NACIONES UNIDAS

CEPAL

OPPORTUNITIES AND RISKS ARISING FROM THE USE OF BIOENERGY FOR FOOD SECURITY IN LATIN AMERICA

INTRODUCTION

1. The Economic Commission for Latin America and the Caribbean (ECLAC) and the Food and Agriculture Organization of the United Nations (FAO) have been involved with the issue of bioenergy for the past three decades. As part of its mission to generate, analyse and disseminate knowledge, FAO has recently set in motion a process for providing member countries with direct policy guidelines and technical assistance in this field. This comes in response to the Johannesburg Declaration adopted at the World Conference on Sustainable Development and the Millennium Development Goals. FAO has also mobilized its multidisciplinary experience to consider the impact of bioenergy in areas ranging from agronomy, land use and gender to technology, industry and the environment.

2. FAO has prepared an International Bioenergy Platform (IBEP), which is designed to serve as the decisive nexus for facilitating transition to a future based on sustainable energy, combining local and global benefits and bearing in mind the need to assure the well-being of future generations. However, there is need for further research and technical assistance in these areas: on the one hand, every effort must be made to take full advantage of the opportunities arising from the production of bioenergy and on the other, caution must be exercised in order to minimize the risk of adversely affecting food security.

3. This document, which was prepared by ECLAC and the FAO Regional Office for Latin America and the Caribbean, seeks to discuss some important aspects of the debate on the issue and presents a set of recommendations for distribution to the FAO Committee on Food Security, which will be meeting in Rome from 7 to 10 May 2007.

A. FACTS ON BIOENERGY AND FOOD SECURITY

4. The document entitled “Assessment of the World Food Security Situation” (CFS 2007/2**)**, prepared for the Committee on Food Security, analyses the question of the impact of competition between food and bioenergy. It states that bioenergy offers both opportunities and risks. The food security implications of bioenergy will be shaped by the scale and speed of change as well as by the type of system under consideration, by the structure of commodity and energy markets and by policy choices in the areas of agriculture, energy, the environment and

trade policies[1]. Technological change in the bioenergy sector is occurring rapidly and this makes it extremely difficult to foresee the future impact of these energy sources.

5. The document also addresses the four dimensions of food security: availability, access, stability and utilization, and analyses the possible food security implications of the increase in the production of biofuels. The overall purpose is to demonstrate that the food security implications will be different depending on the technology used, market structure and policies adopted for bioenergy.

6. The recommendations set out in the above-mentioned document (CFS:2007/2) in relation to Latin America and the Caribbean are very important owing to the diverse edaphic and climatic conditions and also to the conditions under which different raw materials for bioenergy are produced. Clearly, some countries have the natural conditions that enable them to meet a significant portion of their energy requirements from agricultural crops. It should be borne in mind, however, that the introduction or intensification of certain crops may have an adverse social and economic impact, even if the production conditions in the country are such that there is no need to overexploit its natural resources. Consideration must also be given to the situation of those countries whose natural conditions do not lend themselves to the production of bioenergy and which, clearly, will not be able to participate in this oil-import substitution effort.

7. In these three cases, in addition to considering the objective conditions set out above (technology, market structure, speed of change and policies), it must be borne in mind that it will be necessary to construct a special institutional framework which can actually modify policies and technologies adopted in order to achieve a more harmonious development of the production system.

8. The three main categories that are relevant for analysing the food security implications of bioenergy systems are: (i) traditional biomass burned directly for cooking and space heating; (ii) modern biomass-based technologies for the generation of electricity; and (iii) liquid biofuels such as ethanol and biodiesel used primarily in the transport sector. [2]. The present document focuses on liquid biofuels, because this is the fastest-growing bioenergy sector and because Latin America and the Caribbean and in particular some Southern Cone countries enjoy highly favourable conditions for current production and future expansion. A further reason for emphasizing liquid biofuels is that, for the time being, they are produced mainly from agricultural crops, which can also be used for food and animal feed, and thus could have direct repercussions on food security through their impact on commodity prices.

[1] See Assessment of the World Food Security Situation (CFS:2007/2), paragraph 45.

[2] For more technical information on bioenergy systems, see: FAO.2006. Introducing the International Bioenergy Platform. Rome. (http://www.fao.org/sd/dim_en2/en2_060501_es.htm).

B. DIMENSIONS OF FOOD SECURITY AND BIOENERGY

Availability

9. Latin America and the Caribbean's capacity for food production, exports and imports is vast; indeed, availability is not the main problem affecting food security. The region has recorded higher growth in food production (around 0.6% per year between 1990 and 2003) and a higher proportion of food exports than the world average (SOFA 2006). Figure 1 presents an index of the per capita food energy supply[3] of the countries of the region for the periods 1990-1992 and 2002-2004. All countries with the exception of Haiti and Bolivia show a surplus, while Peru shows a deficit in the period 1990-1992. Figure 1 also shows that countries such as Argentina (owing to the economic crisis in 2001-2002), Dominica, Guatemala, Panama and Venezuela recorded negative growth in this indicator. More recent estimates produced by FAO indicate that between 1995 and 1997 and between 2002 and 2004, the Dominican Republic, Ecuador and Honduras also registered negative growth in food availability. In general the Central American countries, where the staple food is maize, are those that face the highest risk in terms of food availability, whether it be a matter of falling domestic production due to unfavourable weather conditions, or a decline in their capacity to import due to the potential increase in maize prices.

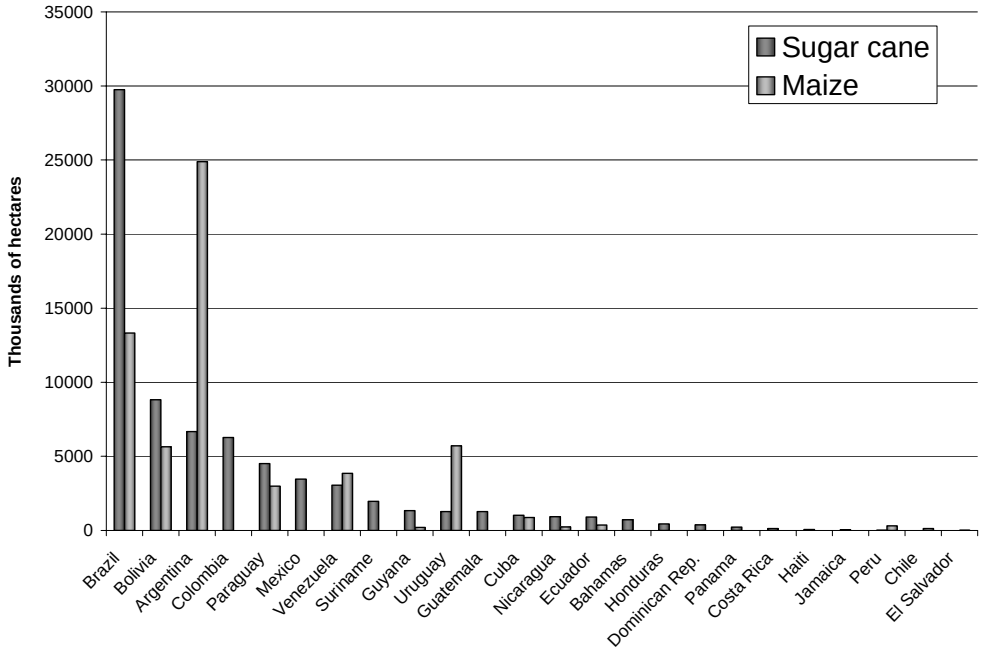
Figure 1 Index of per capita food energy supply

10. If we look at the areas with suitable edaphic, climatic and environmental conditions as well as the appropriate production technology and the area necessary to obtain a 5% ethanol blend (E5), it can be seen that the countries with the greatest potential for agricultural frontier expansion based on sugar cane or maize are Brazil, Bolivia, Argentina, Colombia, Paraguay and Uruguay (Figure

[3] This index was calculated as the ratio of food energy supply (kca/person/day) to the average per capita minimum requirement (2,200 kcal/person/day): values above 1 indicate a surplus and those below 1 a deficit.

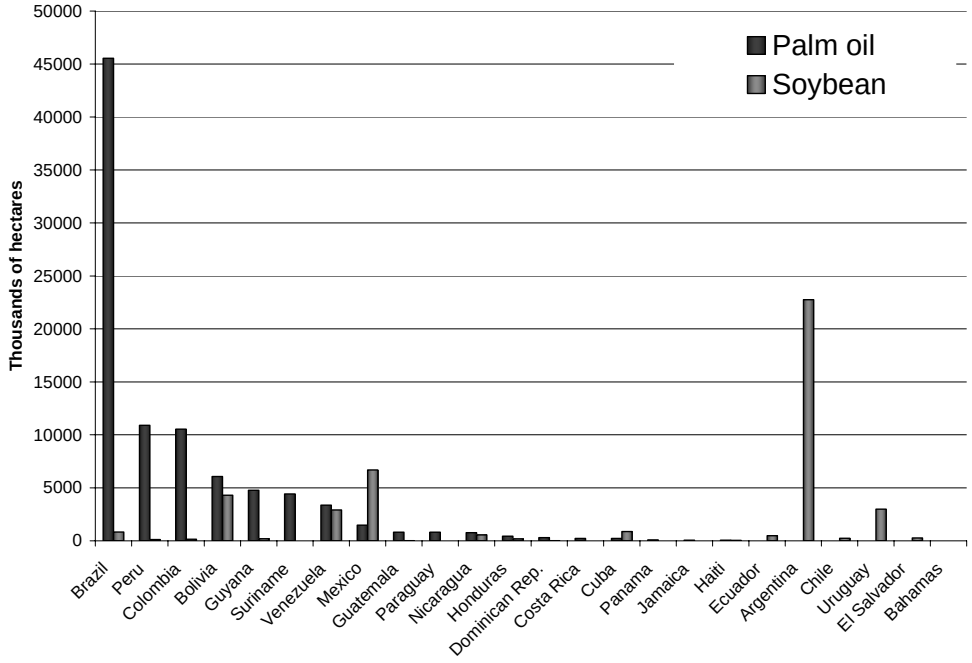
2). For biodiesel (B5), the countries with the greatest potential based on soybean or palm oil are Brazil, Argentina, Peru, Colombia, and Bolivia (Figure 3).

Figure 2 Potential for expansion of farm land once an E5 blend has been achieved. Suitable land area – (cropped area + area for E5 (thousands of hectares)



Note: Potential based on edaphic, climatic and environmental factors and a production technology that is fairly knowledge- and input-intensive. Mutually exclusive values among crops.
Source: Agricultural Development Unit, ECLAC, based on data from the International Institute for Applied Systems Analysis (IIASA) and FAO.

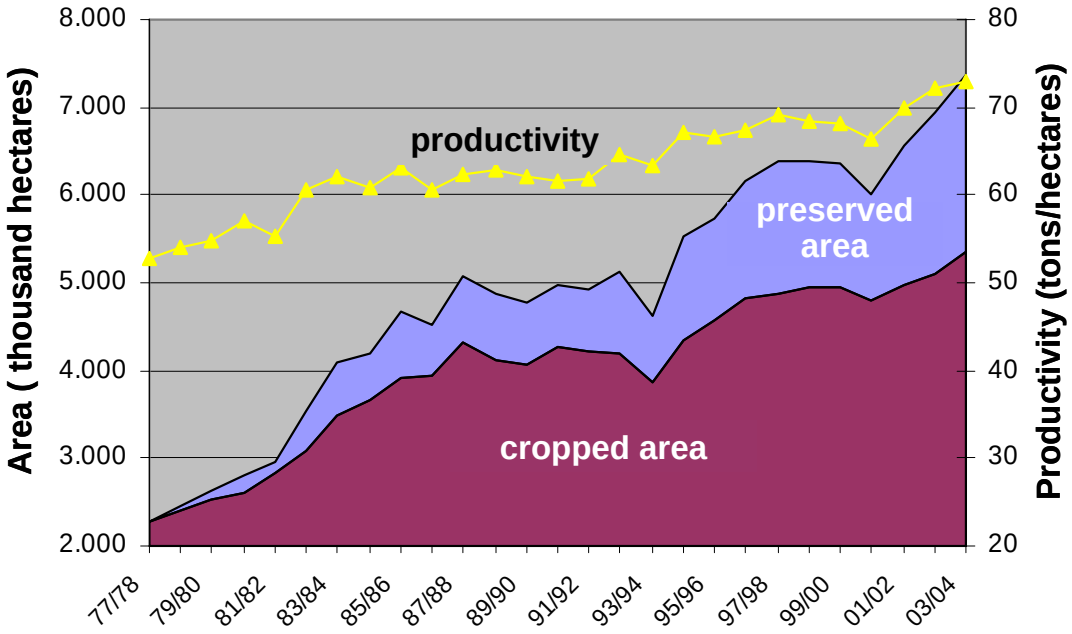
Figure 3 Potential for expansion of farm land once the B5 blend has been achieved, Suitable land area – (cropped area + area for B5). (thousands of hectares)



Note: Potential based on edaphic, climatic and environmental factors and a production technology that is fairly knowledge- and input-intensive. Mutually exclusive values among crops.
Source: Agricultural Development Unit, ECLAC, based on data from the International Institute for Applied Systems Analysis (IIASA) and FAO.

11. It should be noted that significant strides may still be made in different technological areas, for example an improvement in the production process, in biotechnology or in the use of by-products. One example of this is the increase in agricultural productivity in the sugar-cane-ethanol chain in Brazil (figure 4).

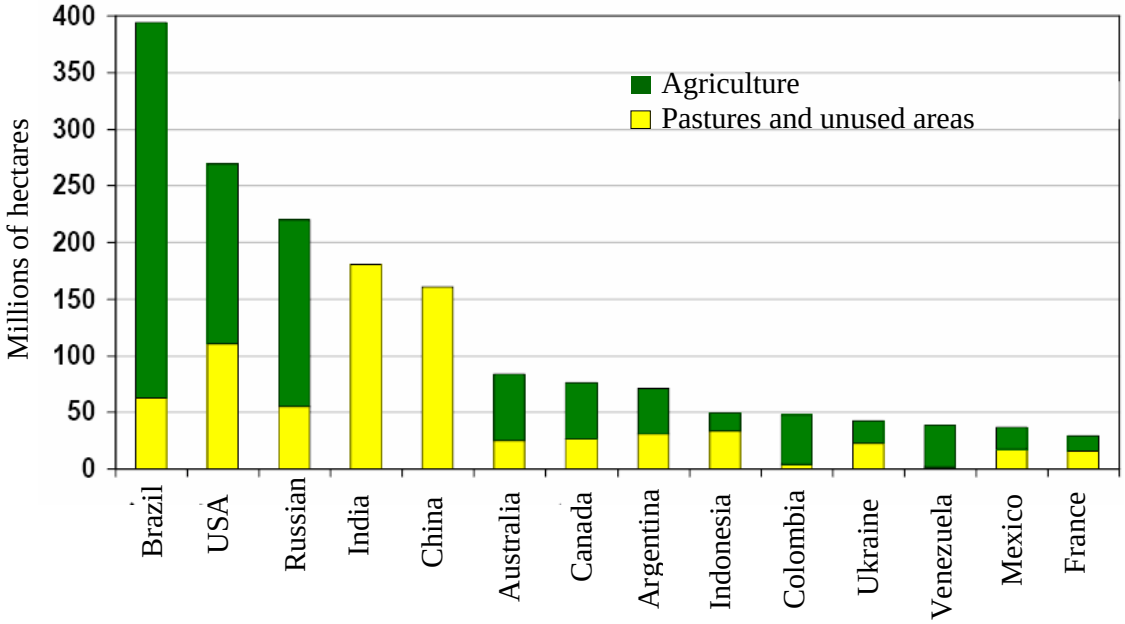
Figure 4 Sugar cane: cropped area and area preserved thanks to technological improvements.



Note: 1 ton of sugar = 80 litres of alcohol. 1 hectare of sugar cane = 6 cubic metres of alcohol.
Source: Centre on Environmental Research (CIMA).

12. There is a widespread perception that arable land is totally occupied or that there is only a small amount available for new crops. The figures show that the opposite is true (figure 5).

Figure 5 Availability of arable land by country



Note: Area harvested in 2004. Arable land in equivalent potential.

Source: FAO, Land Resources Potential and Constraints at Regional and Country Level (2000) and FAO (2007), prepared by ICONE.

Access

13. This dimension is measured by undernourishment, poverty and extreme poverty, and inequality, and these are the most important factors in Latin America and the Caribbean. While recent reports indicate that undernourishment and extreme poverty have been reduced in the region, there are still 209 million people (39.8% of the population) living in poverty, 81 million extremely poor or indigent people (15.4% of the population)[4], and 52.4 million persons suffering from undernourishment (10% of the total population)[5].

14. Bioenergy programmes could be a great opportunity if they could target small producers with limited capacity to access markets in order to sell their products. The creation of a new market and purchases guaranteed by the Government or processing companies would afford these small producers a stable, regular income. This would open up opportunities for investment and would broaden their activities.

15. Successful experiences with the organization of castor oil producers in Brazil have demonstrated that production programmes for the conversion of oil into bioenergy give a strong boost to local economies. Currently, there are over 30,000 small farming households engaged in the production of raw materials in the semi-arid north-east region of Brazil.[6]

16. It should be noted that thanks to financing for castor oil production in Brazil, these farmers intercrop beans, which has significantly increased the food production in the same areas used for the production of biofuels.

17. In the short term, however, it is very likely that a sharp expansion in global biofuel production will have a significant impact on the agricultural sector and also on Latin America. This impact may manifest itself in changes in demand, exports, allocation of hectares for bioenergy and non-bioenergy crops and, lastly, in crop prices, jeopardizing access to food by the poorest sectors.

18. Recent studies show that an increase in the demand for biofuels may result in (1) an increase in bioenergy crop prices; (2) an increase in traditional crop prices;

[4] CEPAL. 2006. Social Panorama of Latin America 2006. Economic Commission for Latin America and the Caribbean, December 2006.

[5] FAO. 2006. The State of Food Insecurity in the World 2004: Monitoring progress towards the World Food Summit and Millennium Development Goals, Rome, Italy.

[6] It is estimated that in order to supplement the 2% biodiesel blend, 205,000 family farmers in Brazil representing approximately 603,000 hectares of land would participate (Campos, Arnoldo., Secretary of Family Farming in the Ministry of Agrarian Development of Brazil, presentation made at the FAO Regional Office for Latin America and the Caribbean, April 2007).

and (3) a reduction in the price of biofuel by-products, for example, soybean meal and distilled grain.[7]

19. Lastly, it should be noted that a general increase in crop prices can affect income distribution, with increased crop prices meaning a transfer of income from consumers to producers and from urban to rural areas. This positive effect could fit in with some countries' efforts to improve incomes in rural areas, depending on the distribution of costs and benefits.

20. Countries need to design policies to promote biofuels, ensuring that they are profitable and that the benefits of their production extend to rural areas, promoting access to nutrition for the most vulnerable sectors of society.

Stability

21. The main component of stability lies in guaranteeing the continuance of productive activities, with remunerative prices, for long periods. The risk of food instability in the region remains, since policies are often transitory, implemented by a single government. Stability is also related to natural resource preservation. Production is often unsustainable, or other crops or activities are destroyed in order to make it viable.[8] The stability of food security in Latin America and the Caribbean will therefore depend on the orientation and design of policy for bioenergy programmes in the region.

22. One of the incentives for biofuel production is the increase in oil prices. This increase, however, can have two opposing effects:[9]

1) Higher oil prices lead to higher agricultural production costs, which could lead to reduced output.[10]

2) Rising oil prices produce incentives for biofuel production, boosting demand for bioenergy crops.

23. As for production costs, regardless of the caloric values of various raw materials, 2006 data from various selected countries cited by FAO[11] are as follows:

(i) In the European Union, the net cost of producing biodiesel from vegetable oils was US$ 835 per ton of fuel;

[7] ECLAC working paper "Efectos económicos de la producción de Biocombustibles en el sector agrícola de América Latina" to be published in the Desarrollo Productivo Series in the course of 2007.
[8] This was the case, for instance, of forests cut down in order to make way for oil palm in some parts of Asia.
[9] For a more detailed discussion of these effects, see OECD (2006) "Agricultural Market Impacts of Future Growth in the Production of Biofuels", Working Party on Agricultural Policies and Markets, Paris.
[10] The impact of rising oil prices is not homogenous, since some crops are more energy intensive.
[11] Grains for Food and Fuel – at what price? Prakash, A., a draft presented at a FAO meeting, 11 April 2007, Rome.

(ii) In the United States, the net cost of ethanol produced from maize was US$ 546 per ton;

(iii) In Brazil, the net cost of ethanol produced from sugar was US$ 387 per ton, substantially lower than in the United States and the European Union.

24. The dominance of one or other of those effects will determine whether biofuel output increases, and the overall scale of production. Furthermore, the varied effects of oil prices on agricultural production costs change the incentives for the production of each bioenergy crop. This in turn may affect the displacement of other crops and, consequently, their prices.

Utilization

25. Bioenergy may also have an indirect impact in the area of food security, reducing the availability of water for domestic use, and threatening the state of health and therefore the food security situation of those affected. Indeed, some bioenergy production systems require large quantities of water for both raw-material production and conversion into biofuel. As for raw materials, two of the most promising crops for ethanol and biodiesel production are sugar cane and palm oil which have high water requirements (between 1,500 and 2,500 mm/year, respectively), whereas maize, cassava, soybean, castor bean and cotton are biofuel crops with moderate water requirements (between 500 and 1,000 mm/year).

26. Policy must not allow bioenergy production systems which make intensive use of natural resources, mostly water, to move into areas where they may impact negatively on food production. Water quality and the maintenance of genetic resources are the basis for preserving the way of life of indigenous populations in the region. That heritage must not be contaminated by the use of different plant varieties, agrotoxics or water in fragile environments.

C. CONCLUSIONS AND AREAS FOR ACTION

27. It is widely believed that all arable land is already in use or that there is little scope for expanding into new crops. This is disproved by the figures for Latin America and the Caribbean, which show that great potential still remains for increasing arable land. Part of that potential could be used for bioenergy crops, and if that is accompanied by a set of well-designed policies and programmes, they could be beneficial to millions of small farmers who are now living in poverty, without endangering the region's forests or food security.

28. If second-generation technologies based on lignocellulosic feedstock became commercially viable, competition for land and other agricultural resources could be reduced. Small-scale biodiesel systems might even improve soil fertility if oil-bearing leguminous crops for energy production were grown in rotation with food crops.

29. Liquid biofuels are the fastest-growing segment of the bioenergy sector and can have direct implications for food security through their impact on prices of foodstuffs and animal feed. The impact on prices would be short-lived, however, lasting until a new balance was found between supply and demand.

30. Liquid biofuel production costs in the European Union and the United States are higher than the cost of fossil fuels, meaning that they have to be subsidized. This is not the case in Brazil, however, where biofuel production costs are only 46% of their levels in the European Union and 71% of those in the United States.

31. According to FAO (CFS:2007/2): “Bioenergy offers both opportunities and risks for food security. The impacts will vary over space and time depending on the evolution of market forces and technological developments, both of which will be influenced by policy choices at national and international levels. It is necessary to develop an analytical framework that takes into consideration the diversity of situations and specific needs of countries.” (paragraph 75).

32. It is the responsibility of the Governments of the region to take the initiative in establishing that analytical framework, maximizing opportunities and minimizing the risks that may result from bioenergy production, bearing in mind the situation in each country.

33. The bioenergy sector is considerably influenced by policies in at least four areas: the environment, agriculture, energy and trade. Policy in one area may affect the outcome in others.

34. It is important to be aware of the ex ante positions (positive or negative) of entities potentially involved in the development of policies for biofuel production or use, in relation to the various policy instruments necessary for implementation, and to continue to monitor any changes in those positions over time. The stakeholders potentially involved include ministries of agriculture, energy, environment, finance, and trade and industry, entities responsible for norms and standards and public and private research, legislators and political parties, local government, business and labour organizations, professional institutes, non-governmental organizations and civil society bodies, national and international pressure groups, the press, the national and international banking sector, investors, oil companies and gasoline and diesel distributors.

35. It is also considered essential to implement a set of policies to reduce the risks for food security which may come from the adoption of bioenergy crops:

> (i) Development and land-use policies, beginning with agro-ecological zoning to indicate which land areas are available for biofuel crops, and a system of incentives and penalties for the use of resources such as forests and water.
>
> (ii) Technological policies to investigate all the region's potential raw materials. These policies should be relevant to small farmers and oriented towards small-scale technologies for the farming segment, industry and end users.

(iii) Policies to regulate markets in products and services, clearly defining issues such as the regulatory framework for biofuel use, commercial rules, incentives and taxes.

(iv) Policies to improve contractual relations among the various actors in the production chain, from primary producers to end users, including the integration of family farming and the protection of labour rights.

(v) Policies which also take into account biofuel consumption patterns, in order to avoid causing waste because of a model of growing energy consumption.

36. The FAO Regional Office for Latin America and the Caribbean will focus on areas for action in the region in the field of biofuels, emphasizing the potential and sustainability of agroenergy, providing support and collaboration to rural programmes and projects, and preparing databases and strategies for communication and dissemination on biofuels.

37. Countries are invited to begin discussions on a voluntary code of conduct on bioenergy production and use. Joint efforts with other international bodies will be encouraged in order to achieve synergies and optimize the results of multidisciplinary activities. The aim is to implement a series of policies and a set of best practices for the guidance and improvement of joint public- and private-sector efforts to promote development and reduce poverty.