the dynamic context of globalization. Policies that address or respond to one process alone are likely to be ineffective and in some cases, contradictory to policies that address another process. If sustainable development of food systems and livelihoods is the goal, then global environmental change and globalization must be considered together in relation to both science and policy.

In order to address these issues, IHDP (International Human Dimensions Programme on Global Environmental Change) and IAI (Inter-American Institute for Global Change Research) co-promoted and co-organized the 2004 Global Environmental Change Training Institute on Globalization and Food Systems – Scientific Workshop (October 24 - November 6, 2004) at the Mesoamerican Institute of the National University of Costa Rica in Nicoya, and the Science-Policy Forum (November 5, 2004) at the National Environmental Forum (NEF) of the National Center of Advanced Technology (CENAT) in San Jose, Costa Rica.

IHDP is an international inter-disciplinary, non-governmental science organization dedicated to promoting and coordinating research, capacity-building and networking on the human dimensions of global environmental change. IHDP takes a social science perspective on global macro-change and works at the interface between science and policy-making. IHDP looks at questions related to human drivers of global environmental change, and to the impact of the changes on human lives, as well as to society's responses in terms of mitigating and adapting to global environmental change.

IAI is an intergovernmental organization whose goal is to advance understanding, throughout the Americas, of global environmental change phenomena and their socioeconomic implications. In pursuit of this goal, the IAI is dedicated to the principles of scientific excellence, international cooperation, the open exchange of scientific information, and to provide policy and decision makers of IAI member countries with sound scientific information that will help them develop appropriate plans and actions for dealing with the effects of global change in the Americas. At present, the Institute has 19 member countries in the Americas: Argentina, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, the United States of America, Uruguay, and Venezuela.

The Scientific Workshop aimed to encourage systematic promotion of young scientists, particularly social scientists, from developing countries and countries in transition, and to initiate their future integration into the IHDP and IAI communities through the promotion of research on themes of the workshop. In addition, it sought to develop partnerships among governments, industries and communities; connect local and regional professionals and institutions worldwide with related initiatives and networks; and to inform local and regional professionals on the funding opportunities available to support projects dealing with global environmental change and food systems.

A Science-Policy Forum was held during the final day of the Institute. This forum focused on the science-policy interface and the use of scientific information in the policy and decision-making processes. It considered scientific information available and what needs to be better understood. Conversely, it also considered policy issues that should be incorporated into the scientific community's agenda. Governmental agencies, national and international organisations, NGO´s, and private companies were invited to attend this forum to learn about the results of the scientific workshop, contribute to the further training of participants, and discuss the scientific and political aspects of global change and food systems with Institute participants from different countries or regions.

Results of the Scientific Workshop

Karen O'Brien

A two-week workshop in Nicoya, hosted by CEMEDE, the Institute for Sustainable Development in the Semi-Arid Tropics, brought together 24 participants from 21 countries in Latin America, Africa, Asia and Eastern Europe, with diverse backgrounds in both natural and social sciences.

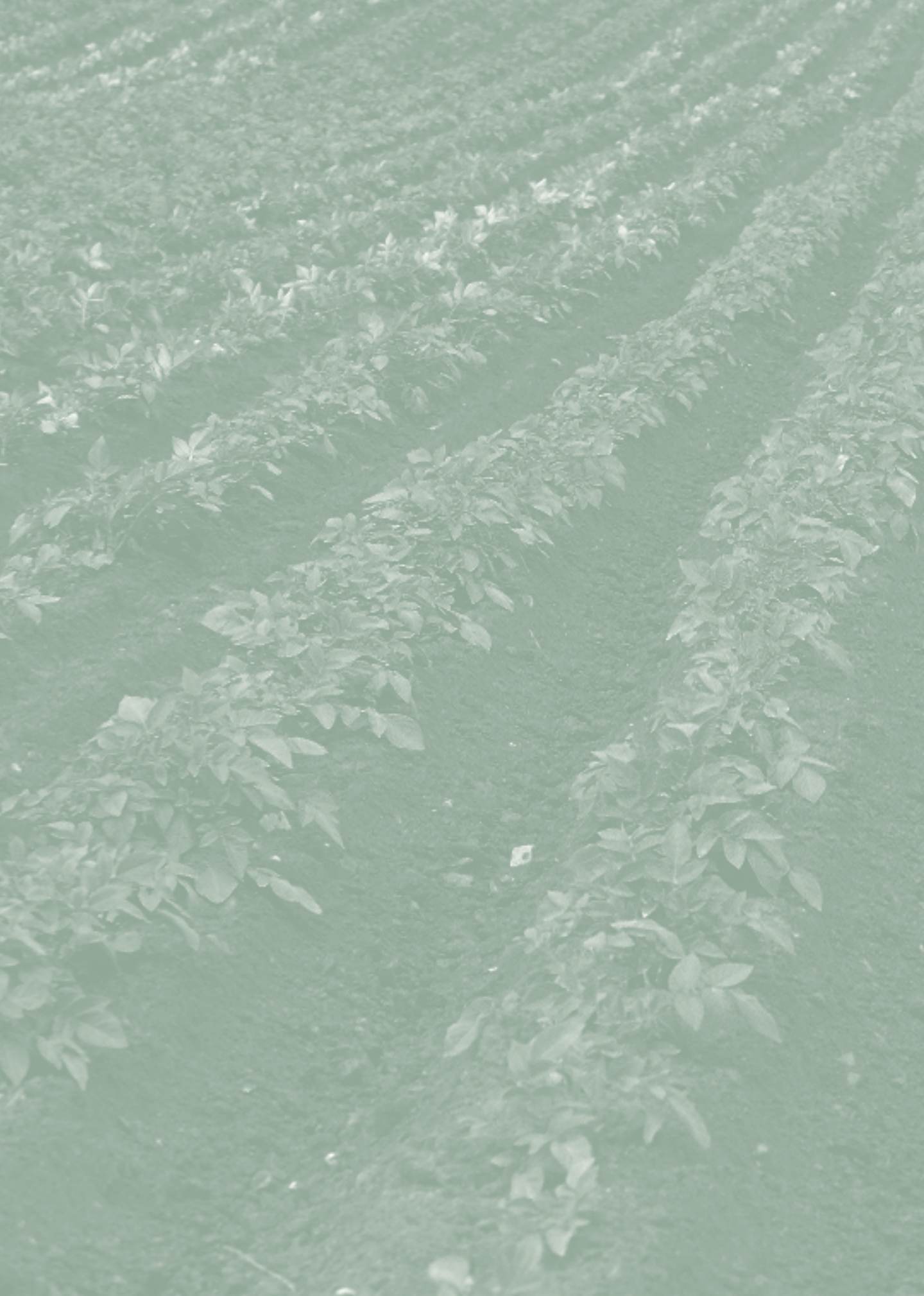
The focal point of the workshop was a shared interest in global environmental change and food systems in the context of globalization, as well as an approach that emphasizes the human dimensions of global environmental change. The topic is relevant and important to both science and policy.

During the workshop, many facets of related issues were examined in relation to some of the core projects that are sponsored by IHDP, for example, industrial transformations, land use and cover change, global change in human security, and institutional dimensions of global environmental change. The theme was also considered in relation to a joint international project on global environmental change and food systems. A number of invited speakers presented some key points related to the workshop theme; issues of sustainability and diversity, water use, decentralization, changes in bio-mass linked to transformations in food consumption, and changes in land use patterns, as well as differential vulnerability to both climate change and trade liberalization. Institutional issues such as fit, interplay, and scale of institutions were also covered.

Towards the end of the workshop, participants discussed how and where science can inform or influence policy. Discussions focused on who are the decision-makers and stakeholders, what is the difference between decision-makers and stakeholders, and what motivates decisions. One important point emphasized was that decisions are taken at all levels, from the farmer to the president, and that there are thus many points of entry for the results of science to influence policy. Through a series of lectures and group discussions, the participants in the workshop identified areas of potential research, and they worked in small groups, or in some cases individually, to develop project proposals that can potentially be turned into funded research projects. Just to give some examples of the topics that emerged, they are related to renewable energy, land use, and climate variability, all in the context of globalization.

The participants brought a vast amount of expertise and a wide array of perspectives to the workshop. Although it was a capacity-building workshop, the high level of experience and knowledge brought to the workshop by the participants contributed to a mutual exchange of knowledge between speakers and participants. The discussions and debates about the

linkages between global change, globalization and food systems were lively, passionate, and sometimes very extensive. There was a keen interest in how science, including research projects that were being developed, can contribute to or inform policies. Although science for the sake of science can be useful, most of the workshop participants envisaged that their research can contribute to positive changes in the production, consumption, access, and availability of food in the context of both global environmental change and globalization. Through the Science-Policy Forum, the organizers and participants gained a better understanding of the concerns of decision-makers and how they can be addressed by scientific research.



III. THE SCIENCE POLICY FORUM

III. Opening Ceremony of the Forum

Based on the Forum Transcripts

The Science-Policy Forum held on November 5, 2004 at the Auditorium Dr. Franklin Chang Díaz of the National Environmental Forum (NEF) of the National Center of Advanced Technology (CENAT) in San José, Costa Rica was officially opened by Fernando Gutierrez Ortiz, the Minister of Science and Technology of Costa Rica. The Minister was accompanied by Gustavo Necco, the Director of the IAI, Maarit Thiem, from IHDP, Gustavo Gordillo de Anda, the Assistant Director of Food and Agricultural Organization (FAO) for Latin America and the Caribbean, Edgar Gutiérrez-Espeleta, the Director of the Development Observatory of the University of Costa Rica, and Karen O'Brien from the Center for International Climate and Environmental Research (CICERO) at the University of Oslo, Norway.

The forum was attended by a broad range of experts, keynote speakers and twenty four participants from developing countries: Latin America, Asia, Africa and two countries with economies in transition: Slovakia and Romania. The forum was intended as a first step towards opening up a new direction in science-policy discourse relating to global environmental change, globalization and food systems concerns.

The Director of IAI, Gustavo Necco, welcomed the participants to the Science-Policy Forum, which was jointly organized by the IAI and the IHDP. In his remarks, Gustavo Necco emphasized that one of the main missions of the IAI is to develop skills in the region that facilitates the understanding of global environmental change. The IAI seeks to develop networks of scientists so that the region may have the information necessary for decision-makers at national, regional and global levels. It also focuses on capacity building, training and the diffusion of scientific knowledge. For this reason, IAI and IHDP jointly organized the Science-Policy Forum, bringing together experts from different professional specializations. The director emphasized that the transfer of this knowledge to the end users should be given priority.

In concluding his remarks, Gustavo Necco thanked the institutions present and extended his appreciation to NEF/CENAT for making available the facilities to a forum of this nature, which he believes is of great value to the region.

Representing the IHDP Secretariat in Bonn, Maarit Thiem welcomed the participants and mentioned that this is the first time that such a forum has been held in association with a scientific workshop. She emphasized that this type of interaction with the policy community in the region was very exciting from the perspective of workshop participants and organizers.

In his opening speech, Fernando Gutierrez Ortiz thanked the Organizing Committee for giving him the opportunity to provide focus at the opening ceremony. As Minister of Science and Technology of Costa Rica, he underscored two key concerns of Costa Rica: food security and quality of life.

He stressed that improving the quality of life remains core to addressing food security. In trying to mitigate these concerns, Costa Rica, like many other nations, has devised programmes through a National Development Plan in the areas of health, agriculture, livestock, science and technology. He stressed that concerns highlighted at the forum cannot just be confined to Costa Rica; they are evident in many nations.

Costa Rica has been involved in multiple national and regional programs and projects to combat food insecurity. To redress problems in the poorer and more vulnerable parts of society, in particular, Cost Rica has formulated a framework of laws and initiated a fund dubbed the "Incentive Fund of the Ministry of Science." These strategies were devised to incorporate issues of concern relating to global environment change, globalization, and food systems.

Regarding food insecurity, the Minister reiterated that it is imperative that persistent food deficit among the poor members of our community be dealt with as a matter of urgency. More importantly, he pointed out that poverty concerns have been on the agenda of donors, and that there are approximately 100 success stories. However, he said, "when we discuss poverty, these cases are not mentioned. We think so inadequately about agriculture that we fail to show a positive impact." The Minister noted that small scale farmers in Costa Rica are faced with fragile ecosystems, stressing that they face many other issues such as hill side topology, irrigation, issues of technology (mechanizations versus manual labor), access to markets, lack of assets to take up loans and credits facilities, among others. The Minister underscored that these issues cut across most of the developing countries.

In addition to the programs mentioned above, the Minister indicated that Costa Rica has valuable programs stressing information and communication technology and molecular biology as some of the alternatives to strengthen food security systems. Aspects of food security systems that are overlooked include bacteriological quality control and transgenic foods. Although these topics were not a focus at the forum, they merit discussion. He stressed the fact that there are a series of actions which have been undertaken in the research and policy fields through government departments like the National Institute of Agricultural and Livestock Transference, the National System of Agricultural Transference Research, and the National Science and Technology System in Costa Rica

The Minister brought up the challenge related to the spiraling complexity of collaborations, coordination and the need for linkages among institutions: "I wonder how we can achieve what are, for me, great challenges such as coordination. First, we must devise ways that will allow for meaningful linkages between public institutions and, then, between state institutions. We have systems formed by laws or by decrees and I believe this is reflected in all our countries. In Costa Rica, we have higher education research centers where knowledge is generated but the transfer of this knowledge to the productive sector is a challenge." The one point he emphasized is "how to achieve this interaction between the state system and the research policies: this has always been illusive and evasive." He went on to say that, "even though we see the state system as one conceptually, operatively this is not so. On the one hand, we have autonomous institutions or what we call the central government, and on the other hand, there is the higher education system." The Minister stressed that synergies among institutions are

vital. Other issues outlined include the incorporation of other variables such as the challenge of globalization to food security and whether globalization affects food security or not.

The Minister also pointed out that there is a mismatch of information and a gap between scientists and policy makers, emphasizing that there is no collective decision making on current problems. He emphasized the fact that problems in research are complex as are the solutions. This raises the danger of researchers overlooking pertinent ideas and hence making hasty recommendations. This tendency is a potential impediment to science policy-linkages because researchers tend to reach quickly to unsustainable conclusions. He reiterated that research results have a high chance of influencing policy formulation. Consequently, when researchers and policy makers engage in the research problem at the identification stage, this relationship should continue throughout the research cycle for it to be credible.

Fernando Gutierrez Ortiz echoed that establishments of policies are political processes and that scientists should seek to understand what politicians want. Meanwhile, politicians should not have a laid-back approach to what scientists can offer that can be taken advantage of. Furthermore, scientists must produce unequivocal results that are congenial to the requirements of stakeholders. The Minister reiterated that donor driven research agendas often miss the local context, making them unlikely to make any meaningful policy impact.

Ultimately, the Minister noted that it would sound foolhardy to end the speech without talking about climate change. A rhetorical question he asked was, "does climate change affect food security or not? This is being studied and analyzed."

To conclude his speech, Fernando Gutierrez Ortiz stated the following: "This morning is really an appropriate moment to think of this great challenge, to dream a little, it does not matter, let us give ourselves the right to dream. At least I am sure that many of these dreams, some of these dreams will come true for the good of all mankind. So, I not only invite you to this, but I also wish to join this commitment and this dream and I hope there will be conclusions at this forum to analyze and see how, as government representatives, we can work together. I invite you to this great dream. Let us look at positive things, not negative ones. Let us see what our predecessors have done and let us try to do more than they have and I assure you that we will soon have a different context at national, regional and at international levels. We have to strive to make it a positive context, ready to face the challenges of this model of knowledge."

Opening Ceremony: The New Axis of Food Security[2]

Gustavo Gordillo de Anda and Francisco Javier Jiménez[3]

Abstract

The concept of food security has been both evolving and acquiring precision. Concern for national and world supplies has led to focusing attention on access to food. Offer and demand are analyzed as a related problem both from the perspective of production, quality and the effective demand for food. Hunger and food insecurity are the result and the cause of poverty, so eliminating hunger is not only a moral and social imperative but also a good investment for economic growth, particularly in the poorer countries. The impact of trade liberation and the contribution of agricultural biotechnology to food security particularly in the least developed countries is discussed. Finally, a proposal is made for a minimal program to improve the competitiveness of smallholder farmers and to combine more effectively development policies for the improvement of rural markets management to face future trends.

Key Concepts: United Nations Food and Agriculture Organization (FAO), agricultural trade, agricultural biotechnology, family agriculture, new agriculture.

JEL Classification : F13, O13, 019, O54, Q18

[2]*The data and opinions expressed in this article are the exclusive responsibility of the authors and do not necessarily coincide with those of the FAO.*

[3]*Assistant Director General and Regional Representative for Latin America and the Caribbean, gustavo.gordillodeanda@fao.org. Francisco Javier Jiménez is a FAO consultant for the Regional Technical Cooperation Project for Formation in Economics and Agrarian Policies and Rural Development in Latin America (GCP/RLA/138/SPA), funded by the Agencia Española de Cooperación Internacional (AECI). francisco.jimenez@fao.org.*

1. The concept of food security

The new axis of the food security concepts are directly related to the controversy generated by the emphasis placed on food supply and demand. Important changes can be observed in the production, distribution and consumption of food, mainly due to the strengthening of marketability in an increasingly industrialized and globalized economy with its dangers and advantages (Maxwell and Slater, 2003).

The new concerns refer to food system characteristics: the effects on human population and the new actors and policies which accompany them. The concentration of urban populations, the higher incomes and the calorie input of their nutritional diets, the lower cost of food and basic products, the growing integration of world trade and better means of transport have quickly and dramatically changed food systems and the scope and nature of nutritional challenges (FAO, 2004a).

The market flaws will always be there and the information asymmetry problems mark the pattern in this context. The design of adequate public policies and their regulation are problematic tasks if we observe the trend towards clientelism and the generation of institutional incomes.

New topics without a defined role appear on this new scenario in a context dominated by the convergence and dietary adaptation of the population, stimulated by the growing concentration of the food industry and its distribution systems, above all in self-service outlets.

These changes have deep repercussions on food security and the more vulnerable groups of the agricultural sector, particularly the smallholder farmers who require significant support to improve their competitiveness and the rural markets.

2. Food insecurity in Latin America and the Caribbean

Towards the end of 2004, poverty and hunger reduction trends are still far from the goals established by the World Summit on Food[4] where the representatives of 185 countries and the European Community undertook actively "to eradicate hunger from all countries in order to immediately reduce by half the number of undernourished persons by the year 2015." In 2000-2002, there were 852 million undernourished people in the world. This includes 9 million in industrialized countries, 28 million in countries in transition and 815 million in developing countries (FAO, 2004a).

In Latin America and the Caribbean, 52.9 million people suffer from hunger and undernourishment every day, which is 1.9 million less than between 1995 and 1997 and 6.6 million less than between 1990 and 1992 (FAO, 2004a). If the reduction rate continues at this pace, it is calculated that by 2015 the number of undernourished people in the region

[4] *Held in Rome in 1996. It takes 1990-92 as the baseline period.*

will only have been reduced to 45 million, which is well above the goal of 28 million set for Latin America and the Caribbean.

Regarding the sub-regions, South America has registered an important but insufficient reduction in the number of undernourished people during the last decade with a decrease from 13.9% to 9.5% of the total population. In Central America[5], however, there is an increase in the number and proportion of undernourished people. During the last decade, the number of undernourished people has increased by 2.4 million people and the proportion from 17.5% to 20.5%. In the Caribbean sub-region[6] the number of undernourished people dropped from 8.2 to 7.9 million and the proportion from 27.7% to 24.1%. In Mexico, the undernourished population has increased in recent years from 4.6 million for 1990-1992 to 5.2 million for 2000-2001; whereas the proportion of the total population has remained the same in recent years (5%) (FAO, 2004a).

The reduction of this indigence is directly related to the existing poverty in the region. In 2002, there were around 222 million poor, 22 million more than in 1990, of which 97.4 million lived in extreme poverty. Of the total number of poor in the region, 146.7 million come from the urban sector and 74.8 million the rural sector. Of the rural population in region, 58.8% of the total rural population is below the poverty line and 36% below extreme poverty the line, confirming the higher incidence of poverty in the rural areas. The little progress in poverty reduction as well as the fluctuations in the rate of progress partially reflect the difficulties of economic growth in the region. During each period of economic crisis or recession, poverty tends to increase. As a result, sustained economic growth is an indispensable but not sufficient condition to reduce poverty (FAO, 2004c).

The unequal distribution of income is another factor that aggravates problems of food insecurity and poverty in Latin America and the Caribbean, placing the region as the least equitable in the world. Of the richest homes, 10% receive more than 30% of the income while the poorest homes receive 40%. (CEPAL, 2003b).

An improvement in the distribution of income tends to strengthen the effect of economic growth on the reduction of poverty. It must be particularly noted that a decrease of 5% in the Gini index would reduce the time required to bring extreme poverty down by half, to between two and five years. Nevertheless, the most recent studies show stagnation and degeneration of the Gini index between 1997 and 2002, suggesting an enormous rigidity in income distribution in the region.

3. New trends in world agriculture

It is necessary to look at the economic and geopolitical changes of the last decades in light of important facts in the world food situation to understand more clearly the challenges facing the region. Food production has increased dramatically in the last 35 years in spite of the 70% increase of the world population. The growth in per capita supply has increased by almost 20%. In developing countries, the population has practically doubled while the growth of per capita supply has grown by almost 30%.

[5] *Does not include Mexico.*

[6] *Includes: Cuba, Haiti, the Dominican Republic, Trinidad and Tobago and Jamaica.*

To put these data in perspective it is necessary to refer to the growth trends of the population, the economy and food. According to the estimates made by the United Nations (UN, 2000) on demographic growth, there is a possibility of a drastic reduction in the growth rate of the world population. It is estimated that the world population which reached 5.75 billion in the baseline year (average of 1995/96/97) and 6.05 billion in 2000 will grow to 7.20 billion in 2015 and 8.3 billion in 2030, reaching 9.3 billion by 2050. It is important to consider two things: first, that in spite of the drop in growth rates, the increase in absolute terms will be significant and second, the said increases will occur mainly in developing countries. From the point of view of the population structure, the projections show that Latin America and the Caribbean will progress towards the maturity of our populations, with a greater aging of the urban population (FAO, 2000).

According to the estimates of the World Bank (2002), the long term growth projections in developing countries are uncertain. There are two factors that affect the growth of developing countries . First, the external environment which is forecasted will be less favorable and more fragile than during the coming decade. Second, economic conditions may get worse due the structural weakness of developing countries, particularly the financial sector and the balance of payments of their governments. Due to these factors, the long -term growth projections (2006-2015) for these countries were reduced from 5.2% to 3.5%, compared to earlier projections.

Considering that economic growth projections are higher in industrialized countries and to a certain extent in economies in transition, the pressure on agricultural demand will be much weaker than would have been the case if the major economic growth had occurred in developing countries where there are greater margins for consumption. The FAO (2000) indicates that though the per capita food consumption will grow significantly, the world average food consumption will come close to 3,000 kcal/day and will exceed this figure by 2030. There are, however, various countries in which per capita consumption will not increase to the levels compatible with significant reductions in the number of undernourished people from the high levels presently prevalent there. At present, the average per capita food consumption in the world has increased to almost 20%, from 2,360 kcal/day in the mid sixties to 2,800 kcal/day presently.

In the same vein, agricultural systems are changing. First, abandoning old models has led to substantive changes in the agricultural, livestock and forestry sectors and in their relation to other economic and social sectors. Second, these changes underscore in various ways the importance of institutions, that is, the rules of the game, in the economic and political management. Third, these changes mark a new frontier between what is private and what is public and consequently a new function for intervention. These changes may be summed up in 6 big trends:

1. A deeper trend toward extensive agriculture which transcends simple primary production related to other economic agents and is integrated both horizontally and vertically. That is why agriculture tends to be highly dependent on the production of such services as marketing, rural finance, technical assistance, and quality control.
2. In response to increased income of the richer sectors both in developed and developing countries and increased urbanization, the nutritional diet has become more diversified and oriented to quality control. This generates a trend toward contractual agriculture which could make it possible to establish more transparent

rules in private contracts in order to achieve a more flexible agriculture, better able to face such changes in interconnected markets as land-labor or land-credit but which at the same time would tend to a concentration of land and productive resources in the rural areas.

3. As a result of the above, knowledge and human capital are becoming strategic variables in agricultural and rural development. It is an agriculture which recognizes globalization and its growing influence, both positive and negative in national agricultural systems. This recognition is essential to strengthen the link between agriculture and external financing, the demands of international competitiveness, and the importance of a management-based technology and data administration for an effective design of public policies;
4. Diversified demand makes it possible to appreciate the role of autonomous cultures and the greater part played by women in productive activities in the rural world. Hence the new agriculture requires the action of the State through differentiated policies to respond to the needs and possibilities of the various types of producers, regions and products. In addition to the above, the irreplaceable role of an associative agriculture is underscored not only for the reconstruction of social cohesion but also to reduce transaction costs;
5. The very sustainability of these new trends demands an adequate management of natural resources expressed through policy instruments, valid technological matrices and an incentive structure which recognizes the social and productive heterogeneity of the rural environment and consequently the diversification of the sources of income of the family unit (household) and the strengthening of urban-rural ties.
6. This requirement to practice sustainable agriculture is at the origin of the change from strictly sectoral policies to increasingly territorialized ones with the vision of the promotion of regional development resulting from the revalorization of rural space as a fundamental component of national economy and of society because of its many multiplying effects.

4. Some repercussions of new trends

These series of changes are quickly transforming food systems and the scope and nature of nutritional challenges. Urbanization and increased earnings, together with other significant factors, have contributed notably to the changes in the food systems which form part of diets and the calorie contribution to the population (see Figure 1).

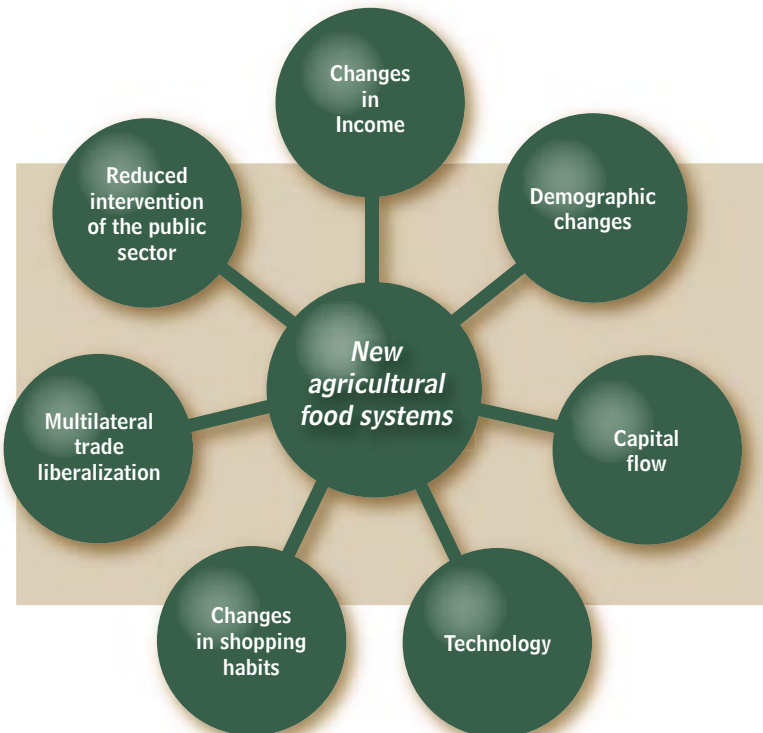


Figure 1 "Changes"

Deep changes are rapidly transforming agricultural food systems and the scope and nature of nutritional challenges in developing countries. Although the pace of such changes varies from one region to another, some common trends can be observed: concentration of population in urban areas, increased income and mean calories intake, drop in prices of food and basic products, integration of the world trade environment, improvement of means of transport, etc.

Source: FAO, 2004a

There are two different trends in the nutritional habits of consumers which are driven by deep demographic and economic changes that appear mainly in developing countries: convergence and dietary adaptation. The first explains the growing similarity of diets throughout the world and depends on a smaller number of basic cereals (wheat and rice) as well as a higher consumption of meat, dairy products, edible oils, salt and sugar and a smaller quantity of dietary fibers (FAO, 2004a).

Dietary adaptation refers to the food changes of the population due to the conditions of urban life: lack of time and the typical accelerated rhythm of cities. In most cases, city life implies that both parents are engaged for longer working days/hours and are far from home. Therefore, this causes the population to consume more food outside the home and to buy more processed foods of known trade marks (FAO, 2004a). These changes in consumption patterns in developing countries and more particularly in urban areas has reached an apparently paradoxical point at which problems of malnutrition coexist with those of obesity, which in their turn are related to poverty.

These trends are aggravated by the growing concentration of the retail food processing and trade. In Latin America, in recent years, there has been an explosive growth of investments made by multinational food corporations and of foods sold in supermarkets. In the decade from 1988 to 1997, direct foreign investments in the food industry increased from US$ 222 million to US$ 3,300 million in the region, much higher than the level of investments in agriculture. With respect to sales in Latin America, supermarkets increased their food sales in ten years at a percentage higher than that of the US in the last 50 years (FAO, 2004a).

These changes in the food markets have strong repercussions on the food security of millions of people who find themselves in a vulnerable position, that is, smallholder farmers and landless workers in the rural areas which form most of the undernourished population of

the world. The globalization of food industries and the expansion of supermarkets offer both an opportunity to reach new and attractive markets and a challenge increasing isolation and extreme poverty of the smallholder farmer (FAO, 2004a).

A greater integration of farmers through strong associations in marketing and processing is required because the competitiveness factors depend on production quality. Production must be totally oriented to market demand (Pingali, P. 2004). Associations would be the answer to the principal problems faced by the small farmer. These problems can be summed up as: little developed markets, small industrial integration, insufficient productive and service infrastructure, low productivity, insufficient flow of financial resources, weak institutions, high scatter of producers, low qualification and skill of human resources and vulnerability.

5. New challenges to Latin American food security

In most countries of the developing world, agriculture represents around 9% of the gross domestic product (GDP) and more than half of total employment. In those countries where hunger is extensive, that is, with an undernourished population of more than 34%, agriculture represents 30% of the GDP and approximately 70% of the population depends on agricultural production for subsistence (FAO, 2003).

Agriculture in the region is significant. Though in the global economic development it represents only 7.3% and yet it is the sector which is mostly involved in overcoming the most neglected social and economic challenges in the region. There are crucial challenges[7] that rural areas have undergone in Latin America during recent years which has necessitated four vital changes:

The *first* important change was the passing from a closed economy to an open one. It represents the first serious challenge for modern rural society. The question it generates is *what is the best way to integrate the agricultural sector in the new model of development, capable of guaranteeing balanced growth for the sector?*

The *second* change is related to the technological matrix. The vision of a homogeneous rural sector was a very serious conceptual mistake reflected in the policies which failed to take into consideration the different strategies at the home level and increased heterogeneity without the counterpart defined in productive terms. On favoring technological packages for large scale irrigation systems and commercial exploitation, a sort of expensive "mining agriculture" was created, depending on government subsidies and irresponsible in its treatment of the environment. In this model, research, technological development, technical assistance and the extension of rural productive systems were abandoned to themselves. The exhaustion of this type of development and the new technological revolution made room for the serious doubts which appeared about the technological model which had been

[7] *All these changes are related to a deep transformation of economic development; since the fifties, the modernization process of Latin American and Caribbean countries has led the agricultural and livestock sectors to play an efficient part as source of foreign currency, food and cheap commodities and the supply labor for industry. This resulted in a serious decapitalization of the rural areas and a spread of poverty while small areas of modern agriculture, highly dependent on state subsidies, flourished. However, towards the end of the sixties this development model was exhausted and its main characteristic – a closed economy – had practically disappeared.*

followed in the country. This second great change also represents another challenge: *how to deploy new technological matrices which fit the production heterogeneity and which would be favorable for rural production and guarantee sustainable development? Also how to reconstruct the technological base derived from the green revolution of the sixties without affecting, but rather stimulating the productivity which has been achieved in the areas with more potential?*

The *third* change refers to the social structure which has been radically modified. At present, Latin American countries are more urban than rural. However, it is important to describe this change. The expected industrial Utopia was not achieved. The industrial sector did not absorb the surplus labor coming from the rural sector: the services sector expanded without this leading to a modern and highly productive and well paid employment. On the contrary, it created an informal sector hit by poverty, and rural-urban migration became a survival strategy for rural communities. All these modified the rural social structure. What does it mean to be a farmer today? The concept of farmer covers many realities: The smallholder farmer, the agricultural or livestock entrepreneur, the settler, the woman laborer, the part-time farmer, the emigrant, the transnational farmer, and the inhabitant of rural towns. This third transformation implies a third challenge for the rural world which is *to think about how to build a new organizational structure which will include the social plurality of the rural sector without generating an oligarchy of associations or a social fragmentation*.

The *fourth* and final change is related to the public sector. It is not so much a question of the size of the government but rather of the limits between intervention and public and private activities and the interaction of the State and society. In rural areas, bureaucracies were established which did not have to render accounts between the rural community and the State and whose power came from the mediation they exercised between the community and the government. Black markets developed then, to avoid mediation and protection. Bureaucracy developed in agencies and state companies. The new community "hope" which is appearing in many regions requires clear participation rules. This fourth change implies another challenge for rural society: *how to progress in the process of rural democratization, creating new institutions which will link the community, the market, the associations and the State and how to relate this democratization process to the decentralization of the State and the empowerment of rural actors?*

6. Breaking down barriers

Food security is one of the most heatedly discussed topics in the area of rural trade, motivated mainly by growing economic globalization. The debate focuses mostly on the impact of the opening of economies on food security in developing countries and those listed as least developed.

Agriculture still constitutes a vital economic activity, giving people the possibility of feeding themselves, producing their own food or offering work and income to accede to food supply. The basic question is how developing countries, in particular net food importers and their population which are vulnerable and exposed to food insecurity, will benefit from the new framework of agricultural and food trade and what policies and programs are needed to take advantage of the trade opportunities generated by the trade reform.

As a result of the changes introduced in trade guidelines, a product of exchange and price relations, trade reforms in general affect national income, richness and its distribution and have consequently direct repercussions on access to food. In the same way reforms affect food supplies and availability of commodities at domestic, national and world level and their stability.

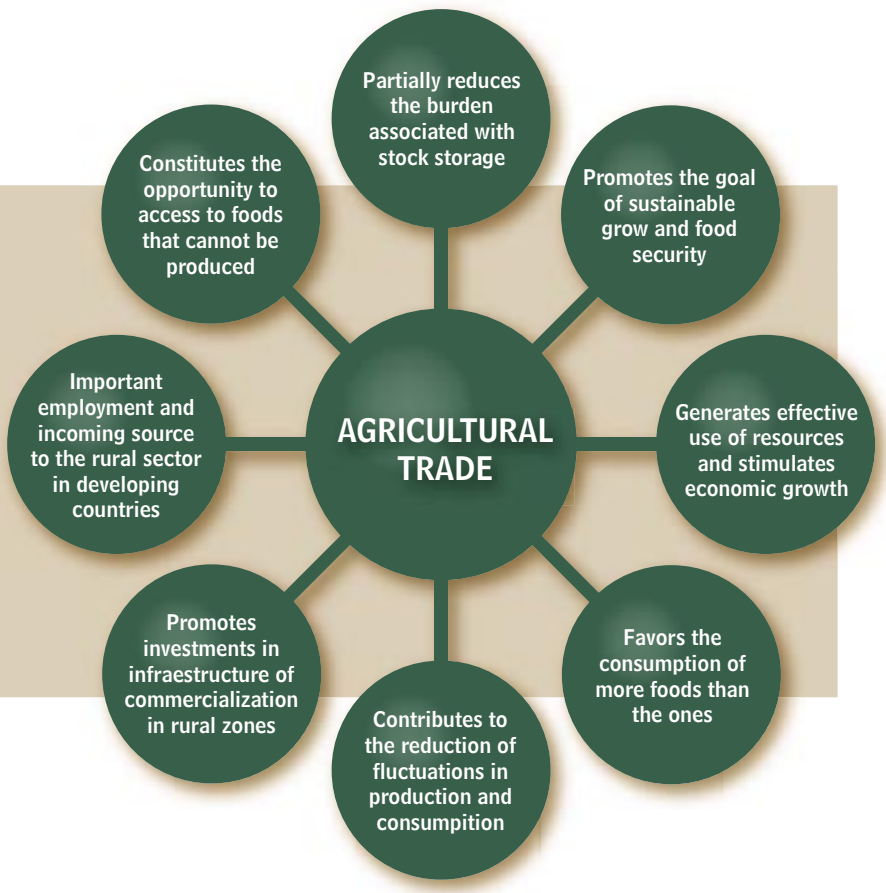


Figure 2

"The importance of the agricultural trade"

Agricultural trade under appropriate trade policies has undeniable advantages for developing countries, such as sustainable growth and food security.

Source: FAO, 2004c

In any scenario possible, eradicating hunger is not only achieved by increasing farm production in developing countries but also by generating possibilities of employment and income for the population. In Figure 2 above, agriculture constitutes a fundamental part of the trade activities of developing countries, particularly those listed as food insecure. For the most of the developing countries, farm produce represents around 8% both of exports and total goods trade. In the countries with the highest hunger level, this proportion can reach up to 20% (FAO, 2003).

Latin America and the Caribbean is the region which is most well placed in agricultural trade of all the developing regions. In recent years, the agricultural exports of this region totaled close to U$S 60 billion a year (U$S 62.3 billion for 2001), compared to 35 billion for 1980-1993. This shows the characteristic export dynamism of the region (FAO, 2004c). This trend is particularly evident since the mid nineties, a period of the liberalization of trade and revitalization of international trade agreements, showing the growing independence and integration of the agriculture of the region with the world markets.

However, a great number of the countries of the region depend on the export of a small number of basic agricultural products for a great part of their earnings from exports. The enormous dependence on one or a few commodities, generally sold as raw materials, makes these countries extremely vulnerable to the changing market conditions. In the last 20 years, the actual prices of commodities have been excessively volatile and have dropped significantly. The effect of these reductions and fluctuations in export earnings have affected incomes, investment, employment and growth of the agricultural and livestock of these countries (FAO, 2003).

Among the main objectives of developing countries in the new stage of negotiations of the World Trade Organization (WTO) is an opening of the markets to processed agricultural products with high added value and the manpower requirements in the developed countries. This process has great weight in increasing the volume and value of exports of developing countries and their economic growth. This drive, however, seems to be blocked by the tariffs that many developed countries maintain for more processed agricultural products which makes the change from the simple export of commodities to the export of products with a higher added value difficult (CEPAL, 2003a).

Another important objective of the developing countries in these negotiations is the modification of domestic policies which distort trade with industrialized countries. Without looking any further, the reduction or preferably the elimination of subsidies and price guarantees applied by these countries to their farm products is required.

Although progress has been made in reducing protectionism in developed countries and aims at an efficient working of international markets, this has in general been insufficient. At present, farm subsidies are lower than in the eighties, above all, in terms of GDP percentage, there has been a re-orientation of subsidy mechanisms towards less distorting policies. The levels of global support for agriculture are still high. For the 2000-2002 periods, these levels reached an average of 315 billion dollars a year, compared to 302 billion from 1986 to 1988. Farm subsidies still represent between 230 and 240 billion dollars a year and most of the support for the producer (76%) is still related to production levels, support via prices, payments per product or subsidies for inputs (FAO, 2004c).

Pertaining to farm subsidies, the European Union (32%) and Japan (19%) maintain approximately the same levels they had in the eighties, both total subsidies and farm subsidies. Australia (0.44%), New Zealand (0.05%) and Canada (1.78%) among others reduce their participation while USA (30%) and Korea (7%) increase them (FAO 2004c).

To the option of these countries giving subsidies to their farmers and consequently generating privileged conditions for competing with the farmers in the rest of the world, must be added a decrease in official assistance and loans for development which makes the scenario even more difficult for the vulnerable countries which place agricultural trade as the handiest tool in achieving food security. Limited by its own fiscal situation, Latin America is a region which does not have priority for official assistance from developed countries, so the funding to eradicate rural poverty and social inequality can only come from international trade and national and foreign private investment in the region (Gordillo, G. 2002).

In fact, the protectionist policies maintained by more developed countries have a much greater negative effect than the reduction of prices of the main agricultural products and the deterioration of food security conditions for developing countries. The adoption of

these measures generates discouragement for investment in the rural sector of developing countries, fosters rural migration and exacerbates the foreign debt of the poorest countries. This is mostly caused by the reduction of the earnings that these countries obtain on selling their export products at reduced international prices.

It is more common to find criticism of the protectionist policies of the industrialized countries when associating it to their negative effect on the development of small farms in the poorest countries. Solving these problems, however, within the framework of the WTO does not imply that agricultural commerce will automatically generate benefits which will reduce poverty and food insecurity in vulnerable countries. It is necessary for the trade negotiations to conform to public policies in the developing countries which will improve the competitiveness of smallholder farmers when they market their produce on international markets. Significant disadvantages are observed, with reference to this, in the export marketing structure, apart from the difficulties in access to land, capital and information (IFPRI, 2004).

The protectionist policies of developed countries generate a lack of interest in developing the rural infrastructure in the poorest countries and, on the other hand, the anti-rural biases of their own political elites limit the existence of favorable public policies which would strengthen the competitive capacity of the small farm. To the above must be added an institutional weakness in rural development and the competitiveness of agricultural activities. In this way, a vicious circle is generated as the poorest countries require and depend dangerously on food assistance and food imports since they are unable to produce the majority of the goods and capital necessary for the expansion of their economies.

There are various initiatives which can make it possible for agricultural trade to follow a fairer pattern in order to contain poverty and hunger in vulnerable countries, ranging from the honest assessment of what has occurred within the framework of the agreement on agriculture to the subordination of bilateral negotiations which the industrialized economies maintain with the underdeveloped countries to concentrate fully on achieving progress in the multilateral negotiations fomented by the WTO (IFPRI, 2004).

The new agreements proposed for regional and sub-regional free trade must be considered as a tool for development, in particular, for the agricultural sector rather than as goals measured only in terms of foreign investment and commercial flow (Zarsky and Gallagher, 2004). The new agreements must be reformulated as key elements to be connected with the world and negotiate new niche products as well as to ensure the entry of developing countries to the innovation, research and development circuit. Private and public efforts in this direction must consider the drive to development of biotechnology applied to agriculture for the production of food and the preservation and sustainable use of biodiversity resources. To this end, it is important to pay attention to the development of good agricultural practices and the fundamental role of smallholder farmers in the agricultural development.

7. Accessing and applying knowledge

Agriculture should respond to the new food needs of the 21st century when a constantly growing population with higher incomes and increasingly more urban lifestyles is changing the food demand patterns. The response should go beyond the traditional approach of

achieving greater yields. It should be involved with the protection of natural resources; it should respond to the consumers who are increasingly more concerned with food security and quality, as well as looking for a better quality of life in the rural sectors (Gordillo, G. 2004b).

Biotechnology makes it possible to increase the availability and variety of food, increasing global agricultural productivity and at the same time reducing the seasonal fluctuation in food supply. By introducing pest resistant crops with a better tolerance of adverse conditions, biotechnology could contribute to reducing the risk of poor harvests under unfavorable biological and climatic conditions and to diminishing the damage caused to the environment by the toxic chemical products used in agriculture. After a first generation of crops obtained with genetic engineering, of which, the main purpose would be to reduce the limitations and costs of production, a second generation would aim at improving the bioavailability of nutrients and the nutritional quality of the products.

The proponents of genetic engineering assert that it is a basic instrument to achieve food security and eradicate malnutrition in developing countries. Those who oppose it argue that genetic engineering will cause environmental catastrophes, increase poverty and hunger and make it possible for companies to become the monopoly of traditional agriculture and world food supply. While the former attack their adversaries for delaying the regulation approval of innovations that could save human lives, the latter accuse the partisans of biotechnology of "deceiving the world". In fact, very few people express total approval or opposition to biotechnology in an environment where discussion should be mainly based on scientific knowledge.

Regulation procedures should be reinforced and rationalized to guarantee the protection of the environment and public health as well as transparency, predictability and the scientific foundation of the process. To strengthen the trust of the consumers and producers it is indispensable to have appropriate regulations.

Hunger, poverty and inequality are much more complex problems which encompass the technological, social, political and historic fields and consequently neither biotechnology nor genetic engineering are a final solution to the eradication of these problems in the world, simply because no magic formulae exists (see Figure 3) (Gordillo, G. 2004b).

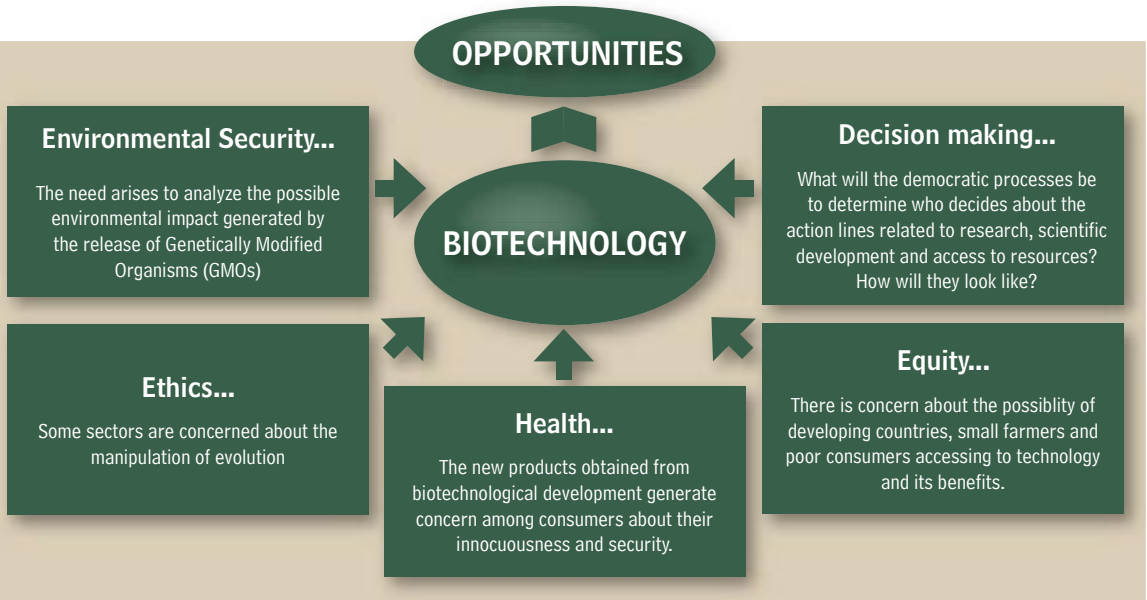


Figure 3 "Transforming in opportunities"

Biotechnology addresses five types of concern that can become opportunities: Health, Enviromental Security, Ethics, Equity, Decision Making
Source: Gordillo, 2004b

FAO research in the field of biotechnology shows that the existing gap is widening between developed and developing countries, between rich and poor farmers, between research priorities and needs and above all between technological development and its real transfer (Gordillo, G. 2004b).

Between 1996 and 2003 the acreage under transgenic crops grown for commercial production increased from 2.8 million hectares to 67.7 million hectares (James C., 2003). This rate of global expansion is impressive but its distribution is very unequal. Only six countries, ten companies and four crops represent 99% of the world production of transgenic crops (FAO, 2004b).

The most diffused transgenic crops are soya bean, maize, cotton and canola. At present, however, transgenic wheat and rice, the principal nutritional cereals, are not produced anywhere in the world. There is no research either into the five most important crops for the semi-arid tropic (sorghum, millet, peas, chickpeas and peanuts) which are the poorest regions. This is attributed to the fact that 70% of research in biotechnology is carried out by multinational companies in developed or advanced developing countries which are not interested in achieving significant progress in these crops.

There is concern that biotechnology may increase the inequality breach in the world but it may also contribute to reducing hunger in vulnerable countries and preserve the environment and natural resources. In the present atmosphere of polarized opinions, it is crucial to decide how to arbitrate between the risks and the opportunities. Objective and impartial information must direct the dialogue and the limits between research, marketing, public relations and activism must be clear and integrated (Gordillo, G. 2004b).

It is a fact that genetic engineering applied to agriculture and nutrition will not be able to obtain satisfactory results if the public is not convinced about its innocuity and usefulness.

FAO supports the development or the promotion of a scientifically based evaluation system to determine objectively the benefits and risks of each genetically modified organism (GMO). To this end, it is necessary to adopt a cautious case-by-case procedure to respond to the legitimate concern for the biosecurity of each product or process before its homologation (FAO, 2004b).

In the case of transgenic organisms which are the main cause of the controversy there is no evidence to date to suggest that they have negative effects on human health which does not imply that this may not occur in the future. The lack of evidence of harmful effects is not the same as being sure that genetic modification is safe (FAO, 2004b).

8. Minimum promotion program for family farms

Food security represents the deepest expectations of man, particularly in those vulnerable sectors with capital limitations and low educational level. The emphasis on achieving greater availability and access to food is laid on the capacity of man to produce and generate earnings with economic profitability and efficiency in the sustainable management of natural resources.

In Latin America and the Caribbean, the most dynamic sector of the rural life are smallholder farmers who have had a significant participation in social mobilization, the productive effort and institutional innovation which appeared in the last decades in the region. This conglomerate is also characterized by the heterogeneity and inequality of its resources and assets which together with the market flaws are some of the causes of rural poverty.

In Latin America and the Caribbean, smallholder farmers may be classified into two big groups according to the level of their assets. The first group is formed by salaried farm laborers and others which have very reduced land resources and use farming as a complement. The second group is formed by smallholder farmers who own different amounts of land and who obtain their income from crops mainly and supplement it with their work (CEPAL, 1999).

Both work groups are obliged to resort to forms of non-agricultural rural employment to supplement the income of the rural homes. This is a substitute for land as a source of income. However, these forms of supplementing earnings do not allow farmers and their families to improve their condition but rather makes them more dependent on non-agricultural income, particularly remittances and investment in animals and grain as a form of providing savings and liquidity for emergencies.

It is necessary to strengthen the role of smallholder farmers in the face of the inequity which prevents the development of this group. It is necessary to improve the competitiveness of this group on land, produce, labor and financing markets. To achieve, this they must have at their disposal more and better information to enter markets under better conditions (Gordillo, G. 2004a).

Policies aiming at raising the competitiveness of farmers and their families are necessary for them to be able to increase the income from their exploitation. It is fundamental to improve the productivity of the poorest and this improvement should mean their participation in a

growing economy within the framework of just markets. If families are able to improve their incomes they will have food security.

Thus, a strategy is established to support small farmers, based mainly on policy instruments which comply with three main objectives: i) to compensate the groups affected by structural reforms in the region as part of an adaptation process; ii) to foment diversified activities in the family units located in the most unfavorable zones and iii) to improve their competitiveness.

The proposal of a minimum program to promote agriculture and rural development aims at improving the competitiveness of smallholder farmers and combining effectively development policy interventions to improve the functions of rural markets.

1. **A rural income policy**, whose continuity is guaranteed by law and which is periodically revisable, may become the nucleus of this minimal program. Direct cash transfers, disconnected from specific products and focused on strengthening rural earnings, could be the basis for different interventions, taking into consideration the characteristics of producers and their productive strategies, regional imbalances and adaptation to various market access strategies. It must, at the same time, enhance diversification of rural activity as an insurance mechanism and reconversion at the farm level, above all, if it is strongly related to generating value via environmental services. Other necessary components in this system would be:
2. **Rural Financing**: A rural financing system which would mobilize savings, above all in the rural family economy context and give priority to capital formation.
3. **Infrastructure Policy**: An infrastructure policy which would aim at considerably increasing both the small productive infrastructure (irrigation, aquifers, land conservation, etc.) and the trade infrastructure (cellars, roads, packing houses, transport systems, etc.) without delaying any important strategic irrigation projects.
4. **Transfer of Technology and Training**: A policy fostering technological innovation and transfer and training of human resources. This means the integration of universities and technological institutes in a massive program of diffusion and transfer of skills and knowledge, supported by new interactions with producers, taking into account the importance of human capital as a basic factor of competitiveness.
5. **Sustainable Development Policy**: A sustainable development policy would stimulate and regulate any form of property of natural resources, including the social responsibility for their use. Contrary to the scattered efforts of a simple conservation strategy, a productive ecological policy would accompany the producer in the development of adequate management mechanisms for the natural resources at his disposal (Gordillo, 2004a).

9. Conclusion

These five fields of public action have a common guiding line. Nowadays, to look for and refute the bases of ideologies or theoretical elaborations which justify the substantially existing injustice requires cultivating a common pillar of state action as regulator and

promoter of private economic agents under the optic of efficiency with a fairer social distribution of their fruit. A basic structure with this profile has today the difficult task of integrating two contradictory elements: one which appeals to individual rights and another which concerns the concept of social rights. Actually, they are elements which exist in the same universe which, in itself, is contradictory and not homogeneous. It is not a question of creating an ideal plan which, however perfect, would become alienated from the world, but to draw with broad strokes scenarios which will be recognized in the world precisely because they do not ignore its contradictions. These strokes take up again the principles of freedom and equality in a different context: the inclusion of all rural actors.

References

ECLAC, "Latin America and the Caribbean in the world economy, 2002-2003", 2003 (LC/G.2221-P/I)
Available at: http://www.cepal.org/cgi bin/getProd.asp?xml=/publicaciones/xml/7/14727/P14727.xml&xsl=/comercio/tpl-i/p9f.xsl&base=/tpl-i/top-bottom.xslt

ECLAC, "Social panorama of Latin America 2002-2003", 2003 (LC/G.2209-P/I)
Available at: http://www.cepal.org/cgi-bin/getProd.asp?xml=/publicaciones/xml/6/15086/P15086.xml&xsl=/dds/tpl-i/p9f.xsl&base=/tpl-i/top-bottom.xslt

ECLAC, "Efectos sociales de la globalización sobre la economía campesina. Reflexiones a partir de experiencias en México, Honduras y Nicaragua", ECLAC Subregional Headquarters in Mexico, Mexico, DF, 1999

FAO, "The State of Food Insecurity in the World, 2004", Economic and Social Department, Rome, 2004
Available at: http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/007/y5650e/y5650e00.htm

FAO, "The World State of Food and Agriculture 2003-2004 - Agricultural Biotechnology Meeting - An answer for the needs of the poor?", Rome, 2004
Available at: http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/006/y5160e/y5160e00.htm

FAO, "Trends and challenges in Latin American and Caribbean agriculture, forestry and fisheries", Regional Office for Latin America and the Caribbean, Santiago, Chile, 2004
Available at: http://www.rlc.fao.org/prensa/tendencias/default.htm

FAO, "The State of Food Insecurity in the World, 2003", Economic and Social Department, Rome, 2003
Available at: http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/006/j0083e/j0083e00.htm

FAO, "Agriculture: Towards 2015/30", Technical Interim Report, 2000

Gordillo de Anda, G., "Food Security and Family Farming", CEPAL Review, 2004

Gordillo de Anda, G., "Un nuevo trato para el campo como asunto de conveniencia pública", Speech of the Deputy Director General and Regional Representative for Latin America and the Caribbean, V Latin American and Caribbean Meeting on Agricultural Biotechnology, REDBIO June 21 - 25, 2004, Boca Chica, Santo Domingo, Dominican Republic, 2004
Available at: http://www.redbio.org/rdominicana/redbio2004rd/Memoria_REDBIO_2004/ponencias/Biotecnolog2.pdf

Gordillo de Anda, G., "Un Nuevo Contrato Ciudadano. International Seminar on Food Security and Hunger Combat Policies", Campinas, SP, Brazil, 2002

IFPRI, "Trade policies and food security", Essays by Watkins, K., Von Braun, J., Diaz-Bonilla, E., Gulati, A., Washington DC, USA, 2004
Available at: http://www.ifpri.org/pubs/books/ar2002/ar02e.pdf

James, C., "Global Review of Commercialized Transgenic Crops", ISAAA Briefs, 2003

Maxwell, S., Slater, R., "Food Policy Old and New Development Policy Review", 2003
Available at: http://www.blackwellpublishing.com/pdf/maxwell_slater.pdf

Pingali, P., "Westernization of Asian Diets and the transformation of food systems: implications for research and policy", ESA Working Paper No. 04 -17, 2004

UN, "World Urbanization Prospects: The 1999 Revisions", United Nations, New York, 2000

World Bank, "Global Economic Prospects and the Developing Countries, 2003", 2002
Available at: http://www.worldbank.org/prospects/gep2003/toc.htm

Zarsky, L., Gallagher, K., "NAFTA, Foreign Direct Investment, and Sustainable Industrial Development in Mexico", Policy Brief, Americas Program, 2004
Available at: http://americas.irc-online.org/pdf/briefs/0401mexind.pdf

III.3. Panels

III.3.1.

Global Climate Change and Agriculture in Central America: Climate Variability And Change and Their Relation to Food Security and Agriculture in Central America

Manuel Jiménez[8]

Abstract

Information on climate and climatic scenarios is important for operative and strategic planning of the agricultural and food sector. Hydrological and meteorological data are particularly useful when making decisions on sowing, financing and insurance of crops, and prevention and mitigation of disasters. In the long term, this information helps to direct adaptation to agricultural activities by reassigning resources or reconversion of production processes.

Relations between food security and the agriculture and food sector are numerous and complex. This sector has a direct impact on food security as provider of processed or unprocessed agricultural, livestock, sea and forest products. Agriculture and food chains at all stages require labor and generate earnings which give access to food. As currency generator, the agricultural and food sector enables countries to import goods not produced locally. Food quality and safety is becoming more important on international markets. The agriculture and livestock sector also has an environmental responsibility with implications for the future of food security which obliges it to make good use of natural resources and to follow a process of adaptation to climate variability and changes.

Considering the above, it must also be taken into account that the location and geography of Central America expose the region to the incidence of various natural hazards which it confronts with an increasing fragility. The dangers associated with climate variability are recurrent – some at short intervals – their consequences predictable and better known to the agriculture and livestock sector. In some cases they exacerbate daily conditions and are particularly severe for agriculture and the rural sector. On the other hand, poverty and food insecurity – particularly hard in rural areas – create a vulnerability which makes these manifestations of natural forces more damaging.

Key concepts: climate vulnerability, food security, agriculture, global environmental change, Central America

---

[8] *Coordinator of VULSAC Project "Vulnerability Reduction of the Agricultural and Livestock sector to Climatic Variability" of the Central American Secretariat of the Agriculture and Livestock Council – Republic of China.*

1. General Aspects

Central America is a region formed by 7 countries with an extension of 522km2, inhabited by 37 million people, depending mostly on the agricultural sector. The agricultural domestic product (Agricultural GDP) and farming have a high rate of participation, particularly in Guatemala, Honduras and El Salvador. Agricultural exports represent more than 30% in all cases and in the case of Nicaragua, it is more than 70% (see table 1).

On the other hand, Central America shows a drop in income equality indicators. With the exception of Costa Rica, all the other countries (Table 1) have a Gini coefficient above 0.5, 1 being the value indicating total inequality. The poorest 40% of the population has from a 10.4% participation in earnings in Nicaragua to 13.3% in Costa Rica while the richest 10% accumulates a participation ranging from 29.4% in Costa Rica to 40.5% in Nicaragua.

Table 1 - Central America: Selected Variables. (2000 or 2001)

Country	Population (2001)	Agricultural GDP (2001)	Agricultural Employment (2000)	Agricultural Exports (2001)	Gini Coefficient
Belize	256	18.0	27.0	NA	NA
Costa Rica	4,008	10.7	17.2	32.9	0.473
El Salvador	6,397	11.8	21.4	33.4	0.518
Guatemala	11,687	22.6	39.1	53.7	0.582
Honduras	6,656	22.2	34.3	46.8	0.564
Nicaragua	5,208	30.0	34.1	70.3	0.584
Panama	3,004	7.8	20.8	37.7	0.557
Total	37,217	NA	NA	NA	0.564

Source: Prepared using the UNDP and ECLAC data bases

2. The concept of food security

There is no single definition of food security. According to the World Food Summit held in November 1996, food security exists when everybody has physical and economic access at all times to sufficient harmless and nutritious food to satisfy their food needs and their preferences to carry out an active and healthy life. This definition has the virtues of counting with international recognition and serving as a basis for world commitments.

3. Basic food and nutritional security factors

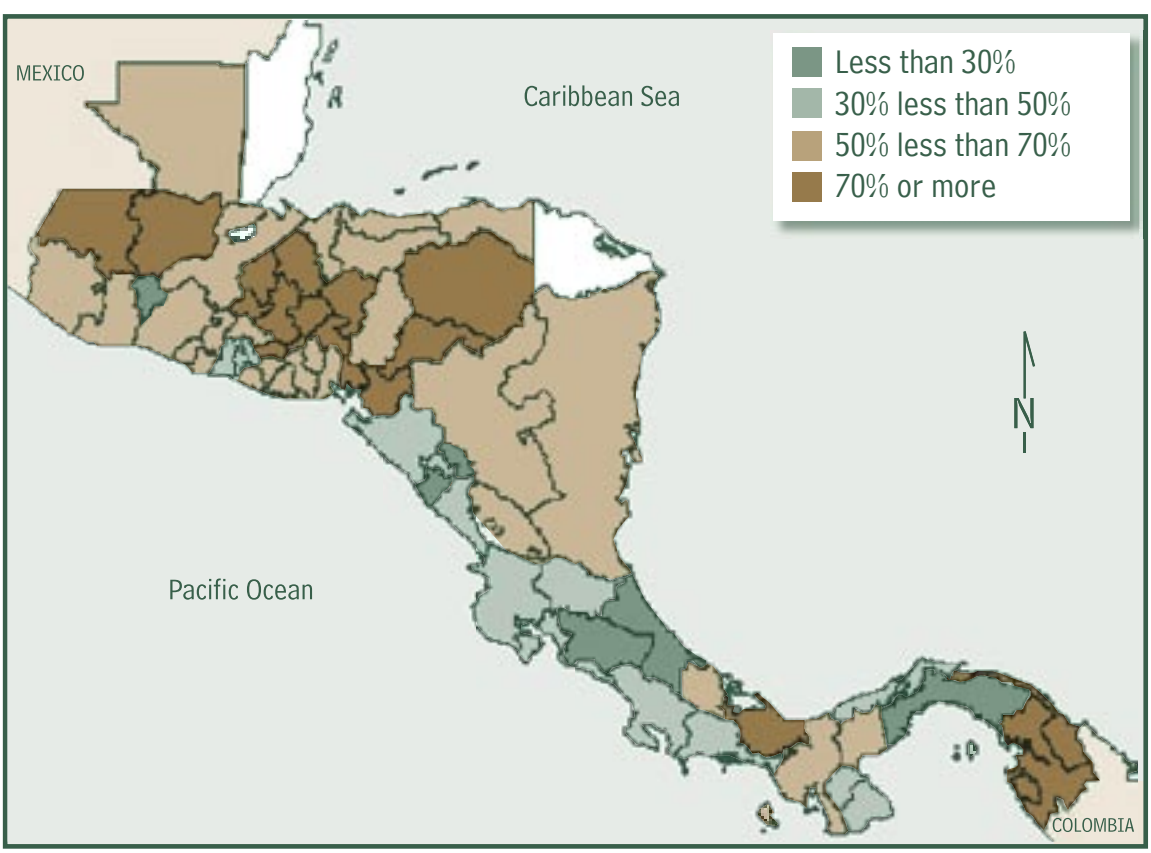
Food and nutritional security may be approached on different time scales. Temporal relations have greater relevance in the short and medium term with climate variability and in the long term with climate change. Food security may also be considered on a world, regional, national, community or home level – even at individual level – which is coherent with the need of dealing with global scale phenomena such as the ENSO or global warming which

affects all these levels as well as local conditions or microclimates which in turn affect small communities differently in Central American countries. Thus, availability, access and use – considered as the dimensions of food security – represent another group of factors which must be identified to understand the relation of agriculture with climate and food security.

4. Selected socio-economic indicators

Is food insecurity basically a problem of availability or access? With the passing of time availability has stopped being the most stressed aspect of food security and attention has concentrated on access in general and poverty in particular. Poverty is found to be the main cause of hunger in the world. Malthus' theory in which he maintained that the population grows more quickly than food production has lost validity in view of the perspective of an eventual stabilization of demographic growth towards the second half of the millennium, and the IFPRI projections indicate that agricultural productivity may grow sufficiently rapidly to sustain the said population (Diaz sf). In Central America, however, the concern persists that most of the countries of the region will not be able to reach the millennium goals for the reduction of poverty and hunger.

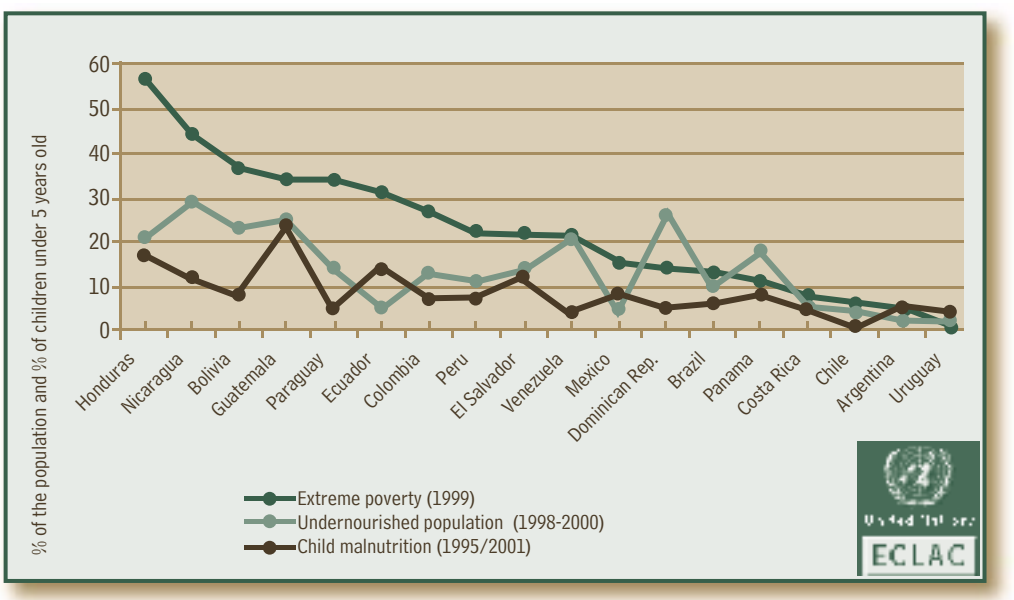
Figure 1: Central America: incidence of total poverty on the population per region, province or department, 2001.
The Central American countries are different with respect to poverty and food security



Font: Sauma, 2003

According to the data published in the 2nd Report on Human Development in Central America and Panama (UNDP, 2003) (see Figure 2), Honduras is the country with the highest incidence of total poverty (72% of the population is below the line of poverty) in Central America, followed by Guatemala with 56% and Nicaragua and El Salvador are close to 46%. The proportion of inhabitant living below the poverty line in Panama in 1999 was 40%, while Cost Rica has the smallest incidence in this group of countries with less than 23%. According to UNDP estimates (2003) for 2001, 50.8% of the population of Central America was in a state of poverty and 23% in extreme poverty. The UNDP points out that half the population of Central America lives in rural areas which concentrate 67% of the total number of the poor in the region and 76.6% of those living in extreme poverty.

Figure 2: Latin America and the Caribbean population in extreme poverty, undernourished population and child malnutrition[9]



The three Central American countries with the most precarious situation in terms of socio-economic indicators are Nicaragua, Honduras and Guatemala (Cepal 2004) Nicaragua is the second poorest country in Central America and the Caribbean. Honduras is among the least developed countries of this region and in terms of its per capita income one of the poorest and in Guatemala, 102 municipalities have been identified as vulnerable to food insecurity with high levels of poverty. According to FAO data, the proportion of the undernourished population in these 3 countries (25%, 21% and 29% respectively) is higher than the Central American average and contrasts with the low level in Costa Rica (5%). According to the SCAC data (2002), the undernourished population increased from 4.9 million Central Americans to 6.4 millions at the end of the decade so that. instead of coming closer to the established goal of 50% reduction, it increased by 30%. The ECLAC statistics (2003) show that Guatemala, Honduras and Nicaragua, like the countries with the highest demographic dependence (percentage of the population under 15 and over 64 which depends on the population between 15 and 64. have values of 89.2%, 82.1% and 84.1% respectively while the same indicator for Latin America and the Caribbean is 58.7%.

5. Relation between food security and agricultural and livestock production

Relations between food security and the agricultural sector are many and complex[10]. This sector has a direct impact on food security as supplier of processed and unprocessed agricultural, livestock, sea and forest products. The agro-food chains at all stages are generators of employment and income which represent the possibility of access to food. As currency generators, the agro-food sector enables countries to create purchasing capacity giving access to importing goods. On the other hand, food quality and safety increase in importance on international markets and they are key aspects to guarantee access to nutritive and innocuous foods as stated by the definition of food security. The agricultural and livestock sector has an environmental responsibility with implication for the future of food security which compels it to make good use of natural resources and follow a process of adaptation to variability and climate change.

The inter-sectorial character of food security is clearly reflected in the relationship between health and agriculture. The intake of healthy food is basic for human health. On the other hand, a person who is healthy is potentially more productive, which is positive for direct access through production or indirect access through income generation from sale of products to purchasing food. A greater fragility caused by the natural hazards of hydro-meteorological origin in Central American countries coincides with a greater vulnerability to food insecurity and greater exposure to negative effects to health and human life, which are particularly marked in rural areas.

6. Climate, risks, food security and agriculture

The IDB document (2005) on The Advanced Profile of the Disaster Risk Management Policy warns that when vulnerability is high, progress in poverty reduction, equity improvement and sustainable economic growth may be seriously threatened by disasters. The recurrence of natural hazards in Central America decapitalizes productive units, increases poverty and vulnerability to future occurrences.Natural forces (droughts, floods, hurricanes, etc.) affect the availability and access to food and the stability of both. Present and future availability is affected because of bad harvests, their inferior quality, work animals with reduced productive indices or animals that die (cattle, fish, fowl, etc.), loss of installations necessary for production, damage to infrastructure and other goods needed for production, deterioration of productive resources (soil and water), loss of seed and seedlings, and forest plantations devoured by fire during droughts. Access is also restricted by reduced sales and the availability of the products for consumption on the farm, and the loss of jobs and other sources of income because of diseases or disabilities that decimate the productive capacity of labor. The decapitalization of productive units, the loss of access to credit and economic depression in the affected zones increase uncertainty and are a source of instability both for the availability and access to food.

[10] *Food security relations with the agricultural sector, risk management, based on previous articles by the author and Murillo R. (2004). Organizational change creation of a unit in charge of the subject of food security in the CNP (preliminary version)*

The most recent extreme events which have impacted Central America (The 1997-1998 El Niño phenomenon, the 2001 drought, the Mitch hurricane in 1998 for example) confirm the high incidence in the agricultural and livestock sector of these hydro-meteorological events. In the case of the hurricane Mitch, two of the most affected countries, Nicaragua and Honduras, suffered losses equivalent to 80% and 49% of their GDP respectively. Aggregate figures for Central America show that of the more than US$ 6 billion in damages attributed to the passing of Mitch, practically half occurred in the agricultural and livestock sector (49%). ECLAC estimated the economic damage caused by the 2001 drought at U$S 162 million of which 61% corresponded to the agricultural and livestock sector.

Global scale events such as El Niño or La Niña and climate change in a broader time perspective have consequences for the availability and prices of food around the world so that their impact on food security is not limited to what happens within national borders.

7. The importance of information

Information on climate and climatic scenarios is important for the day to day operations, planning, and long-term strategies. Hydrological and meteorological data (temperature, wind, precipitation, discharges, early alerts, derivations of water balances and operative climate forecasts, etc) make it possible to make decisions on crop financing and insurance, recycling harvests, relocating crops, preventive action (e.g.: saving water, having forage reserves). Over a longer period of time, this information, analyzed jointly with market trends, may guide better adaptation by reassigning resources or productive reconversion processes and may prove to be of value for the operation of models and other research. These data, sent in adequate form to each of the different users (insurers, bankers, suppliers, politicians, fishermen, farmers, cattle breeders, researchers, international organizations, etc) has unquestionable value for decision making.

8. Final reflection

Climate variability is a fact. Its threats are recurrent – some at brief intervals – its consequences are predictable and increasingly better known by the agricultural and livestock sector whose daily life is made even more difficult in some cases. Many of the solutions to reduce the fragility of the sector and derive advantages from it are compatible with the characteristics desirable for the development of the sector. The agricultural and livestock sector has the task of conciliating its productive effort with environmental sustainability which implies reducing the negative impacts of its activity and anticipating long term trends like climate change with technological solutions. Hence there is a need for information on climate variability and change to be incorporated systematically as an element for decision making in the agro-food sector, among other things to guarantee food security. It is also important that risk management (prevention and mitigation in particular) be considered as a substantial part of agriculture and the rural environment. Finally, national and regional development efforts should be combined with the elimination of distortions on international markets in order to provide trade opportunities and economic growth while recognizing the importance of provisions for an adequate distribution of income to reduce poverty and hunger.

References

BID, "Perfil Avanzado de la Política sobre Gestión del Riesgo de Desastres", 2005

CEPAL, "Anuario estadístico de América Latina y El Caribe 2003", Santiago de Chile, Chile, 2004
Available at: http://www.eclac.cl/cgi-bin/getProd.asp?xml=/publicaciones/ xml /0/14820/P14820.xml&xsl=/deype/tpl/p9f.xsl&base=/tpl/imprimir.xsl.

Diaz-Bonilla, E., Robinson, S., (sf) "La Biotecnologia, el Comercio y el Hambre", IFFRI.
Available at: http://www.ifpri.org/spanish/pubs/essays/ar2000_essay01sp.htm.

FAO, "Declaración sobre la Seguridad Alimentaria Mundial y Plan de Acción de la Cumbre Mundial sobre la Alimentación", Rome, 1996
Available at: http://www.biotech.bioetica.org/d60.htm.

Jiménez, M., "Agricultura y Desastres", San José, Costa Rica.

Murillo, R., "Transformación organizacional: Creación de una unidad encargada del tema de la seguridad alimentaria dentro del CNP (versión preliminar)", 2004

PNUD, "Segundo Informe sobre Desarrollo Humano en Centroamérica y Panamá - Proyecto Estado de la Región", San José, Costa Rica, 2003

SCAC, "Seguridad Alimentaria en Centroamérica: Del manejo de crisis en el corto plazo, al manejo de riesgos y reducción de la vulnerabilidad en el largo plazo -nota estratégica", San José, Costa Rica, 2002

Sirven, M., "Alcanzando las metas del milenio: Una mirada hacia la pobreza rural y agrícola", CEPAL, Santiago de Chile, 2004

Science and Policy Comments

Science commentator: Carlos A. Ruiz Garvia

Carlos Ruiz is a doctoral candidate from Bolivia at the University of Goettingen, Germany, also one of the participants of the IAI-IHDP Global Environmental Change Training Institute on Globalization and Food Systems - Scientific Workshop held in Nicoya, Costa Rica. He was the commentator on scientific aspects of Manuel Jiménez's presentation.

Carlos Ruiz Garvia pointed out that the presentation stands out in showing the relations between climate, agriculture and food security, which are multiple and complex and require multidisciplinary and innovative solutions, and that very often become scientific challenges with political implications.

He underlined that the figures shown on malnutrition are alarming and unfortunately they are increasing, particularly in the majority of the tropical countries. Carlos Ruiz Garvia's comments stressed the dilemma existing between the globalization processes and global climate change, as well as the dilemma between aid versus opportunity as quoted below.

"Globalization drives us to create more large-scale specialization, more intensive systems while, on the other hand, catastrophes show us that the less vulnerable systems are those that are diversified. We have seen that in the case of Central America, the factors, which affect production and food shortage are mainly restricted access to land with agricultural and forest potential, the low level of technological transfer and technical aid, the low level of financing and competitiveness in some countries, and notably climatic risks are added, which affect mainly the highly vulnerable rural areas where there is a limited capacity to adapt to these events and climate change. We have seen, in particular, the example of the devastating effects of hurricanes, as is the case of hurricane Mitch and the El Niño phenomenon and these are just some example of the existing need to undertake proactive programs to understand and comprehend the events from a scientific point of view, to provide strategies and to understand the capacity of the systems to adapt, to implement mechanisms of prevention, early warning, adaptation and mitigation to minimize the impact on those who are more vulnerable. I want to mention particularly in this case the initiative of the Climate Forum, which has produced efficient answers.
I believe, furthermore, that it is absolutely necessary for the scientific community, through its different financing sources, operations and operative systems, to work jointly in a planned way, giving priority to immediate needs and optimizing resources but, in its turn, it is also necessary to avoid duplicating efforts. This can make possible to broaden the spectrum of

applications until the decision makers and all the other actors are finally reached. Again, it is necessary to identify the more innovative scientific solutions. Here I would like to quote an example from my personal experience where we saw that some food production systems based on indigenous post harvest methods can double the food production yield from 30% up to over 60%. This must be approached by the scientific community, in addition to other elements and other more innovative tools. We are aiming at diversity, agro-forest systems, agro-forest-pasture systems, alternative non-timber forest products and non-traditional agricultural products such as medicinal herbs and biotechnology, which have already been mentioned in this forum.

We have to approach new mechanisms like organic and forest certification, which will make our markets more competitive and will enable us to export more competitively even within the globalized system. There is also the issue of insurance systems, which are becoming increasingly important. It is also necessary - here I am pushing a little beyond the topic of vulnerability to disasters - for the scientific community to approach topics which include the sustainable management of resources, in particular tropical forests so that they become less vulnerable systems and render more added value to natural resources until the payments for preservation of biodiversity become effective in our countries.

Finally, I would like to say that there are new opportunities, such as the carbon and renewable energy markets, for example, and that also should be approached by the whole of the scientific community. However, all the initiatives that we have discussed need to be interpreted and understood by the decision makers at a political level. Scientific solutions are often not translated immediately to those they need to reach for the benefit of the communities, particularly for the poorest ones. These solutions need to come along with adequate institutional frameworks, agricultural policies and strategies in our countries.

Policy commentator: Javier Flores

Javier Flores is member of the Regional Water Resources Committee of Costa Rica (CRRH). He made comments on policy aspects of Manuel Jiménez's presentation.

Javier Flores underscored three basic questions from Manuel Jiménez's presentation, namely: i) the definition or domain of food security; ii) the articulation between climate change and vulnerability and the concept of sustainability; and iii) the information system as an important link between science community and policy makers. He also reiterated the delicate problem of donations to vulnerable communities, as well as the need for interdisciplinarity in regard to food security also mentioned by the previous commentator. His comments are quoted below:

"I believe that Manuel has presented to us at least three fundamental aspects regarding food security that we must consider. The first one is the very *definition of food security*. Firstly, he tells us that food security is not a problem of the agriculture and livestock sector. Food security is not a problem of the rural area only. Food security is a problem that touches the society as a whole. It touches all parts of the economy of our countries and of a specific region. He has presented to us three extremely important aspects of food security namely: food availability, income and the satisfaction of needs, as we have seen in previous presentations how crucial is the problem of poverty to food security.

This means that it is necessary to analyze food security not only from the climatic change or food production perspectives but as an inter-sectorial problem which touches different aspects of the policy of a country, and as such, should be seen as a whole.

Another important issue that Manuel has presented to us is that climatic phenomena are recurrent - be them droughts, El Niño or floods - they can put us in condition of food insecurity and great vulnerability. The way in which the whole set of policies is articulated has to do eventually with an often repeated word, which is very difficult to achieve, that is *sustainability*. The three pillars of sustainability are social, economic and environmental that must frame any political action.

I believe that as to the economic aspects – which Manuel combines slighly with the social ones- he has shown a very important example to us, that is the national supply accounts, which are the result of a cumulative effort of many years. It starts with the harvest forecasts of a product to determine the volumes to import or to export in view of the market demand. Now that we want to bring it to the regional level, we need to strengthen our networking and look for mechanisms to link all the countries of the Central American region. This is an important issue and a great effort that must go on developing.

This brings me to the third issue put forward by Manuel, which is *the information systems* that are crucial to any decision-making and form the real link between scientific and political activity. They are the meeting points, the bridges mentioned this morning by one of the opening session speakers, where the political side and the scientific side meet. However, I see that responsibility in the two fields must be clearly delimited and at the same time very well articulated. The scientist must have the possibility and the capacity to interpret what the politicians need and, on the other hand, the politicians must know what they want to be offered and how to use what is offered by the scientists.

In this respect, we must not forget that the vision of a politician is one of shorter term, within the period of an administration, often restricted to 4 to 5 years at the most in our countries. Responsibility of the scientists is totally different. Their vision is often constant and stable and tends to last for more than 4 years, recommending correspondingly longer term political actions for its fulfillment.

I think that in so far one can build up all these programs and networks with technology and qualified teams, we should instead of lamenting or asking for donations, focus on investment. Manuel has shown us in his examples the concern of receiving donations, which, on the one hand may solve one problem, but on the other may generate new problems. If we deliver more corn than our farmers need, why should they work if they already had enough? I think that this is an issue that we must find a balance and seek for projects that will lead to employment and improved competitiveness.

He also tells us at the end, and I think it is well stressed, that the approach to food security is not just a single discipline problem. It must be approached in an interdisciplinary and integrated way. Very often we politicians are concerned in generating laws and policies in a normative framework and feel very satisfied because the law has been generated or what should be done has been done. We forget all the downward mechanisms necessary to be established in order to operate them. This is where the weekness of the political groups resides that needs to be influenced to learn how to work in a more integrated way.

Finally, I think that one way to achieve this is to develop work at the local level, to engage in depth with the people and, also there are times when all weapons need to be used. For instance, the press must be invited from time to time when one wants to draw attention. It is necessary to make a bit of noise and fuss, so as to say, to draw attention to things that require it.

I think that very often, when we are among groups within our community, we feel very confortable and we tell each other things, but we forget that sometimes we behave like the village parish priest; we scold those who go to mass and forget those that are outside''.

Discussion and Questions

Lorena San Román from the United Nations Environmental Program (UNEP) Regional Office for Latin America and the Caribbean chaired and moderated panel 1.

Lorena San Román's coments about Manuel Jiménez's talk.

Jiménez's talk describes in a simple, coherent and technical manner the relationship between food security, agriculture and climate variability and change. He comments on the need to make better use of information on risks, among them climate, and a need to confront the vulnerability of the agricultural and livestock sector and the rural zones, an issue which has not been well-addressed in our countries. He analyzes the economic position and the poverty of the Central American region and the need for the population to have an adequate food supply.

Faced with the panorama presented by Manuel Jimenez, I think that it is very important to integrate all of society in the planning and making of decisions, from the local to the national level, both with reference to the territorial ordering and the economic measures on food security and the vulnerability of productive sectors to climate variability and change. Training of the key actors, such as the parliamentarian and municipal sectors, in the decision processes is fundamental. The latter has been forgotten because political and economic decentralization has not been adequate in our countries. In Latin American society, these sectors have in general received very little support from the technical sectors. Consequently, they very often make uninformed decisions that also affect food security, making countries and regions more vulnerable to environmental and global problems such as climate change.

The Global Environmental Citizen Project of the UN Environment Program (UNEP) is training citizen networks in Latin America and the Caribbean (municipalities, parliaments, consumers, educators, community and religious communities) on four subjects of the Global Environment Facility (GEF), i.e. biodiversity, climate change, ozone layer and international waters. This is aimed at making the decisions of these actors take into account the aspects related to the above issues, based on a genuine knowledge of each topic. The project also helps townships to implement Local Agenda 21, where each community plans its development in an integral fashion with the help of the local government and the inhabitants.

The participation of the population (civil society) in the promotion of actions to reduce vulnerability, in particular those that assure access to good quality, safe food in sufficient quantities for its members, is a key issue. Initiatives like this, as well as dialogue between scientists and decision makers promoted at this Forum will, it is hoped, contribute to actions to promote development, inserting at all levels of society the analysis of global change and its implications.

III.3.2.

A Central American Perspective on the Globalization of Food Production and Consumption

Based on Ana Victoria Román's[11] presentation

Abstract

Food and nutritional security has four main cornerstones: availability, accessibility, consumption, and biological use of food. Food availability depends not only on national production, but also on the import capacity of these countries and food donations. Statistics on agricultural production at the regional level in Central America confirm that food availability is, on the average, sufficient to cover the food needs of the population. However, there are differences between countries and more importantly, within each country. Food consumption, on the one hand, is mostly affected by availability and access. However, individual family and community acceptance of certain foods is directly linked to culture, perceptions, and knowledge. The present globalization trend may play a positive or negative role in the reduction of hunger and malnutrition. To improve nutrition remains a challenge and therefore policies will be required to reduce the negative effects and expand the positive ones, especially for those groups who are more vulnerable at the national and international levels.

Key concepts: Food production and consumption, globalization, food and nutritional security

[11] *Dr. Ana Victoria Román is a researcher of the Institute of Nutrition of Central America and Panama (INCAP) in Guatemala.*

1. Overview

Food availability and consumption constitute two of the basic pillars of food and nutritional security. The nourishment chain starts with food, which can be produced in the country, imported or donated. For certain population groups, however, food insecurity is caused by unavailability, which in turn determines its accessibility. On the other hand, there are cultural and social factors which affect the acceptability and consumption of certain foods. These factors sometimes become an obstacle for food and nutritional security.

Statistics on agricultural production at the regional level confirm that food availability is, on average, sufficient to cover the food needs of the population. However, there are differences both between the different countries and more importantly, within each country. With reference to a sufficient supply of basic cereals, the data indicate that there is not enough to cover the minimum requirements in dry beans (20-28 kg/year/per capita) and rice (14.5kg/year/per capita for Guatemala, El Salvador and Honduras and 60 kg for Costa Rica). In the case of maize, there is enough to cover the minimum needs of the population in Guatemala (115kg/year/per capita), but there is a shortage of production of this crop in the other countries of the region where maize is the mainstay cereal.

Food consumption is mostly affected by availability and access. However, individual, family and community acceptance of certain foods is directly linked to culturally- structured perceptions and knowledge. The chapter considers both consumption and production perspectives of food in Central America, in particular how globalization may influence these two pillars of food and nutritional security.

Food availability depends not only on national production, but also on the import capacity of these countries and food donations. The trend in basic cereal imports from 1990 to 2001 indicates an increase in all of these countries, reaching import levels which in the case of cereals represent close to 80% of the total supply in Costa Rica and 50% in Panama. The free trade measures adopted by the countries of the region have had an impact on the development of a great number of small producers, in part because the opening of national economies to foreign competition provides cheap imported food to regions and families with a food shortfall.

Food aid to Latin America and the Caribbean in 2003 reached 0.47 million tons, which represents 5% of all deliveries globally. This amounts to a 62% reduction in 2003, compared to 2002. Food aid in the region in 2003 reached the lowest levels in the last 15 years. Approximately half of the amount supplied in 2003 was sold on the market, and about 50% reached the targeted groups. Approximately 76% of food aid consists of cereals, while the remaining 24% consists of vegetables and other products. Food aid is generally distributed through non-governmental organizations (NGOs) (67%), multilateral assistance mechanisms (19%) and through bilateral assistance (14%).

Globalization poses new challenges to food consumption, particularly through international trade and changes in tastes and consumer preferences. Statistics on regional consumption of oil, vegetable, fruit and protein indicate that per capita vegetable oil consumption has already doubled in Central America, while consumption of sugar has increased 50% over the last 40 years. The present globalization trend may play a positive or negative role in the reduction of hunger and malnutrition. To improve nutrition remains a challenge, therefore policies

will be required to reduce the negative effects and expand the positive ones, particularly for those groups who are more vulnerable at the national and international levels.

2. Food and Nutritional Security: Central America's Perspective

Food and nutritional security, has four main cornerstones: availability of food, access, consumption, and the biological use of food. Food availability is the most basic aspect, for it is the beginning of the nourishment chain, that is to say the manufacturing of food at national, community, family and individual level. We can assert that there is food security when we are able to provide each person living in a country with enough food to ensure a suitable diet, without taking into account the origin of food, since it can be obtained from either national production or from imports or donation of food.

Diverse sectors are supporting food and nutritional security initiatives to obtain real solutions to food and nutritional problems. These initiatives can reduce poverty and promote sustainable development, but it also improves the organization of projects about food and nutrition that are taking place in this region. This makes it easier to direct technical and financial cooperation with respect to food and nutritional security.

The basic grains mostly consumed in this region are corn, rice, wheat and kidney beans, which form part of the nutritional pattern of Central America's population. Statistics for trends in the production of basic grains from 1990 to 2001 indicate that Belize and Nicaragua have increased production, but that most other countries in the region have reduced their production of basic grains. Availability of food in the region is thus closely linked to the import of grains. For example, in 1998, when Hurricane Mitch hit Central America, there were large imports of grains in this region. The countries of Guatemala, Costa Rica and El Salvador had huge grains imports, in spite of having been traditional producers of those seeds.

During 2003, Latin America and the Caribbean region received 0,47 millions tons of food coming from donations. But the most important thing is that this amount dropped abruptly compared to 2002: 62%; and donations during 2003 reached its lowest level in the last 15 years. The data is provided by the "World Food Program."

Regarding food aid, about 67% of this is being provided through projects. In 2003, there was a decrease in basic aid. Approximately a 50% of nourishment aid goes through commercial channels, and this produces important effects related to food production and on food prices but only 50% of that food gets to those target groups. Equally important is that a major part of the food obtained through this channel does not correspond to products appropriate to the noutritional habits of groups to be helped.

What has happened with food consumption in the last 40 years? What is our nutritional pattern in Central America? There has been a rise of about 17% in the quantity of energy intake. This corresponds to an additional 352 calories consumed daily in Central America. But these national averages: Although there has been a rise in the consumption of food and a higher amount of energy in the diet of people living in Central America, some groups of the population are not experiencing these circumstances. In addition, the consumption of

oils derived from vegetables has doubled from what was consumed 40 years ago; and related to sugar, there is also a significant increase. Presently, there are more oils and more sugar in Central American people's diets. The proportion of energy coming from cereals has suffered a considerable fall from 55% to 47%, approximately. Despite a rise in fruit consumption, Central Americans still do not eat the desirable amount, and it remains substantially below the recommended 400 grams per capita per day. Turning to animal proteins, it is important to consider that there are three main countries where animal proteins are consumed in high quantities: Belize, Panama and Costa Rica.

What are the impacts of these dietary changes? In 1995, at a national level, about 34% of the population of Guatemala was overweight. Three years later (1998), there was an increase to 44%. Taking gender into account, women are more likely to be overweight than men. In urban district and major cities, the situation is still more dramatic: the percentage of overweight has increased and women are the ones who are mainly affected.

3. Globalization

International Food Policies Research Institute (IFPRI) research indicates that globalization (trade expansion and capital fluctuations in particular) offers new opportunities, but it also sets new challenges for food security in developing countries. IFPRI further adds that there are some aspects of the liberalization of agricultural trade that can help the most vulnerable people, taking into account their social and economic position. This can be managed by applying a combination of trade policy reforms with some investment in development. IFPRI mentions five golden rules that can help vulnerable people:

The first measure is that developed countries must reduce their support to the agricultural sector and trade protectionism. IFPRI has conducted some studies at the global level, and in Asia and Southeast Africa. These studies revealed that developing countries are reducing their exports by 37 million dollars annually; this is by approximately 25%, to developed countries.

The second measure is that developing countries must open their markets. Countries like Mexico, Brazil, India and China have duties of 25% on agricultural products, being higher than those of many countries with lower incomes; that is to say, among developing countries there are differences in market openness and different trade policies too.

The third measure concerns agreements on agriculture and market access in future negotiations on trade liberalization. What we propose is that there must be a real content to these negotiations. There are many expections surrounding the Doha Round of trade negotiations that follow upon the Uruguay Negotiation Round.

The fourth measure deals with rules about the harmlessness and quality of food. Sanitary and phyto-sanitary (SPS) regulations should not be used as protectionist tools. This is a really important issue: Importing countries and developed countries require that our products meet SPS standards that protect populations. However, these standards and regulations demand high training and expensive appliances. The question is, how can small producers, who are willing to be competitive and open frontiers, manage with this when

large investments in quality control systems developed in other countries have to be made and implemented?

The fifth measure is that any commercial agreement must be implemented with assistance for development. Any policy regarding trade liberalization must be accompanied by effective development programs and support to those groups that are more exposed. Many groups of this kind are the ones that produce food for self-consumption; they have what we call "yard *(patio)* economy": they produce food for their families and only sell the remaining products in these markets. So, how are these most vulnerable groups to be supported in the assistance for the development?

4. Responses

There are social and cultural factors associated with the idea people have of nutrition and which kind of products they choose to eat. It is equally important to work with the consumer's guidance. How can a consumer make the best decisions when faced with a label of a product? What is the necessary information required, so that a consumer can make the best decisions, to enable choice of the best for individual and family health? The key to make the most convenient decisions is to promote or guide consumers at those levels.

The Nutrition Institute has responded to the challenges of globalization through a series of projects and initiatives. Regarding food production and food manufacturing, the Institute promotes the transfer of appropriate technology and "ecotechnology," or technologies that are "friendly" to the environment. It also promotes the production of cheap food which has been nutritionally improved and which can nourish the population, particularly those groups that are most socially and economically vulnerable. Food must obviously be harmless, and people should not get sick because of its consumption.

There has also been an emphasis to promote efforts that enable consumers to make informed decisions related to nutrition. Within the Central American Customs Union, a technical regulation is being promoted in order to ensure that every pre-packed, labeled product for human consumption satisfies some minimum requirements met by countries within the union as well as other countries. Several organizations are taking part in this initiative, and are working on these regulations. They are establishing requirements for those variables that help consumers make decisions about the purchase of food products. In addition to this, there are requirements regarding language and the information about the country of origin, because many products in local markets are products made with imported ingredients; they are only manufactured in countries in the Customs Union. Information such as names, ingredients (including allergens), identification of the producer, date of production and expiration, lots, and forms of preparation are also important to consumers. This type of clear information can benefit consumers and lead to better decision-making when acquiring foodstuffs.

In addition to this, the Nutrition Institute is promoting the nutritional labeling of food to provide more general information about the product. This would include, for example, the amount of energy, proteins and vitamins provided by each portion to be eaten. At the level of National Technical Committees of the Codex Alimentarus, these matters are being discussed because they are relevant. First of all, the content of trans-fatty acids is important

because they are strongly associated with chronic heart disease. In some countries, such as Argentina, information about these types of fats is already compulsory. In this way, a consumer who is vulnerable to heart problems can make the decision as to whether or not to buy such products based on information.

In the case of a product with any ingredients or raw materials of transgenic origins (i.e., genetically modified organisms), this type of information must be reflected on the product label because there is no capacity in the region that offers to undertake routine analyses of imported food. Normally, whenever there is a doubt about transgenic origin, a sample has to be delivered to another country for analysis. Such measures about transgenic foods are necessary not only when it comes to the formulation of regulations, but also in relation to the strengthening of the institutions involved.

5. To conclude

Analyzing the potential of globalization and nutrition in the Central America, where global expansion of trade and agricultural finances can help avoid fluctuations in food availability through food imports at reasonable prices, there are potential benefits. However, the increase in trade and imports could bring about a change in the structure of diets. For example, there is already evidence that children in the region attending kindergarden have a higher tendency to be overweight than in earlier periods. This problem emanates from food imports that do not suit the Central American's population's diet unless the consumer gets proper information and education on this matter.

Additionally, some cheap diets that include lots of fiber and grains are being replaced by diets with more sugar, oil and saturated fats. In some countries, including Costa Rica, the situation at the end of the 1990s show that 32% of people were overweight, with 12.2% obesity in women from 15 to 49 years old; in Guatemala, there is a 34 % obesity rate and Honduras is beginning to show the same tendency. The question is, how can we work out this thing of globalization, so that an improvement in nutrition can be obtained?

Among other issues discussed in this lecture include: effective integration of the countries making up this region to the world's economy; strengthening the institutions with supporting policies; reduction of trade barriers in industrialized countries to make easier the access of developing countries to their markets; and promotion of new technology related to information, biology and communications. A number of measures can facilitate the design of policies and tools to face the competitive stronghold and risks resulting from globalization. However, globalization should not replace appropriate national policies that have been designed to respond to the epidemiological profiles characteristic of their populations.

Finally, the issue of obesity and overweight as discussed here is a problem associated with trade liberalization in Central America, where there are many vulnerable populations; and where many undernourished people can be found. This undernourishment can be attributed to unavailability and inaccessibility to food (26.1%); to lack of environmental education (19.3%); to women's education levels (43%) and to women's status (11.6%). The question is, how are these populations that are vulnerable as regards food production and consumption going to be supported?

Science and Policy Comments

Science commentator: Lilibeth Acosta-Michlik

Lilibeth Acosta-Michlik is original of the Phillipines and works as a researcher at the Catholic University of Louvain in Belgium. She was also one of the participants of the IAI-IHDP Global Environmental Change Training Institute on Globalization and Food Systems - Scientific Workshop held in Nicoya, Costa Rica. She was the commentator on scientific aspects of Ana Victoria Román's presentation.

As Lilibeth Acosta-Michlik is originally from the Phillipines, she shared the experience of her home country regarding the topic raised by Ana Victoria Román, giving her comments an Asian perspective.

She was impressed by the fact that in Central America experts are trying to link food security to nutritional security as this is one way of decreasing both social and economic vulnerability. She argued that a country cannot achieve nutritional security without improving the quality of life of its people. By linking them, one is actually focusing on resources and hopefully this will help in the efficient implementation of policy. She was very happy to see that institutions that are developing knowledge for the people are able to push such a strategy to be included in policy agendas.

Acosta-Michlik also referred to the difference between the Central American and Asian food security perspectives. In Asia, food security means food self-sufficiency at the domestic level. She underscored that with globalization and trade liberalization processes, Asian countries continued to maintain a certain level of protection because it is only in this way that they could be able to obtain food self-sufficiency in their internal market. She pointed out that this does not mean that they do not like globalization, but they would rather focus first on their region, and open their market outlets slowly for agricultural products. She sees liberalization as a process, as highlighted by the speaker from the Food and Agricultural Organization (FAO), where regional trade agreements are very important because it starts as a small group and develops competitiveness through it in order to achieve greater liberalization prospects. She pointed out that regional trading blocks such as the Asian Free Trade Area (AFTA) paves the trading ground for countries to get ready for world liberalization.

Furthermore, she highlighted that other speakers in the Forum mentioned that even developed countries are not yet ready to liberalize their countries, as one can see with their continued escalating subsidies. Even if they diminish their subsidies, they tend to shift them to other forms of support that will continue distorting, maybe not the trading

patterns, but the equity among producers in different regions. For example, the European Union (EU) moved its policy from direct subsidies on production to indirect ones through environmental policies, which is a way to protect their farmers.

Quoting her words, Acosta-Michlik said that "…we should know that developing countries do not have the same capacity to provide these subsidies, so we need to be leveled up in the process. I saw that Central America has opened up its market and not in a gradual process. I am not saying that Central America is doing right or wrong, but I believe that by opening up to the global market, some countries will gain and others will lose as different countries and sectors are endowed with different comparative advantages and different levels of development. Most likely we will see that globalization will lead only some sectors and some groups of a country to gain. Therefore, it is important that policy-makers try to distribute this gain, which means from the wining sector to the losing one or from groups that have gained, such as consumers, to those groups who are losing due to globalization, such as small producers."

Regarding the interface of science and policy she said that: "we have seen already some interesting examples, and I think that the Institute of Nutrition of Center America and Panama (INCAP) is a very good example because of their strong initiative to linking their findings to policy-making regimes. Another example of link between science and policy the German case where the government has an independent scientific group which provides them with important advice on scientific issues. This scientific group is derived from representatives from different scientific institutions, and through this, they are able to elicit responses from the policy-makers as there is an established communication channel between them. IAI and IHDP are moving towards the same direction by building up a network of multi-disciplinary scientists and try to link their knowledge to policy-makers through a forum like this."

She recalled however that "we might be forgetting a component that is missing in the science-policy interface. The reason we develop science is because we think that it is good for the people. We implement policies because we think that it will improve the quality of life of the people. But where do these people come into the science-policy link? I think that it is important when we develop knowledge from science, that we also elicit response from these people as we might be giving wrong suggestions or recommendations to policy makers. For examples, there is a scientific group who is suggesting the possibilities of implementing insurance in developing countries at local level as natural disasters and risks are becoming more frequent. But do we know actually whether such a strategy will fit the social values of the people? In the Philippines, for example, people usually help each other in the event of a fire or natural disaster. I had a neighbor that had his house burned completely, but because of the help from different people, family and neighbors, office colleagues and others, one month after the fire he has built even a bigger house as a result of this network and the culture of helping each other. I think that this is one important issue that we should also consider."

In her final remark, she gave an example of a catastrophic flood that occurred in Germany, where people contributed money for the first time. "Before people used to rely on insurance systems and has destroyed the interdependency among people. They know that even without other people's help, they will survive because they have insurance. But depending on the magnitude of the disasters insurance companies just cannot cover everything. So what happened is that all people were giving out money and a substantial sum was raised

so that all victims were assisted. This created a sense of joy among them and for the first time, they have rediscovered their social values. Therefore, when we scientist suggest recommendations to policy-makers, we should ask ourselves whether they are people oriented and not only for the sake of science. In fact, it is important to consider the interest of the people we intend to help.''

Policy commentator: Alfredo Alvarado

Alfredo Alvarado is from the University of Costa Rica, director of Agricultural Research of Costa Rica and member of Natural Academy of Sciences. He made comments on the policy aspects of Ana Victoria Román's presentation.

Alfredo Alvarado commented on the concept of underdevelopment and globalization and highlighted the importance of the issue of vulnerability of Central America to catastrophes. He emphasized that the topic about globalization and communication, subsidies in the North and all other issues that we have discussed earlier are very important. His comments are quoted as follows:

''I think when we speak about globalization we take it as something that will overcome underdevelopment, but I do not see it this way. When we talk about social unrest in Central America, we refer to corruption, guerrillas, the ''maras'' from Central America, for instance, problems about drugs, problems about the size of armies. That is to say that if we do not overcome all these problems, all what we have spoken here is useless.

Central America is a region where many tectonic plates are found placed one over the other. Because of this, there are earthquakes, hurricanes, volcanoes erupting every two days, droughts, El Niños and La Niñas and while we do not know how to face these phenomena, insurance systems emerged as one of the options to consider. All these experiences are already difficult, more so if we add corruption. Somebody has to have his land insured despite the fact that the land holdings are not in marginal zones. I do not see globalization as a panacea for underdevelopment.

In what is called the ''economist's arena'', agricultural and livestock systems in Central America have been accused of inefficiency, which upsets me as an agronomist because at least we have been able to maintain the best coffee production in the whole world, the best bananas and palms production and other agricultural products that are grown in the region. Thus, when we are accused of inefficiency, it is not true. I would rather pose the problem in another way. What we see are deteriorating terms of trade and incompetent negotiators that have increased duty barriers instead of reducing them. This has limited us to compete in an efficient way with producers from other countries.

With regard to subsidies I would even be more drastic. Today somebody mentioned about the case in USA and Spain, where no politician would cancel the subsidy for irrigation as he will never be elected President. So there is a trade-off, meaning: we do not care about what you do, but what is the reward? If we want to improve agricultural production, all these issues have to be taken into account, including the issues brought up by Ana V. Román.

Related to the concept of globalization, there is a serious problem with the ownership of land holdings in Costa Rica as well as in other Latin America countries. In order to be efficient, many defend bigger farms sizes. This is what they defend; I am still waiting for

somebody to prove it. What is happening now is that many small farms that cultivate rice, corn or any other crop are being bought and are planting trees instead. So, there are farms of 5000 hectare of teak in Brazil, farms of 10.000 or 15.000 hectares of eucalyptus. When talking about policies, there is a strong deterioration of the GINI index.

Another issue of my interest that Ana Victoria Román covered is closely connected with my criticism towards a program called PCCMCA (Cooperation Program for the Improvement of Food Crops in Central America) which recently celebrated its 50th anniversary in an elaborated way. The yields of kidney beans, corn, rice and others crops mentioned earlier have not increased its yield in spite of 50 years of agricultural experiments within this program. I think that there is a need for a review of this program. Ana Victoria Román has mentioned that Nicaragua and Belize are the exceptions, so I see if I put it in economic terms. If we apply sustainability indicators for Central America, Panama and Costa Rica will most likely appear better than the rest, but if we look at it as a group, as the rest of the world sees us, we are seen as non-sustainable countries. In spite of the better averages of Nicaragua and Belize, we are still part of the group considered unsustainable.

Another interesting point that Ana Victoria Román spoke about is the linkage between globalization and junk food. In Costa Rica, we have McDonalds, Burger Kings, Pizza Huts and a thousand greasy food chain stores. But albeit Americans are all gaining weight, the North Americans will always win because there are much more obese people there than here in Central America. But it is a concern that in Costa Rica, the consumption of kidney beans per capita has fallen. Fortunately, the situation regarding the consumption of folic acid, iron and vitamin C has not changed. This needs to be further analyzed so that we can improve our diet in region.

Another important issue that I would like to make some remarks on is poverty versus transgenic and/or organic products. I have not yet met a poor person who asks whether what he eats is transgenic or organic food. - If there is something to eat and it is cheap, I eat it-; and we are speaking about 70% of the people in this region. That is to say farmers here have to choose between two options: to work and produce healthy food for the North, who can afford paying for it, or to produce simple food for the starving ones here. There are discontinuities in this remark and many things need to be discussed in this regard.

In his concluding remarks, Alfredo Alvarado said that Ana Victoria Román's lecture as well as others presented during the morning session are more descriptive than prospective. In particular, the presentations did not fully engage in addressing how the problems raised can be solved. He recounted that in the morning session somebody said that only 7% of land in the region is under irrigation. He considers that in Central America there is high potential for irrigation, and that IICA is working on this right now, or at least they are trying to run a program to expand irrigated areas. At the same time, they are also working on the opposite extreme that is on the other side of the Atlantic, where water is being drained instead of irrigated. "With irrigation, we could produce much more food, if we want to improve the current situation of our people."

Regarding self-sufficiency versus imports, he remarked that further discussion about price policies is worth pursuing. He stated that: "Today, we are watching how kidney beans are priced at 160 pesos per kilo as a result of our failure to produce more of this regional staple crop. Had we the ability to produce more kidney beens and had we have more competence; the situation would have been much different."

Discussion and Questions

Alexis Vázquez, the Executive Director of the National Institute for the Innovation and Transference of Agricultural Technology of Costa Rica, chaired and moderated panel 2.

Unidentified speaker:

"In the previous lecture, the lecturer has forgotten to say that food security no longer exists in Costa Rica because the CNP has dismantled the whole infrastructure that was in place where farmers could buy kidney beans, corn and many other inputs. We speak about food security, but we do not speak out that during the 60s, politicians took away from farmers' their intercropped banana, *tacacos*, *chayotes* from their coffee plantations, to increase coffee productivity. They have converted and obliged us to buy a green technology package that brought only damage. One speaks of food security when farmers who were responsible for approving loans by using their intellect were dismissed, and we did not have such a high default level in banks as when they began with the fashion of feasibility studies and other requirements. One speaks of food security when everything is imposed from outside of the country, they say that following this we will go out of poverty and we will progress. Once more, we go from failure to failure. Now we are saying that globalization will be a panacea, but panacea for whom? Farmers go on being poorer every day and not because they do not want to work, but because there is just no work since many years ago, they no longer receive credits. We are talking about a panacea with products coming from exports, while an economist is sent to negotiate quality rules and I ask you: what do Europeans eat, the crown on the pineapple or the fruit? What do Europeans eat, the skin covering bananas or bananas? Due to the negotiation led by Lizano Fait, we can neither export a pineapple with a twisted crown nor a banana with a few millimeters less. When out of specification, we have to dump them into this country or elsewhere in Latin America. Nevertheless, the environmental consequences are that we had to cut down trees so as to be able to plant huge areas to please the whims of industrialized countries. We should think about the issue of food security deeply because we continue talking over and over again and yet we fail to realize that the solution to this problem is most probably around the corner. Our old farmers are wise – and I finish with this – when I was growing up, a rich farmer was the one who had bananas, *chayotes*, corn and who kept an ace in his sleeve. That was a rich farmer and we did not grow up in poverty because there were oranges, *guavas* and many other things to eat but those things have been taken away by technology, they have been cut down and now farmers do not have anything to eat."

Tania Zambrano from the Institute for Environmental and Ecological Science (ICAE), Venezuela:

"Ana Victoria Román, during your lecture, through the last slide, you called our attention to the fact that almost 50% of the children in pre-school age suffer from underweight and this is due to women's role based on the information they have. Taking this information into account, we see the need for women's education. It should be an overall priority regarding food security and specifically, food quality consumed by their families. Thanks".

Ana Victoria Román:

"Yes, as you said, women's education is the element that has the deepest impact. I think that this is a strategy that has to be extensively developed at national level and regional level and among the most vulnerable groups. This is a topic that is not only connected with education, but also with the time, or with women's condition itself. This is very valid in some countries such as Guatemala, where women and girls spend around 5 to 6 hours carrying water to supply their families for cooking and hygiene – this is the equivalent to 500 calories. So this implies an extra charge on women, just to have access to this kind of education and to be able to bring an impact on their children's health. I think this is an important observation."

Referring to the colleague who spoke previously, Ana Victoria Román said: "I think his reflection is really valid. I do not think that globalization is the way to work out the problems we have, this is an opportunity in which we have risks and opportunities. How can we minimize risks? How can we make decisions and set policies to protect those groups, as you have correctly said, who are the most vulnerable ones?

The decline in food production in this region calls our attention. If we check information about the production of cereals in Costa Rica, we will see that last year there was dependency. Up to 80% of cereals consumed come from imports, obviously wheat is included in this package, and we do not have wheat production here. However, a similar situation can be observed with another staple crop which is a very important in our country: rice.

There are certainly issues that need to be reviewed. For example, the observation about the "backyard" fruit production that was destined to family consumption are now no more eaten by the family but exchanged with junk food or other goods that are extensively traded in front of consumers, who do not have the required education to make the most appropriate decisions.

And when Alfredo Alvarado spoke about junk food, we were impressed by the information given by a journalist researcher from the USA about the evolution of fast food, and how their market strategy can influence the nutritional habits of children below 7 years old. McDonalds and Burger King's happy boxes and all those promotions directed to them may change their nutritional habits for the rest of their lives. Children who have learned to consume all that greasy food, low fruit consumption and obviously high carbohydrates content will grow up following that nutritional pattern. Who is going to make them eat banana, regardless of their missing or exceeding millimeters? Who is going to make them eat *tacaco*, if what they are used to eat is junk food? They celebrate their birthday party at McDonalds. So children are not the ones to blame but us, as we are the ones who can make decisions about their nourishment and the nutritional pattern of our family. In terms of public policies, we should

legislate on the promotion and implementation of activities that will educate our population so that they can make the best decisions."

Inés Margarita Torres Ibero from Center of Cooperative and Community Development Studies (CEDECOM), Cuba:

"I would like to congratulate all the speakers who have dealt with the globalization's effects, advantages and disadvantages that this brings in our development agendas. Referring to this, I wanted to highlight two main concepts. The colleague from the Philippines mentioned an experience in her country and another in Germany regarding strategies and development projects to counteract the double exposure to globalization and to global environmental change. I want to speak about what is happening in Cuba. Everybody knows that Cuba is one of the most questioned countries because of the situation of its economy. It is true that our economy is suffering many disadvantages compared to other countries, but we also have to give answers related to globalization as our country is also facing the effects of this phenomenon. First, more now than ever, after the fall of the socialist system and the strengthening of the American boycott and taking into account the internal structural problems we have, the first thing to be considered is the strengthening of science within policy and policy within science. In other words, this means universities and communities investigating all possible strategies, potentials and problems, elaborating projects for local development that cannot count on foreign funding in most cases. As a golden rule, we can only rely on our own educational system, and we are positive that we are able to face the impacts brought by globalization.

We can mention some projects related to food and nutritional security in my country. It was clear to us for a long time and to the Cuban scientific community that food security cannot be approached just as a concept, but as an integrated axis of human development and this is called food and nutritional security. Therefore, we follow up related problems, such as undernourishment, people suffering from AIDS, as well as pregnant women and youth are taken as priority. I see that there are colleagues here, who have visited the island and have witnessed life experience, which could testify what is happening there in spite of all our limitations.

With respect to agricultural production, Cuban farmers are very different from what I have heard here. Farmers in Cuba have the highest purchasing power of the population with the highest consumption rate and can consume everything they produce. There are local development programs aiming at strengthening farmer's capacity so as to establish solidarity and cooperation projects with the urban sector. There is also a close connection between science and policy. In this regard, we consider that we are seeking a prospective education and a prospective development."

Sandra Mejía from the Association of Municipalities of Nigaragua, Nigaragua:

"I want to make a comment and ask a question to Ana Victoria Román regarding the slide and the figures presented on grain production in Nicaragua and its capacity to export. If it is true, and I think it is, that the situation of the basic grains production in my country is critical, especially in relation to kidney beans and wheat. Currently, the price of these grains is four times as much as it used to be because farmers export them through non- conventional channels. Foreign merchants from El Salvador and Honduras buy their production in advance.

As there is no well-established credit policy for our farmers they commit their production and sell it in advance. As a result there is a decrease in the grain supply in our internal market forcing us to import. I find this phenomenon very contradictory."

Unidentified speaker:

"I would like to contribute to the discussion starting with the words of our poet Roberto Sosa, who says: *It is difficult to forget the poor because they are many*. Alfredo Alvarado's comment focused on two main problems that are persistent in Central America. The first one is the low rate of adoption of technology. We, agronomists, can say that we did not succeed in regard the adoption of technology when we examine the yields of our agricultural production. The other day we analyzing a Inter-American Development Bank (IDB) project and I was asked to suggest some research topics. My first suggestion was to ask why are people unwilling to adopt what we propose. Actually, this is the first question we have to ask ourselves and if we take the case of Central America we can summarize it in two deeds: We have adopted spine wire fences and the *Jaraguá zacate*. These are the only two things that we agronomists have managed to achieve.

And then there is the problem of land ownership that we do not want to talk about anymore, yet there was much discussed during the 70's and 80's. Whilst we have problems related to land tenure as the ones we face nowadays, it is difficult to improve their technological profile. We have basically 35% to 40% of producers, not population, who do not own land. They are producers but not the owners of the land, which make it very difficult to improve their situation. I believe that we have to think about the causes of why we did not move forward today or is likely to remain as such."

Sergio Omar Saldaña Zorrilla from Mexico. A PhD Studant at the International Institute for Applied Systems Analysis (IIASA), Austria:

"I think we cannot afford to misunderstand some important concepts. It is the case of *food security,* which sometimes seems to be confused with *food sovereignty*. Food security refers to the capacity of an economy to ensure that people belonging to a society will be provided with food of a minimum quality, without taking into account its origin. Food sovereignty requires that food be produced inside the country. In this regard I do not agree with Lilibeth when she said that food security can only be obtained by means of protection. I would openly refute this idea because it is not true. For instance, if you take a country like Austria, where half of its food comes from Italy, it does not present any problem because there is complete food security. They have a high living standard with a relative integration to international markets.

This leads us to another interesting question: What is then food security? Agricultural economists generally take two different positions: one group supports food security and the other, the strengthening of rural incomes. In general, food security is seen from the neo-structuralist paradigm of agricultural economists from the Economic Comission for Latin America and the Caribbean (ECLAC/CEPAL), which aims at providing food to all the population. Their supposition is that through this action the average level of life for these groups will improve – mainly the urban one, which has become the priority of this model (substitution of imports, strengthening of their industries and so on). However, several countries that have adopted this model for different reasons have overlooked the issue of rural incomes.

What happened to Mexico, for instance, with globalization is that it has opened its trade and inserted its economy into the global market. Today, we have commercial agreements with 47 countries. We have guaranteed the supply of food and everybody has access to food but when you look at the figures on levels of undernourishment, this has not improved. Thus globalization did not improve our nutritional profile. On the contrary, it has ruined our rural income. Often the access to imports can be considered as an advantage in the case of natural catastrophes, but on the side of the farmers' income, this may be dangerous and damaging because of the price that they will have to sell their products. This is an important point because in the past, people thought that after a disaster, farmers could benefit because of the rise of the price of lost crops, but in an open economy context, this does not happen because our prices are dictated by the international market. I would like to conclude by saying that this is but an attempt to define some concepts''.

Alexis Vázquez, the Executive Director of the National Institute for the Innovation and Transference of Agricultural Technology of Costa Rica, chaired and moderated panel 2:

"I will try to make a summary of Ana Victoria Román's lecture. She mentioned about availability and consumption, but first, she mentioned the problems brought by globalization, which implies opportunities as well as new challenges.

With respect to availability, Ana Victoria Román reminds us that it consists of having enough food to feed the whole population. Regarding food production, Ana Victoria Román mentions four related elements: technology, production, cost structure and inputs. Ana Victoria Román has also indicated that there are some measures so that liberalization can benefit the poorer countries, such as lowering of agricultural protection in developed countries, opening up markets of developing countries, establishment of agricultural agreements, establishment of non protectionist and harmlessness measures and assistance for development as required for any trade agreement.

Related to consumption, she has clearly pointed out how consumption habits have changed in this region, where we seem to be a little fatter every day. She clearly points out that it is very important to set policies for regulating the customs union about labeling, so that consumers can make the right decisions relating to the product they buy. The label must list very precisely the characteristics of the product. And at the end, she points out that globalization should not substitute adequate national policies. Ana Victoria Román also showed us how the production of staple grains has diminished in Costa Rica.

I would like to remind the audience, just in case some do not know that since the structural adjustment in Costa Rica, there is a political decision of dismantling grain production. We can judge it good or bad, but this is what caused the fall of our grain production in Costa Rica during the last years. However, as the Executive Director of INTA, the National Institute for the Innovation and Transfer of Agricultural Technology, I must say that we must maintain the generation of technology to support the production of the basic grains. It is essential that our farmers have the necessary technology so that they can generate new seeds and new materials in their plots. We also think that it is essential that our country adopts food security policies to promote not only access to food but also support to sustainable livelihood and job opportunities to all rural households, since most of them knew only how to produce these grains and nowadays they are producing practically nothing.

Diversification or Specialization: Challenges for Rural Livelihoods in a Changing World

Carlos Pomareda[12]

Abstract

The paper begins with a brief reference to globalization. The association of globalization with trade liberalization and pressure on domestic markets leads to an unfortunate negative perception. There is therefore an attitude towards protection. There is a need for a broader view of globalization and a search for opportunities.

The rationale for decision making in small-scale agriculture is addressed with particular reference to the relation between risk and net return and their value in resource allocation. This relates to the issue of specialization or diversification among small-scale producers. Numerous forces influence the desirable pattern of diversification. Among poor small-scale producers, the latter includes crop mix, holding of livestock, off farm work and in some cases value adding activities, such as handicrafts.

Among the main features of agriculture in the region are the small scale of operations, strong dependence on rainfall and a high exposure to weather and market risk. At the aggregate level the countries are small, with a reasonable degree of communications, and are quite urbanized, thus offering alternatives for off-farm diversification. Their situation is particular and not comparable to the case of the Andean or African rural households. This situation favors the income portfolio of agriculture-oriented households.

The trend in rural incomes and other features in the rural sector resulted from policy decisions. Some of these policies worked against small producers, as for example the decline in investments in agricultural research, extension and irrigation and limited investments in human capital and the strengthening of producer organizations.

The scenario ahead requires considering the opportunities that small producers have to produce and market products with added value that takes advantage of their ecological

[12]*The autor is the Executive President of Servicios Internacionales para el Desarrollo Empresarial (SIDE S. A.) in San José, Costa Rica. sidesa@racsa.co.cr*

and cultural characteristics. Interaction with urban centers within the region will also provide opportunities for their products, besides generating complementary income from employment in off-farm activities. It must be recognized that the imports of traditional products such as corn is likely to continue due to low international prices. As are resulted, continued local production of these crops, although desirable for food security reasons, will be quite difficult for small producers.

The paper closes with some concluding remarks regarding policies needed to encourage the right type of diversification. These include: avoiding further land fragmentation; providing water for irrigation; building infrastructure and production systems to improve quality of the land; improving knowledge and managerial quality of producers; improving capitalization of farm units with small size equipment and machinery through longer term credit programs; encouraging small scale irrigation to decrease the impact of seasonality on production patterns; developing non-agricultural activities in the farms and local communities, mainly for women and younger people; attracting investments that create higher quality employment through tax policy and promotion of rural attributes; and strengthening local producer organizations in a corporative way, through specific support on management matters.

Key concepts: **diversification of production, specialization of production, globalization, small rural household, inductive policies.**

1. Introduction

The process of globalization has become a fact. Firms and individuals face the challenge of adapting to it. Adaptation means reconsidering and revising interactions with the external world. This will allow decisions based on more and different information and action as a function of such information. Globalization also means that there is greater awareness of markets for goods and services in places beyond the usual.

These challenges are faced by rural households in general, but they take a particular form in the case of those dedicated to agriculture[13]. In those households, the degree of interaction with the external world determine actions taken and the results of those actions. In agriculture it must be also recognized that, for a variety of reasons, not everyone has the same level of interaction with the external world.

This paper offers an analysis of the challenges faced by households primarily involved in agriculture and facing the process of globalization. The paper centers on the issue of specialization or diversification. The paper is organized as follows:

Section 2 offers a brief reference to factors that should be recognized as part of globalization. The current focus on markets for agricultural goods and market distortions is incomplete. It leads to an unfortunate negative perception of globalization and therefore an attitude of protection. Instead, there is need for a broader view and a search for opportunities, as discussed here.

Section 3 discusses the rationale of decision making in agriculture, with particular reference to the relation between risk and net return. This is a key matter to address the issue of specialization or diversification. This section makes reference to what should be the desired pattern of diversification.

Section 4 describes the main features of agriculture and rural environments in Central America. This particular reference is necessary because, being that Central American countries are small, with a reasonable degree of communications, and quite urbanized; their situation is particular and not comparable to the case of the Andean or African rural households.

Section 5 examines the composition of income of agriculture-oriented households. It shows the alternative means of diversification and the related sources of income and their implications.

The trend in rural incomes and other features in the rural sector resulted from policy choices. It is therefore important to briefly review such measures, in order to identify needs for change. This is achieved in section 6.

The previous information allows an analysis in section 7 of a possible pattern of change in agricultural households in Central America, in light of expectations associated with globalization and other factors. The paper closes with some concluding comments on section 8, regarding to policies needed to encourage the right type of diversification.

[13] *Although the title refers to rural livelihoods, this paper addresses primarily the case of agricultural households.*

2. The Meaning of Globalization

Globalization is the process that allows greater interaction among persons, firms and governments around the world. It has occurred because the joint effect of at least three forces. First, the force of liberalized international trade allows corporations to pursue larger markets. Second, there is political interest in capturing partnerships, in a world where the communist – capitalist division has tended to fade out. And third, it has occurred as a result of innovations in communications. The detail behind these major areas would require several pages, beyond the scope of this review.

Although globalization has been fostered by those primary forces, globalization is here to stay. Hence, it must be exploited to the best, by everyone wishing to move ahead. Globalization includes many dimensions. There internet, for example, is a service for the world. It has overcome the limits of the telephone. It means that more people can communicate on a permanent basis and at a much lower cost. This allows strengthening personal and corporate relations, to acquire knowledge, to advertise products and services, to obtain entertainment, etc.

Financial transactions are made more rapidly and less expensively. This facilitates business, and it allows international financial flows to be an element of greater influence on the behavior of the international economy. Of course faster financial flows also contribute to a more significant international transfer of financial instability.

Tourism has grown substantially, in part due to the fact that more information about sites and opportunities is more readily available. This includes agrotourism and ecotourism offered by farms of any size and location. As a result, competition is also stronger.

Technological innovations, including those for agriculture and agro-industry, can now be obtained anywhere in the world. Equipment, tools, materials, seeds, vegetative tissues and embryos, can be purchased anywhere, ordered by internet or mail and paid for by electronic or card transfers.

International flows of goods and services are also growing substantially as a result of compliance with common rules and efforts to lower the barriers to trade. Nevertheless, in the particular case of agriculture entails major constraints, as subsidies in developed countries, and escalating tariffs for more value added products, distort the common rules and work against the benefits of trade for lower income countries.

Globalization means especially that all actors around the world can participate in global relations under common rules. The WTO Agreements and the several hundred other agreements, provide the rules for trade, environmental care, labor relations, sanitary and food safety compliance, etc. As they are accepted by governments, they become mandatory and in many cases force the revising of previously defined national policies.

Globalization is then a process that places attention beyond the local site. However, interestingly, when the discussions focus on global matters, small entrepreneurs ask themselves what they should do about it. The advice has gone in several directions including: Building a partnership with other small firms; producing under contract with a larger firm

or one in the next step in the production chain; selling the firm to a larger corporation; and resisting the trend for generic products and becoming differentiated. This latter option of course requires more management capacity and a stronger effort to obtain identity.

Given the above, the question is therefore, how could the small business in agriculture benefit from globalization? The three comments on this regard are: First, learn about its meaning and lose the fear of it; second, learn how to be part of it; and, third, take action to be part of it.

As simple as it would seem to engage in globalization for those individuals with some education and financial resources, the fact is that most small agricultural producers are far away from being able to take the required steps. The point is to recognize how each individual or community is currently affected or not by globalization; what challenges and opportunities are faced; and what are the steps to follow to take advantage of it. This is a new form of analysis of the opportunities for development, beyond the traditional approach of closed economies and local opportunities

3. The Rationale for Decision Making in Agriculture

Decisions are made by agricultural enterprises on a continuous basis. While their relevance and impact depend on the complexity of the issue and the amount of resources involved in implementation, decisions are critical for all agricultural enterprises, be they family farms or large agricultural corporations.

In all cases, there are two basic elements that are taken into account: The expected net return of the decision and the implications on increase or reduction of risk. The weight provided by each individual to both parameters depends on his attitudes towards risk. Since the pioneering work of Chayanov (1966), it has been recognized that in general agricultural producers are risk averse. Also, in many cases there is uncertainty (more than risk) when the probability of the expected outcomes is not known.

Other considerations for decision making concern the magnitude of the effort required, the time until the returns are perceived, and the requirements of resources, including family labor required. These factors could, on occasion, be definitive for the option chosen.

This also pertains to various possible considerations regarding risk. It includes: the risk of market price fluctuations; the risk of having to engage larger costs than expected because sanitary controls; the risk of losing the harvest or part of it because of weather or other factors; the risk of having the harvest, animals or tools stolen; and the risk of being kidnapped; etc. As mentioned earlier, in many of these cases the farmer faces a high degree of uncertainty.

The exposure to risk means that the producer may not be able to obtain enough income from sales, or that the basic food security of his family is in danger. There is also the risk that he may not be able to pay his debt in a case where he had borrowed money and will lose his property given in guaranty. Because each individual has his own risk aversion attitude, and this may vary over time for the same individual, each one places a different value on these aspects when taking decisions.

Most options open to the producer at the farm unit are characterized by cost, requirement of resources, and level of return and associated risk. These characteristics apply to crops under different technologies, raising of animals of different species, and producing higher value products such as cheeses (instead of selling fluid milk) and handicrafts. In many cases producers also have other options such as off farm employment and other sources of income.

It is generally observed that the portfolio of choices and subsequent decisions of the producer are guided by the Markowitz (1959) principle of the optimal combination of low variance - high negative covariance among the alternatives. Hazell (1970) introduced later the principle of the risk aversion coefficient, as a means to reveal the weight that each individual gives to these parameters when searching for an optimal combination. Even later, Hazell, Pomareda and Valdes (1986) incorporated the option of agricultural insurance in the risk decision model, to allow a higher level of risk taking, when insurance coverage is available at a given premium.

These decision making principles continue in application today and they are likely to remain. What is new is the number of options available to the producer. They have increased in recent years, and they will become greater as agricultural producers engage in the process of globalization.

The analysis has led us to the questioning of specialization. Apparently this would be the right choice as a sole activity, only under absolutely no risk and perfect certainty. It is hard to think of an option in small-scale agriculture of such fantastic characteristic. However, there are agricultural enterprises which specialize in one alternative, such as chickens, pigs, oranges, rice, etc. However, the particular conditions that allow for this specialization are found especially when such farm activities are not the primary source of income. That is to say that off farm income comes primarily from other sources.

Specialization may not always be the best option when risk is evident or when risk aversion is high. However, it must be admitted that specialization could allow greater efficiency in production. In that case for example, the programming of planting and harvest dates of the same crop allow some degree of adequate risk management.

Considering that farm level specialization may be desirable for technical and efficiency reasons, there is also the issue of whether specialized farming should be encouraged as the only source of income; or should it be primarily pursued as a complementary source of income? There is a trend in the latter direction. One reason this occurs is when there is a positive trend in land value. Thus, the producer keeps the land as long as it increases in asset value: It will be rational to keep it, as long as the discounted net benefit of such a decision is positive.

4. Small Scale Agriculture in Central America[14]

Although the principles discussed in the previous section have general validity in agriculture, they take a particular meaning in the case of Central America. The following paragraphs provide information for this particular case.

[14] *This brief reference to the region as a whole must be taken with care, as there are differences among countries.*

More than a geographical space, Central America is a socioeconomic and ecological structure. The descendants of the Maya and other cultures remain as the dominant ethnic group, except for Costa Rica. It is true that the urban areas gather a mix of races and cultures, yet being that our concern is the rural areas, and in particular, small agricultural producers, the social characteristics of the rural population must be a point of entry for the analysis.

Most small agricultural producers are descendants of the native inhabitants. Their cultures and values hold them strongly to the land and nature. They are agriculturalists, artisans and merchants, in principle; thus the prospects for their performance in other activities than agriculture are possible. However, education, age and household commitments do not always allow the change.

The economic and social influences brought in with colonization, exposed them to change and resulted in migration toward urban areas. Rural - urban migration has been the most significant feature of demographic change in Central America. However, many of these migrants to the cities are not better off in their new habitat. Nevertheless, it is important to value urban - rural relations as a key element for the development of the region.

From the ecological side, the region has some dominant features: First, a high degree of biodiversity, which in turn explains why agriculture, silvopastoral systems, hunting and fishing were the basis for living in their closed rural economies until the 19th Century. Second, there is a variety of ecosystems: They range between the flat drylands in the Pacific side and the hills and the tropical plateaus of the Atlantic. Third, there is a marked seasonality of the rains, abundant between May and November and almost nil between December and April. And, fourth, natural disasters, including earthquakes and hurricanes, are part of the continuous scenario, and this will not change. Thus, in general, the agricultural producers in the region have on one hand alternatives and on the other, reasons for diversification.

The original social communal organization was built on the basis of a wise utilization of natural resources, the productive activities and the need for protection against disasters. They are revealed in the eating habits (strongly dependent on corn tortillas, beans, chilies, tomatoes and local fruits), social and religious gatherings, music and dance. Food security was a principle in the socio-political model, because of the high risks of not having enough to eat, until the next season, due to natural disasters. These disasters have affected the stability of production and the available time for farming, as part of it had to be dedicated to reconstruction.

The social and economic structure of the Maya and the characteristics of the ecosystems, were not respected by colonization, which remains as an important force even in this new century. The presumption that what was good for the white settlers had to be good for the indigenous population, encouraged agricultural production systems, and forms of organization, which have not always helped the smaller agricultural producers of the region. Deforestation and extractive agriculture were encouraged by policies aimed at economic growth and accumulation of economic power, but not motivated by development of the local populations. Resource exhaustion and rural poverty grew as a natural response.

The referred issues are no arguments to go back trying to reconstruct the previous rural systems of Central America. Yet, these issues must be recognized in order to suggest an adequate pattern for the future.

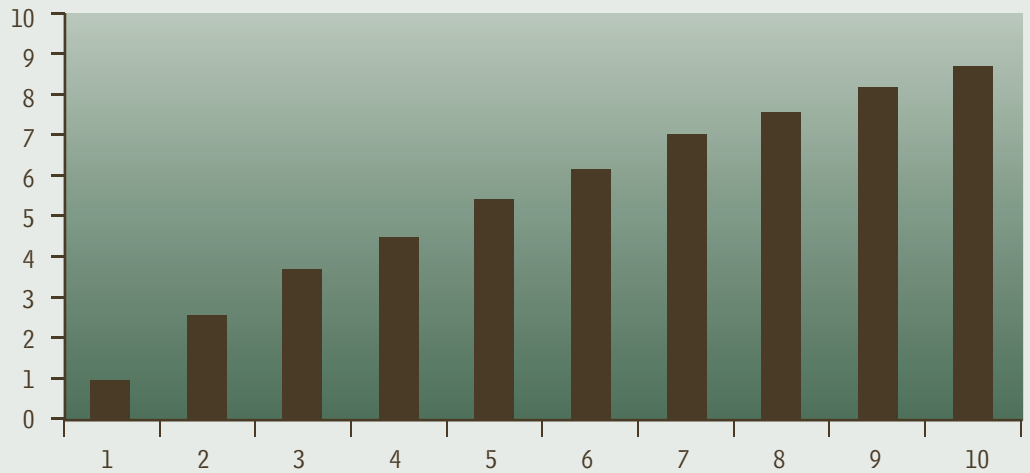
An attempt is made here to describe the main characteristics of small agricultural producers in Central America. Each one of the identified characteristics is additive to the preceding, hence as more of the characteristics are added to the first one, the poorer are the producers and less feasible it is to overcome their condition, through farming and even more difficult through specialized farming. Small agricultural producers are:

1. Owners or holders of farm lands, of a size such that cannot produce enough for a decent living for the family;
2. Usually located in fragile ecosystems, thus highly exposed to losses, because of natural disasters;
3. Deprived of irrigation water, therefore the land can only be exploited part of the time, with a result of very low productivity;
4. Limited in their availability of tools, equipment and machinery, hence the productivity of labor is very low;
5. Owners of very few low value capital assets, and many times without title of the land; this makes them unable to obtain formal credit;
6. Dedicated to produce basic grains, beans or other low profit crops and cattle of low productivity, and dependent on such products for basic food;
7. Limited in their technological knowledge and managerial capacity, hence unable to incorporate innovations;
8. Isolated from main roads and without access to transportation, hence costs of commercialization and post harvest loses are high, plus prices paid for inputs and services are also high;
9. Usually highly risk avert, hence unwilling to bear debts; and
10. Without access to health and other basic services, so that illness and diseases are common, contributing to low productivity.

Figure 1 provides the hypothetical case of small agricultural producers with increasing difficulties; the referred features mount onto the producers' shoulders. Evidently not all features occur in all cases, nor does one exclude others. Presenting the situation in this mode allows us to identify critical issues, which need specific policies for improvement.

Along with these characteristics, it should be recognized that many small agricultural producers in Central America, for which some of these constraints were not present or removed, were successful in producing high value crops and livestock products for domestic and international markets. As a result, their income and welfare has improved; their children are better nourished so that many of them went to the university and became successful entrepreneurs and important local political leaders. Group organization, technology, individual capacity and willingness, were key conditions observed in most of the successful cases.

Figure 1. Additive characteristics of Small Agricultural Producers with their possibility to succeed



The number of successful small agricultural producers in Central America is limited to probably less than five percent. Others manage to live in reasonable conditions. The larger portion live in very miserable conditions; their income places them easily below the poverty line. They are frequently exposed to temporary government relief programs, which provide transitory benefits. Furthermore, such programs are often managed within an environment of corruption and are of low effectiveness.

5. Land Use and Income among Small Producers

A limitation for this research comes from the unknown number of agricultural producers in the region, the size of their land holdings, the crops grown and animals held, and the composition of income. There has not been a recent census of agriculture in any of the countries. An approximation is that the number of farm units is around one million.

It is estimated that in Central America around 375,000 farm units hold some cattle. The total cattle population is 11 million; thus the average number of cattle per farm would be around 30. Considering that a limited number of farms hold more than 200 head, most of the farms hold less than twenty head of cattle. That could be considered a small operation, particularly if most of them are for a dual purpose, with milk yields of around 1000 liters/cow/year. Most of these producers also grow other crops, particularly basic grains, plantain and cassava.

In the coffee sector, the most important in Central American agricultural sector; most of the farms are of less than two hectares. ECLAC/CEPAL estimated that, in Central America, there are 291,000 coffee producers. Around 200,000 have average plots of 0.8 hectares and

47,900 have average plots of 3.6 hectares. Even with such a small size of plots, producers who grow coffee used to generate on the average, a reasonable income per hectare, before the coffee crisis of the last three years. Larger incomes among small producers are obtained only by those growing vegetables for domestic and export markets. In this case, the size of plots is smaller than one hectare, and it is limited to the lands of better quality and with water for irrigation.

Small producers in Central America also engage in other farm level activities. They include poultry for eggs and meat produced under contract with commercial plants and distributors. There are around one thousand small broiler operations that hold an average of 5000 chickens, during growth periods of seven weeks. These small producers usually have very small plots; they depend basically on family labor and they are located in periurban areas.

Relating the sources of income of agricultural producers in Central America, few live exclusively from farming. The composition of income comes from: crops, milk and cattle, off-farm employment in other farms and other rural activities; and remittances from relatives in urban towns and abroad. This composition varies among regions in each country and among countries. In Costa Rica off-farm employment is significant; in Nicaragua, remittances from Costa Rica are crucial and in El Salvador remittances from the U.S.A account for almost 50 percent of total family income in the lowest rural income strata.

Small agricultural producers and landless peasants in Central America account for the largest portion of the rural poor. Also, it is estimated that currently the rural poor account for near sixty percent of total population under the poverty line. Even when there are interesting proposals to generate rural income outside agriculture, such as ecotourism and services, it should be recognized that many of the rural poor have limited possibilities to employ themselves outside agriculture. Age, education, location and other factors limit their options.

An important feature to consider in Central America is the location of poor agricultural producers with respect to urban markets or to roads. In general, the situation is not as dramatic as in the Andes or in the larger countries as Brazil. However, there are important variations. In general those located closer to roads and towns have been able to generate complementary incomes and receive better prices for their products.

6. What Policies Contributed to the Current Conditions?

Without any question, there are a number of government policies that have contributed to the current situation of poor small agricultural producers in Central America. This has happened in contrast with what is observed in Europe, for example, where there is a specific goal to protect the small producer, and this is not just the result of having the money to do it. More important than that, this form of agriculture is a model for development.

The model in Central America did not value small agricultural producers as an asset. Rather, they were always seen as a liability. With that view, land reform during the sixties has been the means to distribute resources in order to pacify these interests. In the seventies and eighties, subsidies to products, inputs and credits were provided to level off the field with the industrial sector: Little was done to assist the small farmers in their route to progress.

Early in the eighties an effort was supported throughout the region, with important contributions from USAID, to assist small producers in the change towards non-traditional crops, with a reasonable success in a few cases. In the nineties a more radical attitude was taken as part of the structural reform programs: "Small farmers had to organize themselves, change crops and be competitive." Often Ministers of Finance and Trade and even some Ministers of Agriculture, repeated the poorly learned lesson: "Either small producers change or get out of agriculture." Of course, this did not always happen. Many small producers continued with the same crops, but just got poorer and more deprived of opportunities.

Table 1 - Policies in the 1990's and their influence on Small Agricultural Producers

Policy Measure	Effect
Agricultural Export Promotion	Creation of rural employment
Urban Bias – maquilas	Migration of the most capable
Diminished tariffs to agricultural products (grains)	Increased imports of grains and lower domestic prices
Financial reform	Higher interest rates for agriculture and more stringent credit conditions
Fiscal austerity	Lower expenditures on agricultural research and development and diminished capacity of Ministries of Agriculture
Diminished tariffs on agricultural inputs	Lower costs of production, but benefits were more significant for larger agricultural producers, which used imported inputs

Table 1 summarizes the main policies in practice in the nineties and even now, with direct influence on the situation of agricultural producers. Evidently, there is a mix of positive and negative effects, yet the latter outweighs the former. Some of these policies have been in practice for many years, thus they have already created structural changes.

The nature of structural conditions makes it more difficult to change the situation of small agricultural producers, as simple responses to market signals. For example, the size of the plots is getting smaller, because of the division of property; the older and less capable are staying at the farm; the quality of the resource base has diminished; water for irrigation is getting scarcer and in general small producers face large transaction costs. These conditions cannot be reverted easily, thus the solution of the problem may take many years and only if there is continuity in the policies.

7. Prospective Scenario under Globalization

At the risk of omissions of some important factors, one can expect that the scenario ahead will be dominated by difficult conditions and possibly some opportunities. The expected features would likely include the following:

- Increased difficulties to compete in the international markets for the agricultural products exported from the region. This would lower the possibilities for employment in rural areas;
- Continued negative trends in the prices of basic grains. This would make it more difficult for small agricultural producers to produce these crops competitively, unless a portion is produced primarily for family consumption;
- Remaining high tariff protection for agricultural products with higher aggregate value in developed countries. This will make it more difficult to create employment in export-oriented agro-industries;
- Stronger pressure to attend to social matters in urban areas. This would leave fewer public resources for agricultural programs and rural infrastructure;
- There is no reason to expect that natural disasters will diminish or lower their damaging effects. This will continue affecting the livelihoods of the rural poor, especially those located in the most fragile environments;
- Opportunities brought by the trade agreements, allowing exports of differentiated higher value products;
- Increasing interest in the provision of environmental services on agricultural farms, thus encouraging practices that are congruent with this goal;
- Rapidly growing technologies for agricultural production and processing, which could allow production of higher quality and higher value products; and
- Growing tourism (local and international) interested in the rural scenery and culture as an alternative.

The scenario referred to is realistic, thus getting smaller farmers out of their current critical situation poses three major challenges. First, the conditions are more difficult regarding competition; second, the negative structural factors have become stronger due to deterioration of the land and infrastructure; and; third, there are less public financial resources than in the past for poverty alleviation programs.

On the other hand there are opportunities. First, the prospects are reasonably good on markets for differentiated, new, and value added products, and for services that can be provided by agricultural enterprises. Second, in general markets have become wider in the sense that consumers for specific products and services can be found anywhere in the world. And third, globalization does not deny opportunities to the products and services that reflect image and quality on the basis of local characteristics.

8. Concluding Comments

The analysis of constraints and opportunities referred to here ought to be taken as a point of departure to identify the policy options. Policies should be defined to remove those constraints, but also keeping in mind the goal of positively guided diversification. Hence, the goals of these policies, one at a time and in conjunction, would include:

- Avoid further fragmentation of the land;
- Provide water for irrigation;
- Build infrastructure and production systems to improve quality of the land;
- Improve knowledge and managerial quality of producers;
- Improve capitalization of farm units with small size equipment and machinery and

basic infrastructure, through longer term credit programs;
- Decrease the impact of seasonality on production patterns;
- Develop non-agricultural activities in the farms and local communities, mainly for women and younger people;
- Attract investments that create higher quality employment through tax policy and promotion of rural attributes; and
- Strengthen local producer organizations in a corporative way through specific support of management matters.

For policies to achieve these goals, they need a substantial change from the current pattern, which has focused on free low-quality agricultural extension and giveaway programs. Governments and donors are responsible for them and both create dependence on public sector entities and international agencies, which, in turn, is used as an argument to perpetuate inefficient bureaucracies. There is a strong need for education and clear messages about the role of government and elimination of the notion that public entities are gift minded. In this regard, a substantial change is needed in the old-fashioned Ministries of Agriculture, Institutes of Agricultural Research and Institutes for Rural Development.

From this analysis it could be concluded that some small agricultural producers may improve their incomes through increased productivity, higher quality of products and added value if they face globalization with an optimistic attitude. For many of the poor farmers, that may not be possible, or it could not be achieved as fast as it is needed. Even if it was possible, it would not be enough for everyone. Hence, off-farm employment is needed. To make this possible, there is a strong need to focus public investment in key aspects as education and health and attract private investment, domestic and foreign, in commercial agriculture, rural agro industries and other activities feasible in rural areas. These firms ought to commit themselves to work with the human resources available and contribute to improve their skills.

A comment is also needed pertaining to the policies to allow the addition of value at the farm level and to allow rural areas to attract investments. At least three matters deserve more attention. First, policies for agriculture must encourage a better relation among actors in the production chain and training of farmers in the "how to" of positive diversification and aggregating value. Second, policies must define specific incentives to attract investment into agriculture; including urban business, the transnational corporations and national food industries willing to assume social responsibility. And third, there is a need to take a very strong position in international trade negotiations, regarding the need for developed nations to eliminate the current tariff structure on agricultural and food products with aggregated value.

A closing remark is much needed: The quality of life of smaller agricultural producers depends strongly on two major forces: First, their own effort, to get out of poverty, without expecting more gifts from government agencies and donors. And second, a new framework of policies, to create better conditions for competitive farming and private investments in rural areas. Regarding the latter point, three focal points are: First, more efficient public investments and programs to lower transaction costs; second, a heavy emphasis on programs to create capabilities of individuals and organizations; and third, a strong reliance on private actors and market forces and less emphasis on give away-government managed programs.

As the last comment, there is the need for a positive image of the rural sector. This is fundamental. Very little will be achieved if there is not a change from the current view of the rural sector as the worst possible option, to one that sees in it opportunities.

References

Chayanov, A.V., "The Theory of Peasant Economy", Edition Smith, Thorner and Kerbly, Homewood, Illinois, 1996

Hazell, P.B.R., 1970, "Game Theory - An extension of its applications to Farm Planning under Uncertainty", Journal of Agricultural Economics, Vol. 21, 2002

Hazell, P.B.R, Pomareda, C., Valdes, A., "Crop Insurance for agricultural development. Issues and Experience", The Johns Hopkins University Press, Baltimore, 1986

Markowitz, H.M., "Portfolio Selection: Efficient Diversification of Investments", New York, John Wiley, 1959

Pomareda, C., "Do Small Farmers have a Future in Mesoamerica?", Paper presented at IFPRI´s Symposium on Sustainable Food Security in Mesoamerica by 2020, San Jose, Costa Rica, 2002

Science and Policy Comments

Science commentator: Man Yu Chang

Man Yu Chang is a socio-economist from Brazil. She has a PhD in Environment and Development from the Federal University of Parana, Brazil. She is the adviser for forest Clean Development Mechanism (CDM) projects at the Department of Environment and Water Resources of the State of Parana. She was also one of the participants of the IAI-IHDP Global Environmental Change Training Institute on Globalization and Food Systems - Scientific Workshop held in Nicoya, Costa Rica. Below are her comments on the theme presented by Carlos Pomareda.

As a social scientist Man Yu Chang's comments focus on the political perspective of the globalized economy, by underlining the prospects of market exclusion of the majority of small farmers in developing countries. She stressed that although globalization opens up many market opportunities to the rural sector, they are not within the access of most small landholders as they are not qualified to compete in the more competitive global market. Instead they are marginalized and even risk losing their existing market share. Only a very small percentage, thumb guessed by Carlos Pomareda at 5% of the better-off farmers in Central America, may have the chance of identifying their market niche and taking part in the global market. The remaining contingent will become a social problem, as, on the one hand it is marginalized as producer, and on the other, there is not enough jobs to absorb it as labourers. Man Yu Chang's comments are disclosed as follows:

"I agree very much with the general picture drawn by Carlos Pomareda that globalization helps to open up many market opportunities to the rural sector. Indeed, in economic terms, globalization promoted trade and intensified economic activities do act as a source of economic growth. However, if taken from the social perspective, one sees that globalization may also be the source of many negative outcomes as opportunities are not provided equitably. There are winners and losers, and the latter are likely to outweigh by far the former since the majority of the rural producers, very well pointed out by Carlos Pomareda, lack competitiveness to enter the globalized market.

This analysis may sound pessimistic. However, in actual effect this is but the pursuit of a more balanced growth. Let us add the political perspective to this picture, meaning the prospects of the distribution of gains. There is the concern that the great number of the global population will remain at the margin of this market and will not take part in this gain; on the contrary, they are the losers of the process. According to Eduardo Viola, a political scientist specialized in globalization and one of the speakers of our scientific workshop; the marginalized groups amount to 1/3 of the global population. In other words, we are

not talking about minor social groups that may be easily put aside; it is but one third of the global population at stake.

Why is it that globalization is accompanied by negative social impacts? Let us refresh the concept of sustainable development referred by Manuel Jiménez, our previous speaker in his presentation on food security in Central America. We all know that sustainable development is a process rather than a state that is built on the three pillars of sustainability: economic growth, social equity and environmental protection. The problem is that the globalized market is very often much skewed to one of the sustainable basis, namely the economic sustainability of profit. As a result, growth under this priority is likely to come with social drawbacks as well as environmental ones. In our Science-Policy Forum we are focused on food security, thus more concerned on the social side of food production, such as poverty and market exclusion. We haven't even debated on the environmental impacts that such unbalanced growth may imply.

Let us go back to the discussion on diversification and specialization. Why is it that a great number of rural households will remain at the margin of the globalized market? If we take the small producers, not only as a production unit but also as a consumption unit, diversification increases the robustness and the stability of these units, which is very important for the reproduction of the household. The rationale of the globalized market drives producers towards higher competition through specialization of their production systems, nevertheless it also exposes them to higher risks.

Interestingly, even if these producers are willing to face higher risks, most of them are not qualified as such, since it requires investment, expertise, liability and information, which they are poorly endowed. In his paper, Carlos Pomareda has synthesized these limitations. In terms of human capital, most small producers are ill prepared, their connectivity to the worldwide network is weak, and their material endowment is far insufficient. If they do not have the access to financial resources it is unlikely that they would technify and specialize their production system. On the other hand, they need to remain diversified in order to maintain stability, as small producers are also consumption units.

As far as international trade regimes are concerned, the world market is not favorable to the inclusion of agricultural products from developing countries. On the one hand, there are heavy subsidies for agricultural production in developed countries whilst there are tariff barriers for agricultural products from developing countries to enter into their market. On the other hand, most emerging economies have to follow structural adjustments plans that force public expenditure cuts, which directly affect the competitiveness of their products. Government budget cuts compromise funding for research, agricultural extension and market infrastructure.

We as scientists are faced with the question of "what can we do to help to change or improve this picture?" Unfortunately, the role of scientists is rather low profile, and to a large extent, we are also a product of this context. In developing countries, scientists have limited funds to carry out research so that we can understand better our situation. The fortunate ones that are endowed with resources to carry out adequate research have to make the results reach the policy-makers. Once in the hand of policy-makers, the results still have to go through the barrier of political engagement so that recommendations based on the research findings could be implemented. There are many layers of barriers so that engaged scientific results can meet engaged policy makers.

Most speakers in today's Forum have revealed critical aspects of the globalization process. At the end of our Science Workshop we were also asked to write a research proposal, many of which have been qualified by some of the organizers as naïve and romantic. The reason is that most proposals seek to oppose the prevailing economic rationale. However, I defend that if we scientists play our role and examine the real causes of the negative impacts and recommend sound policies to tackle them, while policy-makers play their role and implement whatever is within their reach, and civil society also plays its role and organizes itself, although it may look naïve to row against the mainstream, if each player contributes, individual dreams become collective and this might turn to reality in the long run."

Policy commentator: Mario Samper

Mario Samper is a researcher at the Social Research Institute of the University of Costa Rica (UCR). He made comments on policy aspects of Carlos Pomareda's presentation.

Mario Samper made clear that he is not a policy-maker. He is a researcher that has worked in recent years in the interactions among producer organizations, extensionists - mainly from the Ministry of Agriculture - and researchers. He approached Carlos Pomareda's talk from the perspective of his recent work experience. He underlined that it is a challenge for the family sector in agriculture in Costa Rica to strive for its share in different markets so that they could have a vision of their future. However, it implies concerted efforts and conditions that have yet to be achieved, among which includes: building up their entrepreneurial capacity to raise their competitiveness; promoting local transformation of their products to add on value, to create access to market, adequate credit, and knowledge; and above all to having inductive public policies and institutional support to foment their agriculture. His comments are quoted as follows:

"Carlos Pomareda offered us a broad and suggestive analysis on the challenges and opportunities faced by rural family units dedicated primarily to agriculture and livestock production. As our previous commentator has said, they are effectively production and consumption units and it is precisely this combination that is characteristic of the peasant economy and differentiates them from agricultural enterprises and other types of business in general.

In Carlos Pomareda's article there is special reference to Central America's insertion to the so-called globalization. I'm not going to go into detail on the aspects that are characteristic of it. I would rather refer to it as the present stage of a process of making the economy, policy and culture worldwide, which has started several centuries ago and is important and interesting to see in the long run, as well, understand the particularities of the present stage. However, as we don't have enough time to list all considerations; we could perhaps leave them to the discussion at the end, if it is the case.

I would like to mention very briefly, just to make a counterpoint to what some of the producer organizations that we have interacted with have presented. On one hand, as to globalization, they effectively point out the negative impacts they have suffered, but on the other hand, they also recognize the existence of new opportunities and of some positive experiences, as Carlos Pomareda has said. However, in order to transform a couple of positive experiences to a successful process of strengthening peasant agriculture at a much higher scale it would require building up their organizational and entrepreneurial capacity,

improving their access to credit under appropriate conditions - as Carlos Pomareda has also stressed in his talk - and particularly their access to knowledge or, rather, to improve the relationship between scientific, technological knowledge and local knowledge, which I believe, in this respect, is not exclusive but complementary. At the same time, it would require the states to adopt policies that are clearly in favor of family agriculture, contrary to what has been happening in recent years.

Carlos Pomareda also contrasts specialization and diversification as strategies of different types of producers, presenting, to a certain extent, an inverse relation between them with reference to specialization in agriculture versus specialization within agriculture. In other words, in so far as one specializes more in agriculture, one could specialize less within it and vice versa. Perhaps something similar occurs with diversification where on one hand it would be necessary to think of income diversification which is a type of diversification that would include non-agricultural income and on the other agricultural diversification, meaning diversification of crops and animal husbandry or more diversified production systems which would also be more resilient. And obviously there is a series of intermediate options, which I think are prevalent: a main or single market crop combined with production for self-consumption. It is the self-consumption production that makes it possible to have a specialized crop for the market, for example, combined with other production systems or with on-farm processing and services. The participation of farmers in trade is very important, some serving as informal credit, as is rural tourism which is becoming increasingly more important.

Well, because we are short of time and because it has not been presented today I'm going to say it very quickly. I'm not going to go through the description of the history of the Central American agriculture nor its characteristics. I will refer very briefly to policies. Even in this respect, as my time is practically over, I'm not going to recapitulate or make specific mention to what Carlos Pomareda has said in this regard, but perhaps make a counterpoint to it. I'm simply going to mention some principles that the producer organizations presented in a document which is still at a preliminary stage called: *The family agriculture of the future in the Huetar Norte region: a contribution to the rural territorial development from the perspective of producer organizations*. It is an exercise in thought of the future they want for the family agriculture. They presented various principles, which I'm going to only mention them. The first one is to generate income to provide a decent life for their families. Under this heading there are several subitems, such as: identification of profitable crops; on-farm production cost control; price problems; access to markets; and very importantly, to ensure for young people the possibility of living well on agriculture. This question of rural youth is a key issue for the future. The second principle is to provide quality agricultural products with added value by the producers themselves. This should allow them a better participation in the final price even in trade negotiations, which is one of the points that Carlos Pomareda mentioned and I agree that this is indeed fundamental. Under this item, there are the issues of: good farm practices in diversified agriculture; local agro-industries; and the recovery of local, regional and national markets so as not to depend so much on the fluctuating export market; to foment self-sufficiency in farm operations to reduce risks, but self-sufficiency does not mean avoiding the market, it means reducing expenditure on food and inputs; to generate local jobs to strengthen the social tissue of the rural areas which is, in the first place, to maintain the number of rural families, which has been gradually decreasing; to ensure daily workers have decent working conditions; to develop new activities such as rural tourism to diversify income; to manage natural resources; to reduce the use of chemicals; to protect the soil; and to provide multiple services for the community, such

as water protection, biodiversity, carbon sequestration, beautiful scenery, development of rural culture and knowledge and restriction of emigration to cities. And then to build local development in the communities based on participation, in coordination with other stakeholders and aspects.

Finally, I would like to extend a very broad proposal that I have developed, which has ten basic points: 1) farm improvement to foment competitiveness; 2) to improve its sustainability; 3) the issue of market access; 4) market information; 5) the issue of added value; 6) rural tourism, which we have already mentioned; 7) access to credit under appropriate conditions; 8) access to knowledge in general and in particular about innovative options; knowledge not in the sense of technological packages but rather in the sense of the ability of generating, appropriating and transforming technological knowledge. And this of course has great implications for 9) public policies; and 10) institutional support to foment family agriculture.

Discussion and Questions

Armando Rabufetti, Director of INIA in Uruguay, was the moderator and chair of panel 3.

"We will now have a question and answer session and I would like to ask for the questions to be brief, as well as for the answers. Good messages do not require many words, either in asking or in answering. So following this democratic authoritarianism - forgive me but time is rare - the floor is open for questions."

Jiehua Lu, demographer, from the University of Beijing, China
"I am from China and I think that we are changing our concept regarding food security today. There is a book intitled 'Who Feeds China' written by Les Brown and the Chinese Government has proven an opinion different from the one defended by this book. China is a very crowded country with 21% of global population but only 7% of arable land. Our Government has changed its policy regarding globalization and sees that it is positive to the country. Nowaday anyone can find Chinese products everywhere, but hardly can find any agricultural products outside China. The reason is that agriculture production has become low in relation to its population. Hence, Chinese Government started to see globalization to be positive. But I am of the opinion that China should start seeking for localization, meaning how Chinese agriculture could produce more agricultural production for its people."

Armando Rabufetti:

"Firstly, Carlos Pomareda is going to make a quick comment and then I am going to make another comment myself."

Carlos Pomareda:

"Very Briefly, I think that it is true that globalization favors accumulation, but it is particularly the commercial component of globalization that is bringing these effects. I believe the problem is that we don't use the means we have to avoid that, because we have a great deal of options to apply within what is allowed by the World Trade Organization WTO, including safeguards and being much more stringent in the enforcement of rules and not to accept to be forced down. So I think that we have to make a clear distinction between the negative effects of globalization and those generated by trade due to our own neglect or lack of strength to apply the allowed rules.

I believe there is no possibility of developing agriculture by focusing on small producers only; I think we have to focus on the whole group and see the interaction, because people go to work to other farms, to work in industries, young people deal with technical services, some of them repair bicycles; so it is difficult to think that the solutions for small production in agriculture are going to emerge by looking only inside it. I guess we have to see the way one cooperates with each other, and this is where the concept of social responsibility of companies can be inferred from.

I want to close with a comment about how to influence policy-making. There are three ways of exerting one's influence on policies: small producers develop pressure mechanisms, they have outbursts of rage, they nag and they put pressure; medium size producers go to fora, meetings, workshops, they organize chambers, they even pay for research; and the big ones invite the minister to have lunch. This is the way policies are influenced. So we have to be aware of the way we get to the ones who, at last, decide about what policy measures are to be taken''.

Armando Rabufetti:

''I think it is not necessary to make a summary of what we have been talking about during this panel. I think that Carlos' words have been as clear as those of the commentators. I only want to deal with an item and this is the central one in this forum, that is to say what can we do so as to improve the link between Science and Policy? That is the central theme. In this sense, in spite of taking the risk of being incomplete and imperfect and even uncomfortable, I think it is better to win a game with difficulty than to win a championship easily, this is the diagnosis. It is easy to present a diagnosis, and we are champions in doing this. What is hard work is to give solutions, how to bring about interface between science and policies, something seen as fundamental since IAI's twelve years of existence. This was precisely what led to a strong interaction with the ''Human Dimension Program'', this was what made the IAI incorporate topics related to the human and socioeconomic dimensions in its agenda, and what finally brought this Training Institute to be one of the 8 or 10 that have been held since 1999 following this aim.

I think that the problem we have to deal with is where and how we can make science and policies get closer. I insist, even risking being incomplete, imperfect and uncomfortable, to say two things – there must be much more – one of them is *where*. There cannot be a good interaction between Science and Policy if we do not speak to politicians before defining science. I think those who take decisions have to explain what problems need to be solved during the planning stage. This way science, through its method, will be able to generate the corresponding knowledge.

When a research problem is established after having identified its relevance, the transference of the result is practically immediate, because one will be dealing with something useful, not something relevant only in a researcher's CV, but something that is going to make it important to his community, to his country, to the region or to the whole world.

So, in the planning phase of research, politicians' participation is like the client in the market, they help to define its relevance. This does not mean that long term elements can be forgotten as science should always look forward.

And the other one is *how*. Well, here we can say that what we need to improve a lot is c*ommunication*. Many years ago, when I was a student in agronomy, an extensionist, who was not Uruguayan, told me: "I am not from Uruguay, so, I really do not know how to forward the knowledge on research results through extension. I told him that in my country, as in the rest of the world, the first clients of the extension service are the politicians and not the producers, they are also clients, but the politicians are the important ones." What I was trying to tell him is that the results must be translated into an understandable language that is economically and socially feasible. This is an effort that the scientific community has to find. That is why those who have read Carlos Pomareda's article are able to see the importance of what he says, that "it is necessary to rebuild, to revitalize or reform the anachronistic and bureaucratic agricultural ministries and also the research institutes, that continue to be handled with a view of the Middle Age." I think that this is one of the fundamental elements that agricultural research must try to achieve, to fulfill the interface between Science and Policy; the two must have some common points.

I can tell you, for sure, that based on the experience we have gained in Uruguay that, if the customer agrees with what the system does, he /she ends up being its most devoted defender against any criticism, be it from the inside or from the outside.

These are the comments that I would like to make to contribute to the discussion of how to bring Science and Policy closer together".

III.3.4. Synthesis of the Science-Policy Forum

Gabriel Macaya[15]

Gabriel Macaya began by thanking the Organizing Committee for the invitation to participate in this forum. In his opening remark, Macaya said: "The first thing I have to say is that I have been really hasty when accepting this synthesizer role, which gives this a musical connotation; that is why I liked it and that is why I have accepted. But this role is a very ingrate one. First, because you cannot be in good terms with everyone, not even with the presenters; at the same time, you cannot reflect exactly what they have said, neither with the audience because you will not say what they expect, nor what they have been waiting to tease out from the different discussions. And in the second place, I wonder why I should do your work. You, as participants are the ones who should summarize this meeting. Thus, what I am going to do is to try to summarize certain repeated topics with a personal touch." He reiterated that the topics discussed may not have been the most important ones, but, perhaps he would address them because they are recurrent.

This conference reminded Macaya of an anecdote, which he felt he needed to share with the audience: "A work made by a French cartoonist, Sampé, a well known caricaturist who had lots of influences from the 50's to the 80's. During the 70's Sampé published a series made up of three books titled in a very provoking way to what has happened today. The first one was called "Nothing is simple", the second volume was called "All becomes complicated" and the third one "Everyone for itself" and I wonder, when dealing with some of these topics if we are not in this situation. I do not want to end up like Sampé, saying "Every one for itself", and that everyone is pulling in his own direction. I think there are some very important things to be rescued."

The first topic he dealt with was related to information interface: the Science – Politics, put differently, politics as the way of making decisions and politics as planning. He analyzed it from the point of view of Jacques Delors' work presented in his book "Education locks a treasure." According to Jacques Delors, this modern world presents six basic tensions, which have to be faced. In this regard, Macaya presented some of the "tensions", which emerged during the forum.

The first "tension" is the tension between what is global and what is local. He gave the Internet as an excellent example of how it spreads from the local to the global level with a strength that sometimes scares us. Macaya continued to say that the second tension is "between long and short terms, in other words, between the immediate answer or the

[15] *Gabriel Macaya is the former Rector of the University of Costa Rica*

balanced and carefully thought one; between urgent demands, as we say in many countries, to put the fire out, the urgent in front of the substantial; that tension is one of the main ones we have seen appearing through all our discussions. A third and a more specific tension is the one between free market and protectionism, and I think we have to speak about it; we do not have to solve these tensions but as in the French sense: we have to face them, we cannot ignore their existence as if we were an ostrich. And the last one is the tension between diversity and specialization; or between diversity and homogeneity. I think that these tensions appear through the whole discussion."

In addition, he commented on some issues that are fundamental to this forum. They include information interface, research, science and politics, and decision-making. He said: "there are different logics in different sectors, which can be put forth to have a dialogue. While we do not understand those differences within their logic, we will never get a valid communication between them. These differences in logic imply different values. Whenever a scientist asks for a piece of information, he is not thinking about that information the same way as somebody else does. That is to say, when a scientist receives a piece of information, he thinks about it in terms of the results of a research process, whereas, the politician has other values assigned to that information. If we fail to take this interface between science – policy into account, policy decisions are not going to take place. The same happens if we want to place an interface between scientist and communicator. So, what we need is information sharing because this issue about interfaces needs that knowledge of different logics and different systems of values. We need to create translators, that's to say mechanisms or algorithms, which allow us to take that primary logic and make it evident for the second. And we have greatly forgotten about the need of the translators; they are not people, they are algorithms, means, and programs, which will enable us to do that translation."

He underlined that "evidently, translation mechanisms between scientific production and decision-making and policy are going to be needed in our context, and I particularly think that in the whole world, a mediator, as I told you before, with his own logic, as the mass communication media. We cannot think of having those mechanisms leading to the interface or those translators if we do not establish a relationship with the mass media. And it is in this context that each media's logic is also different. This makes the problem still more complex. Although I am not going to speak about this in a deeper way, I think this is something important to be taken into account."

In his second comment, Macaya explained that "food security and nutrition is a concept with many meanings and the problem with these issues having many meanings is that sometimes they are given different connotations by different people. He reiterated that the concept of food security and nutrition has multiple meanings and that despite our agreeing with three or four points determining the definition, this discussion made the diversity of meanings evident. It is important to highlight these differences, and this forum provides an appropriate environment to do so. If we say that food and nutrition security has many meanings, we also have to say that it has many factors and many dependencies. There is where we can get to a conclusion: It is neither a problem of nutritionists, nor a problem of agronomists or economists but it is a concept whose final meaning should come out of an interdisciplinary interaction process."

In the same vein, he discussed issues related to disasters and food security. He emphasized that "there are some topics, which have been dealt with in more detail than others. I think that there have been some issues given less prominence when dealing with disasters or the response to disasters, such as plagues and epidemics among others, which are fundamental when we deliberate on issues concerning agricultural production. We should include these issues in our discussions because they are very important. This has made me think strongly about the importance of plagues and diversity, since one of the most important factors in the fight against plagues is diversity in the face of homogeneity of crops, of varieties, of seeds, of methods of production that creates an important fragility when facing plagues, as does the fragility of those crops when some natural disasters, such as hurricanes, floods, and fire occur."

He gave a good example of the impact of globalization on consumption patterns and food availability. He noted that this concept takes us to a very complex discussion in which, in spite of the strength of certain consumption habits, we cannot ignore the possibility of globalization shaping consumption patterns. Macaya insistently spoke about the infliction of some consumption patterns linked with junk food. He stressed the way McDonalds or Burger King have changed their main patterns all over the world. He urged us to think of McDonalds 20 years ago and also think of those who were discontent because McDonalds sold salads. Macaya said: "They do sell salads successfully, not because they are willing to sell them, but because there was an imposition mechanism of the consumption pattern, opposed to the one we are analyzing. I think that this is important because we can try a different strategy to continue with the given example, for instance, what would happen if we place a fruit into the "happy box"? I think that as consumers, we can have that necessity to change the process 180 degrees. However, this raises a concern that I consider to be important."

Finally, he underscored the importance of education, apart from information as the key for the mechanism towards change and progress; as presented by Ana Victoria Román, where being underweight, lack of education, and women's conditions are given emphasis.

On deliberating on the issues of globalization, diversification and consumption patterns in Central America and referring to the paper presented by Carlos Pomareda, Macaya said: "It is a fact that our region is like a mosaic, not a mosaic made up of countries but involving the interior of each country. And that characteristic of being a mosaic worries some people because it can be seen as a negative factor for integration, on the contrary, it can be a strengthening factor, which can make us arrive at new solutions because of the diversity. That is why I think that the mosaic must be emphasized and made evident. And this takes me to the logic about diversity again. And here I am going to be accused of being a social Darwinist but as I have been educated in genetics and evolution, I strongly believe in the sense of diversity being a mechanism, not of selection but of change and progress. It is important to see how, at the sight of globalization which leans towards homogeneity as per the comment made at the very beginning, on the contrary, we can find some mechanisms which can be used to improve that diversity and from this diversity we can get the necessary solutions. "

He concluded by saying: "I want to say that this brings us to change the point of view we have been supporting until now toward a more prospective one in which we can see

diversity as the element that will allow us to build the changes we are looking for. And within that prospective view, what Carlos Pomareda said at the end of his lecture is really important: diversity exploitation and that prospective view must be connected with a re-evaluation of rural concerns. We should be convinced that the interface between Science and Politics should be a joint venture by planning with the stakeholders and taking into account that prospective of re-evaluating what is rural. I end my summary here, hoping that I have not spent excessive time."

CLOSING CEREMONY IV.

Scientific and Political Challenges for Decision Making on Climate Change and Food Security

Chelston W. D. Brathwaite[16]

Abstract

In 1940, the Inter-American Institute for Cooperation on Agriculture founder, Henry A. Wallace, Secretary for Agriculture and Vice-President of the United States of America, said that everything is made of our Mother, the Earth, Man is part of the living landscape, made of the same materials, moulded by the same natural processes and laws. He concluded by stressing the need to think in terms of inevitable connections between the natural processes and laws that make man and his environment. This synopsis underscores an inevitable link of great force: the interaction between global climate change processes and globalization and the implications of the said interactions for food systems and food security.

The interaction between climate change and poverty; the impact of climate change on the rural population, particularly on the poorest who depend on the natural resources base to obtain their food; the mechanisms which explain the links between rural income and climate; how markets will adapt and how climate change will change the behavior of farmers; how the rural population adapts to climate change and its variability; how far rural poverty is caused by adverse climatic conditions; which climatic factors are important as possible determinants of rural poverty; these are, among other topics that should be included in a work agenda which will relate scientific concerns for climate change with the political programs for the reduction of poverty and food insecurity.

The above topics are important because, like economic globalization and commercial opening, the implications of climate change are not neutral. More importantly, most scenarios reveal that the tropical and subtropical developing countries are more adversely affected by global climate change. Many of these countries depend heavily on agriculture.

Key concepts: Global climate change, globalization, food systems, food security.

[16] *Chelston W.D. Brathwaite is the Director General of the Inter-American Institute for Cooperation on Agriculture (IICA).*

1. Introduction

On speaking today of global climate change, globalization and food security, we think of Wallace's foresight when in an article published in 1940 he pointed out that: "By thinking in terms of "a living unity" I intend to suggest nothing mystical, but only a foundation fact. Everything is made of our Mother, the Earth. Man is part of the living landscape, made of the same natural processes and laws. His body, his thoughts, and his spirit are the product of that landscape: the sun, soil, wind, and air. We are slowly learning to think in terms of a new science called ecology, in terms of inevitable relationships — to recognize that all living things under the sun — the clouds, the rocks, the soil, the streams; factories, cars, airplanes; and the people and the spirit of the people — are all of the same going concern." (Wallace A. H. The War at Our Feet, Survey Graphic, February 1, 1940).

More than 60 years later, Wallace's words acquired huge validity in the frame of an event like this where many members of the scientific and political community are brought together: two facets that Henry Wallace has unified. That is because scientific development has enabled us to reach unprecedented productivity levels in food production and material prosperity levels, which have never been dreamt of a 100 years ago. However, there are 800 million people on the planet that are undernourished today, according to the 2003 Food and Agricultural Organization's (FAO) report on the State of Food Insecurity. One of the biggest challenges of our days is to provide the 800 million citizens of the world with food, shelter and an adequate nutrition. Starvation and deprivation with no antecedents in a materially rich world should never been seen in human history.

It is evident that today, like never before in the history of humanity, we must think in terms of the inevitable links Henry Wallace warned us about more than 60 years ago. Two inevitable links meet at this forum. In the first place, interactions between the global climate change processes and globalization and the implications of these interactions for the food systems and security. In the second place, the relation between the scientific community and the community of decisions makers is essential so as to understand and face the challenges imposed by economic and global environmental processes about food security in order to design robust, credible and effective public policies.

The issues addressed at this conference are crucial to the mission of the Inter-American Institute for Cooperation on Agriculture (IICA), that is, to support its Member States in their efforts to promote progress and prosperity for the hemisphere, by modernizing the rural sector, promoting food security, and developing a competitive agriculture and livestock sector, which has to be technologically advanced, environmentally well managed, and socially practical for the populations in the Americas.

Rural welfare, food security and sustainable agricultural development are, therefore, central elements in IICA's mission. These topics show the importance of bringing closer together the agendas of the scientific community and the decision makers. The importance of feedback from the scientific community for our technical cooperation programs also becomes more effective.

2. Interactions between climate change and poverty

Although it is well known that climate change is important for ecosystems and in particular for agriculture, little research has been done on the interaction between climate change and poverty, particularly in developing countries. In 2002, the poor population in our continent was estimated at 221 million and the population in extreme poverty at 97 million, of which 46 million lived in rural areas. The incidence of poverty and particularly extreme poverty is significantly higher in rural areas: 62 out every 100 rural inhabitants of the region were poor in 2002; 37 out of every 100 lived in extreme poverty, that is, without sufficient earnings to satisfy their basic food needs.

In fact, the above figures are worse than those at the beginning of the eighties when concern about global climate change began to appear and the signs of globalization were already evident.

Climate change, in the long run, may have an effect on the role of rural populations particularly for the poorer ones who depend on local environmental conditions, notably, the natural resources base to obtain food. The rural poor are clearly vulnerable to changes in local agricultural productivity. We know that climate has a considerable impact on crop productivity. If the climate is good, the local producers can obtain high yields with agricultural intensification. However, in marginal territories, the net income of producers varies considerably from one year to another so that this population is extremely vulnerable to environmental variability limiting their earnings and investment possibilities.

We must, therefore, understand better the mechanisms which explain the links observed between rural income and climate change on the basis of a detailed study of agricultural productivity. The evidence is increasingly clear that climate has a deep effect on agricultural productivity. In fact, it is recognized that the scientific community has done excellent work in modeling the links between climate change and agricultural yield. We must, however, improve our capacity to understand and model the way markets will adapt and how farmers will change their behavior in relation to climate change. Few studies have been undertaken to assess the behavior of farmers in relation to climate change in developing countries. This is why we applaud and support the initiative of this forum as a fundamental step in that direction.

Prof. Robert Mendelsohn and his colleagues' studies at Yale University show the relation between climate change and agricultural production and the vitality of the rural economies of Brazil, India and the United States. These investigations also reveal a strong and significant link between climate change and net agricultural income. This has led scientists to conclude that climate change also explains the distribution of agricultural earnings.

A research agenda connecting scientific concern for climate change and political plans related to the reduction of poverty and food insecurity should include extensive studies of this type on other latitudes. For example, the implications of climate change and global environmental phenomena for the Millennium Development Goals (MDG), especially with reference to food security, sustainable management of natural resources and the reduction of poverty, should be examined. The agenda resulting from this approach will undoubtedly

be substantive. For example, the question is: how does a rural population adapt to climate change and its variability? It is necessary to know the strategies that rural communities develop today to adapt to adverse climatic conditions.

It is also important to understand better how much rural poverty is caused by adverse climatic conditions. The questions are: Is rural poverty caused by lack of capital, effective institutions, access to the market, or an unfavorable climate? Which climatic factors are important as possible determinants of rural poverty? These are just some of the questions to which we do not have clear answers for the design of more effective strategies to combat poverty.

It is also vital to admit that with globalization as well as free markets, the implications of climate change are not neutral. In fact, recent scientific evidence, particularly the reports of the Intergovernmental Panel on Climate Change (IPCC) indicate that important benefits in the polar countries and small benefits in temperate countries could come from moderate global warming. Most scenarios, however, predict that tropical and subtropical developing countries will be most adversely affected by global climate. Many of these countries depend heavily on agriculture.

Though these findings are informative, they are not sufficient to draw conclusions for other developing countries. If we want to help countries promote sustainable agricultural development, which is our mandate, we need more research on the repercussions of climate change on agriculture, particularly in those countries where it is an important factor of the economy. Sustainable agricultural development is one of our most promising tools to reduce rural poverty and food insecurity in our countries.

3. Agriculture and development

I would like to underscore something that we consider fundamental in IICA. Agriculture and the rural sector can only be improved if we recognize the fundamental part played by agriculture in the social and economic development of these countries. We consider that agriculture must be valued for what it is because it is the foundation of society and the cornerstone of any economy. Statistics show a reduced participation of agriculture in the economy, a contribution that in many countries is below 10% of the gross domestic product (GDP).

However, researchers at IICA suggest that when taking into consideration the connections of agriculture in the whole of the productive chain, the contribution of agriculture to national production is from 3 to 7 times greater than reported in official statistics, which corresponds to primary production only. For example, a recent study made by the Institute in various Latin American countries shows that in Argentina official figures indicate that the contribution of agriculture to the GDP is just 4.6%; however, this figure increases to 32.2% when the connections with the rest of the economy are considered. In Brazil, the increase is from 4.3% to 26.2%, in Mexico, from 4.6% to 24.5% and in Costa Rica, from 11.3% to 32.5%.

So, in countries like Costa Rica, when we speak of the impact of climate change on agriculture we are speaking of impacts that could go beyond the conventional view of the agricultural

sector as the only primary sector. This type of implication about climate change is important in our countries and that is why we need the cooperation of the scientific community. As Henry Wallace would say, these are inevitable relationships which we must be in a position to understand better through the crossed fertilization of dialogue between scientists and decision makers.

4. Agriculture and technology

In May 2004, we held a Ministerial Conference on Agricultural Science and Technology at IICA. It was convened by the Secretary of Agriculture of the United States, Ann Veineman. Participants included the Ministers of Agriculture and of Science and Technology of Central America, Mexico and the Dominican Republic. The conference revealed that investment in technology is essential to improving agricultural productivity and thus in contributing to the reduction of rural poverty. I believe that the same can be said here today, referring to the need of investing in research on the links between agriculture and climate change.

On the average, almost 40% of the increase in food production in the last 4 decades in Latin America is due to the introduction of modern technologies, mainly improved seed varieties and agronomic information. We have also seen the increase of disparities of certain products from different countries, partly as a consequence of the unequal development related to their research and outreach capacity.

The countries with higher relative development usually invest from 1.5 to 2.5% of their gross agricultural product in agricultural technology. In most Latin American and Caribbean countries, however, this average just reaches 0.4%. If the development of agricultural research and outreach capacities as well as investment in agricultural technology have been fundamental in explaining the present disparities in land development, even in developing countries, then what will we say in the future about today's investments to enable us understand the relationship between climate change, agriculture and rural poverty, about investments in new and improved technologies, which could make it possible to increase crop yield, and agricultural productivity in a context of a changing climate?

At IICA, we are committed to supporting member countries in their efforts to improve technological development in agriculture. To this end, we act as a platform to strengthen national agricultural research programs, promote the exchange of technological data between countries, and foment greater cohesion between the regional mechanisms for research cooperation policies.

The joint efforts of the scientific community, together with technical cooperation agencies, like IICA, are fundamental to identifing research and investment priorities to face the challenges that global climate change phenomena and globalization present.

5. The 2003-2015 Agro Plan

I would not like to end without referring to the importance of this event, within the framework of the mandate given us by the Ministers of Agriculture of the Americas a year ago in Panama City during the 2nd Ministerial Meeting on Agriculture and Rural Life. I

am referring to the 2003-2015 Agro Action Plan for the Agriculture and Rural Life of the Americas. Being the Technical Secretariat of the Inter-American Board of Agriculture, IICA is responsible for supporting countries, which are in the process of implementing and following up the said plan and related issues. The conclusions derived from this meeting will, without any doubt, represent an important input to this process.

6. To End

I would like to emphasize how pleased we are for having been able to participate in the organization of this scientific and political forum. Undoubtedly, new forms of promising dialogue have been instituted between scientists and decision makers. This has been a fundamental step in the promotion of the dialogue necessary to understand better the interaction between global processes of climate change and globalization and the implications of these interactions for the food systems and food security with a view to designing more robust, credible and effective public policies. Finally, I have no doubt about the fact that the conclusions derived from this event will help us in building a solid agenda including research and cooperation to support countries in their effort to obtain sustainable agricultural development, food security and welfare of their peoples in the most efficient way.

References

Wallace, A. H., ''The War at our feet'', Survey Graphic, 1940

FAO, ''The State Food Insecurity in the World: monitoring progress towards the World Food Summit and Millennium Development Goals'', Food and Agriculture Organization of the United Nations, 2003

IV.2. Final Remarks

Max Campos

In the closing session of the Science-Policy Forum, Max Campos, head of the Regional Committee of Hydraulic Resources of the System for the Integration of Central America gave final remarks. He was accompanied by Gabriel Macaya, former rector of the University of Costa Rica, and Chelston Brathwaite, the Director of IICA.

In his opening remarks, Max Campos thanked the organizing committe for the nice invitation and for giving opportunity to the Regional Committee of Hydraulic Resources on behalf of the System for the Integration of Central America to be a partner of the IAI once again, as it is habitual and a tradition with the University of Costa Rica, the National University and, for a long time, with IICA as well.

He continued to say: "we are really pleased to have made a contribution, in particular, to have given our support to the work of the National University of Costa Rica and the Scientific Workshop held at CEMEDE in financing some of the participants, mainly those coming from Central America, who will be, in fact, our role models to go on working towards the future. We strongly believe in the value of investing in training and education. This is why we are here giving resources, personal time, lots of enthusiasm from the regional sector in responding to the demands of policy of the Presidents of Central America and their Foreign Affairs Ministers, so that we develop this agenda that I consider fundamental and very important.

I was particularly pleased when I heard the General Director of IICA speak about the huge importance given to climate change in IICA's agenda. In a short while, the Inter-Government Panel of Experts on Climate Change is going to meet in Costa Rica, where practically the closing discussion about the Fourth Impact Assessment Report will take place, and where the agricultural sector as well as food and nutritional security, are going to be in the main agenda. Something to be highlighted about Central America Integration and especially for those who do not know Central America very well, is that, we have a political, economic, cultural and environmental structure that cannot be regarded as the European Union, rather it is a regional effort that tries to join the efforts of those eight countries from Central America today, together with the Dominican Republic which has joined this effort. In this regard, we are sharing an agenda involving some common interests of those eight countries making up that integration. Speaking about this, I would like to emphasize the fact that we have been leading this kind of agenda together with other agencies for the Integration of Central America, which are specialized in nutrition, food security, as presented by Ana Victoria Román, who has been speaking about her own experience, as well as the ones of this Institution.

Let us put it this way: a series of actions are achieved in each country and as a region so that food and nutritional insecurity that we experience here in Central America can be correctly cared for, since we are listening to the manifestation of the policy side. So we have science and policy handy. But I feel that sometimes we lose focus and that there are other things to be considered apart from science and politics, including a series of interfaces so that science and politics can really work. We have the will, we have hope, we have knowledge, but often there are other missing ingredients, and they will be the challenge of the future, after this Forum.

We do not want to take the place of the only leader, thinking that it is through water resources that the main points are going to infiltrate this lecture about food security and nutrition. We think it is of great importance since most of the countries making up this region have strong water resource principles, but we also know that its quality and climatic variability determine whether water is not always where and when we want it to be. In fact, this is an additional challenge to the whole problem, and we also know that from the technological, agricultural and knowledge perspectives, all these efforts must be shared by every sector, and they must also be multi-disciplinary. It is in this context that academia has an essential role.

I challenge you to work together, hand in hand, to take advantage of these political and scientific issues related to our agenda, including a bit less of rhetoric and more action, and supporting the management mentioned by Lorena San Román. We have to work in partnership with those communities, which are really suffering and if this is going to be our role, let's take it and use it to define a future agenda.

On behalf of the Regional Committee, I want to thank you for the invitation to participate in this forum. We are engaged in the whole process related to the implementation of everything we have been discussing today and all of what these colleagues and friends have been promoting and supporting at CEMEDE during the past two weeks of the Scientific Workshop to make this a reality."

CONCLUSIONS:

Elements towards a Dialogue between Scientists and Legislative Authorities

Edgar E. Gutiérrez-Espeleta[17]

The breach between research and politics is recognized not only by the scientific community but also by those who must prepare state policies necessary for development. To understand the reason for this, the sphere in which each one operates must be considered.

Scientific investigators and policy makers work in very different spheres. The environments in which they move are so different that this has generated a trend to block the flow of information between them. In addition to their very different structural roles, this has led to the formation of stereotypes between these two communities.

Researchers, for example, think that those who form policies are always too busy to read the results of research projects or that they draw precipitate and valueless conclusions from the reports without taking into account the existing knowledge on a given issue, or that their actions are not based on the data, or that they mistrust research, or that they have a perspective limited in time and space. Furthermore, scientists consider that policy makers must draw conclusions on the basis of the information generated by investigation, i.e. that investigators must send them the reports and let policy makers decide what they should do with the information presented therein.

On the other hand, policy makers think that scientists study subjects, which are not very relevant to agricultural and livestock policies, or that they are not concerned by the repercussions that research may have on politics and government, or that they tend to be carried away by methodological fashions, or that they use too much scientific language which is inaccessible to them, or that they make inconclusive generalizations on broad theoretical topics, or that they do not take into consideration the problems faced by the normative authorities. In addition, scientists always say that much more research is necessary.

As to the different structural roles, researchers rely on their colleagues or peers to validate the research they are doing and to obtain personal prestige and advance in their profession. This is reflected in the research design: the problems they study, the variables selected for the study, the methodology used, etc. The principal points of reference, however, for normative authorities are their own organizations so that they tend to do what benefits the

[17] *Edgar E. Gutiérrez Espeleta is the Director of the Development Observatory (OdD) of the University of Costa Rica (UCR).*

system most. They consider a variety of groups to obtain ideas and work through fields of influence. Thus, the system determines the needs of research and the use of its results.

It seems that the scientist frequently assumes that the normative authorities take decisions with an integral and rational perspective, assuming that the problems may be differentiated from each other, establishing priorities of goals, values and objectives, examining alternatives and measuring consequences by means of cost-benefit analyses and that finally the option which leads to achieving more goals, values or objective is chosen.

Actually, in general, the problems cannot be defined clearly nor differentiated from each other. There are value conflicts which make it impossible to compare them or balance them. The time and resources that the normative authorities dispose of are limited and the decisions taken in the past tend to eliminate future options. In fact, decision making is more like a gradual approach, i.e. the selection of goals and objectives is mixed with empirical and factual analyses, not easy to distinguish from each other. There is very little difference between these alternatives and existing policies and the evaluation of the different consequences is reduced to those that are considered more evident and important. These dynamics enter a loop where the problems are defined and redefined continually so that there is no single decision for a given problem. A reduction of present problems is sought or, if not possible, the adoption of decisions to confront the lack of complete information, resulting in a variety of behaviors which lead to trying different solutions, acting tentatively, postponing action, staggering decisions, dividing decisions, taking compensatory decisions for protection, maintaining strategic reserves or making reversible decisions.

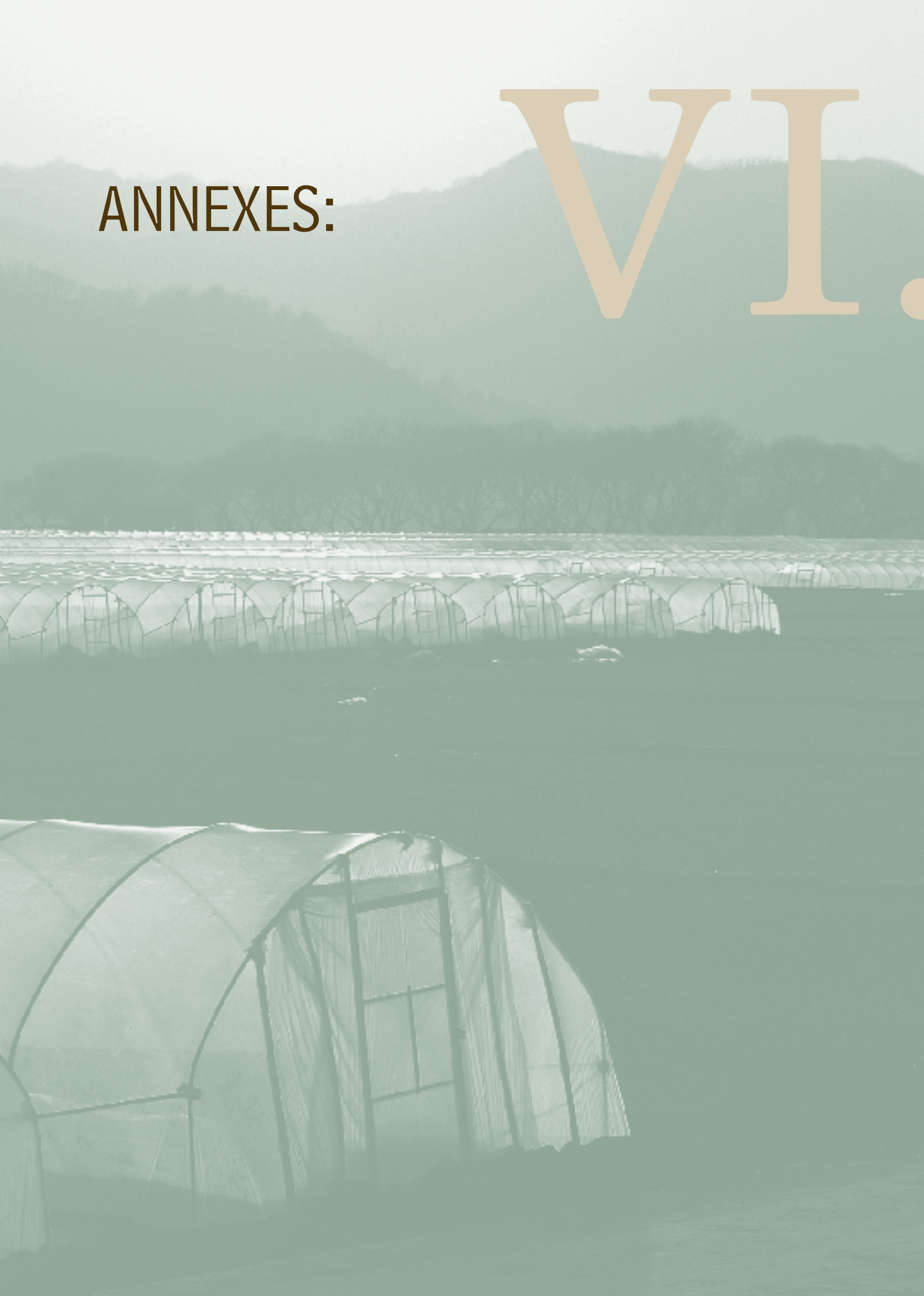
Sometimes the fact that setting policies is basically a political process is underestimated. The decisions taken normally have important consequences for the prestige, power and expectations of a variety of actors and groups so that they all try to influence the process for their benefit.

Both the investigators and the decision makers have to understand the different environments in which they work. Hence the importance of creating exchange spaces between the two communities which would allow us to know each other better, i.e. to exchange opinions on our specific fields and needs and, starting from there, to be able to establish communication mechanisms which will make it possible for information generated by the scientific community to flow to the rationale of the decisions taken by the normative authorities, and for the needs of the authorities to be communicated to the scientific community so that they may respond with the required data for better decision making.

Reference

Workshop on how to communicate the results of research in population, health and environment to decision makers. PRB, MEASURE, UICN. 2000. Costa Rica

ANNEXES: VI.



VI. Forum Organizing Committee

1. Edgar Gutierrez, Development Observatory (OdD) of the University of Costa Rica (UCR)
2. Pedro León, National Environmental Forum (NEF) of the National Center of Advanced Technology (CENAT) of Costa Rica
3. Walter Fernandez, National Academy of Sciences of Costa Rica (NAS-CR)
4. Patricia Ramirez, Comite Regional de Recursos Hidraulicos (CRRH)
5. Adrián G. Rodríguez, Inter-American Institute for Cooperation on Agriculture (IICA)
6. Karen O´Brien, Center for International Climate and Environmental Research (CICERO) at the University of Oslo.
7. Valerie Schulz, International Human Dimensions Programme (IHDP)
8. Marcella Ohira Schwarz, Inter-American Institute for Global Change Research (IAI)
9. Gicela Ana Zambon, Inter-American Institute for Global Change Research (IAI)

VI.2. List of Participants to the Science-Policy Forum

Name	Organization	Country
Participants of the IAI-IHDP Global Environmental Change Training Institute on Globalization and Food Systems - Scientific Workshop		
1. Barthelemy G. Honfoga	University of Abomey-Calavi	Benin
2. Carlos Alberto Ruiz-Garvia	University of Goettingen	Germany/Bolivia
3. Carlos Manuel Icaza Lara	Food and Agriculture Organization - FAO	Mexico
4. Charity Kagiso Kerapeletswe	Botswana Institute for Development Policy Analysis - BIDPA	Botswana
5. Erika Trigoso Rubio	University of Arizona	USA/Peru
6. Gabriela Nedita	Institutul de Bioresurse Alimentare Institute of Food Bio-resources	Romania
7. Herbert Yanes	World Food Program - WFP	Honduras
8. Ines Margarita Torres Rivero	Centro de Estudio de Desarrollo Cooperativo y Comunitario - CEDECOM	Cuba
9. Jiehua Lu	University of Beijing	China
10.José Pedro Castaño	National Agricultural Research Institute - INIA	Uruguay
11.Kanthi Wijetunge	Ministry for Economic Reform, Science & Technology	Sri Lanka
12.Lilibeth Acosta-Michlik	Université Catholique de Louvain - UCL	Belgium/Phillipines
13.Livia Bizikova	Institute for Forecasting, Slovak Academy for Sciences - SAS	Slovak Republic
14.Magali Garcia Cardenas	University of La Paz	Bolivia
15.Man Yu Chang	Department of Environment of Paraná	Brazil
16.Maria Ernestina Quezada	Independent consultant - AGENDA	Guatemala
17.Maria Methol Petit	Ministry of Livestock, Agriculture and Fisheries	Uruguay
18.Marie J. Rarieya	Rensselaer Polytechnic Institute - RPI	USA /Kenya
19.Rodolfo Osório de Oliveira	Food and Agriculture Organization - FAO FAORLC	Chile / Brazil

20.Sandra Mejía Mendoza	Asociación de Municipalidades de Nicaragua	Nicaragua
21.Sergio Omar Saldaña Zorrilla	International Institute for Applied Systems Analysis - IIASA	Austria/Mexico
22.Shuni Leonard Unganai	Meteorological Services	Zimbabwe
23.Suruchi Bhadwal	The Energy and Resources Institute - TERI	India
24.Tânia Zambrano	Instituto de Ciências Ambientales y Ecológicas - ICAE	Venezuela
25.Thanh Vo	Department of Science & Technology of Thua Thien Hue province	Vietnam
Other Participants		
26.Alexander López	Centro Mesoamericano de Desarrollo Sostenible del Trópico Seco - CEMEDE / Universidad Nacional de Costa Rica - UNA	Costa Rica
27. Eduardo Viola	University of Brasilia	Brasil
28.Jorge Manuel Luna A.	Centro Mesoamericano de Desarrollo Sostenible del Trópico Seco - CEMEDE / Universidad Nacional de Costa Rica - UNA	Costa Rica
29.Karen O'Brien	Center for International Climate and Environmental Research - CICERO	Norway
30. Maarit Thiem	International Human Dimensions Programme on Global Environmental Change - IHDP	Germany
31.Gustavo V. Necco	Inter-American Institute for Global Change Research - IAI	Brazil
32.Marcella Ohira	Inter-American Institute for Global Change Research - IAI	Brazil
33. Robin Leichenko	Rutgers University	USA
34.Valerie Schulz	International Human Dimensions Programme on Global Environmental Change - IHDP	Germany
Regional participants		
35.Adrián Rodríguez	Inter-American Institute for Cooperation on Agriculture - IICA	Costa Rica
36.Adriana Bonilla	Comité Regional de Recursos Hidráulicos -CRRH	Costa Rica
37.Alex Blamfels	University of Sydney	Australia
38.Alfredo Alvarado Costa Rica	Universidad de Costa Rica – UCR	Costa Rica
39.Álvaro Fernández Costa Rica	Observatorio del Desarrollo – OdD / Universidade de Costa Rica - UCR	Costa Rica
40.Ana Lucía Corrales Costa Rica	Rainforest Alliance	U.S.A.

41.Ana Lucía Hernández Costa Rica	------	Costa Rica
42.Ana Victoria Román Trigo	Instituto de Nutrición de Centro América y Panamá - INCAP	Guatemala
43.Anafredo C.	Observatorio del Desarrollo – OdD / Universidade de Costa Rica - UCR	Costa Rica
44.Carlos Pomareda	Servicios Internacionales para el Desarrollo Empresarial - SIDE	Costa Rica
45.Carmen Monge Costa Rica	Inter-American Institute for Cooperation on Agriculture - IICA	Costa Rica
46.Chloe Hill	University of Loughborough	United Kingdom
47.Dorival Vartomián	Foro Ambiental	Costa Rica
48.Edgar E. Gutiérrez	Observatorio del Desarrollo – OdD / Universidade de Costa Rica - UCR	Costa Rica
49.Elizabeth Rojas Arias	Oficina de Divulgación y Información - ODI / Universidade de Costa Rica - UCR	Costa Rica
50.Esteban Leiva Costa Rica	Instituto Costarricense de Acueductos y Alcantarillados - AYA	Costa Rica
51.Federico Paredes M.	Ministerio de SALUD	Costa Rica
52.Francisco Rodríguez Soto	Proyecto PRU-GAM / Compañia Nacional de Fuerza y Luz S.A. - CNFL	Costa Rica
53.Frank Van Laer	Indiana University	USA
54.Gabriel Macaya Trejes	Universidade de Costa Rica - UCR	Costa Rica
55.Gustavo Gordillo	Food and Agriculture Organization - FAO	Chile
56.Heidy Vega Garcia	Universidad Nacional de Costa Rica -UNA	Costa Rica
57.Javier Flores	Banco Centroamericano de Integración Econômica - BCIE	Honduras
58.Johnny Rosaler	Independent consultant	Costa Rica
59.Jorge Serendero	Sipcom – Green	Costa Rica
60.José Miguel A.R.	Consultant	Costa Rica
61.Juan Carlos Antillón	INCOM	Costa Rica
62.Krister Andersson	Indiana University	USA
63.Leda Muñoz	Universidade de Costa Rica - UCR	Costa Rica
64.Lorena San Román	Programa de las Naciones Unidas para el Medio Ambiente - PNUMA / Oficina Regional para America Latina y el Caribe - ORPALC	Costa Rica
65.Luis Carlos González	O. Ambiental	Spain
66.Luiz Augusto Guzmán Brenes	Cruz Roja Costarricense	Costa Rica

67.Manuel Jiménez	Secretaría Consejo Agropecuário Centro-Americano - SCAC	Costa Rica
68.Mário Castejon	Food and Agriculture Organization - FAO	Chile
69.Mário Samper	Instituto de Investigaciones Sociales - IIS / Universidad Nacional de Costa Rica - UCR	Costa Rica
70.Mário Solis Z.	Auto Universal SA	Costa Rica
71.Max Campos	Comité Regional de Recursos Hidráulicos del Istmo Centroamericano - CRRH / Secretaría del Sistema de la Integración Centroamericana - SICA	Costa Rica
72.Milagro Saborio Rodriguez	Inter-American Institute for Cooperation on Agriculture - IICA	Costa Rica
73.Nydia Rodriguez R.	Assoc. Terra Nostra	Costa Rica
74.Octavio Ramirez	Food and Agriculture Organization - FAO	Costa Rica
75.Olman Quirós Madrigal	Ministério de Agricultura y Ganadería - MAG / Gobierno de Costa Rica	Costa Rica
76.Patricia Ramirez	Comité Regional de Recursos Hidráulicos del Istmo Centroamericano - CRRH	Costa Rica
77.Paulo Manso	National Meteorological Institute - IMN Inter-American Institute for Global Change Research - IAI	Costa Rica
78.Rodrigo Wagner	Food and Agriculture Organization - FAO	Chile
79.Rosa Murillo Vasquez	Consejo Nacional de Producción - CNP	Costa Rica
80.Silvia Tomic Vicuna	Fundación ACECOD, Asistencia a Centroamerica en Comunicacion y Desarrollo	Costa Rica
81.Walter Fernández	Academia Nacional de Ciencias	Costa Rica

Note: The editors apologize for eventual error in the transcript of the hand written names of the list of participants.