

Report of the
PANEL OF EMINENT EXPERTS
ON ETHICS IN
FOOD AND AGRICULTURE

Fourth session
26–28 November 2007



FAO
Viale delle Terme di Caracalla
00153 Italy

Tel.: (+39) 06 57051
Fax: (+39) 06 57053152
Internet: www.fao.org

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Abbreviations

CCA

Common Country Assessment

EFTA

European Free Trade Association

EU

European Union

FIAN

FoodFirst Information and Action Network

FIV

food insecurity and vulnerability

FIVIMS

Food Insecurity and Vulnerability Information and Mapping System

FTA

free trade agreement

GHG

greenhouse gas

IAASTD

International Assessment of Agricultural Science, Knowledge and Technology for Development

IFES

integrated food and energy system

IPR

intellectual property right

OECD

Organisation for Economic Co-operation and Development

PRSP

Poverty Reduction Strategy Paper

TRIPS Agreement

Agreement on Trade-Related Aspects of Intellectual Property Rights (World Trade Organization)

UN

United Nations

UNEP

United Nations Environment Programme

UNICEF

United Nations Children's Fund

UPOV

International Union for the Protection of New Varieties of Plants

WFS

World Food Summit

WHO

World Health Organization

WTO

World Trade Organization

Introduction

Establishment and terms of reference

This is the report of the fourth session of the Panel of Eminent Experts on Ethics in Food and Agriculture, established by the Director-General in accordance with Article VI.4 of the FAO Constitution and Rule XXXV of the General Rules of the Organization, initially for a period of four years as of 1 January 2000. It met twice in its first four years of existence. The term of the Panel was extended by a further period of four years beginning on 1 January 2004. The panel met in 2005 and held its final session on 26–28 November 2007. For reasons related both to Panel reporting and to internal processes within FAO, the final report was completed only in August 2009. Information and events after November 2007 have been taken into account through consultation among the members of the Panel.

The Terms of Reference of the Panel, to raise public awareness and advise the Director-General on ethical issues in food and agriculture, are provided in Annex 1.

Membership

The Director-General appointed eight eminent experts of recognized competence in ethics, philosophy, humanities or a relevant economic, legal or scientific discipline with experience of ethics, and of high moral authority and international or regional standing, to serve as of 1 January 2004 on the Panel in their personal capacity for four years. The members of the Panel appointed for 2004–07 are Mr Francisco J. Ayala from the United States of America, Ms Ruth Chadwick from the United Kingdom, Ms Chee Yoke Ling from Malaysia, Mr Carlos María Correa from Argentina, Mr Souleymane Bachir Diagne from Senegal, Mr Asbjørn Eide from Norway, Ms Cecilia A. Florencio from the Philippines and Mr Tewolde Berhan Gebre Egziabher from Ethiopia. Mr Eide was appointed chair of the Panel. Mr Ayala and Mr Eide were also members of the first Panel; the others were new appointees. A summary biography for each Panel member is presented in Annex 2.

Unfortunately, Mr Diagne and Ms Florencio were not able to attend the fourth session.

Summary of previous Panel considerations

In its Terms of Reference, the Panel was requested both to reflect on, and to promote reflection on, ethical issues arising from food production and consumption practices and on agricultural development, including forestry and fisheries. This was to be done in the context of food security, sustainable use of natural resources, the safeguarding of biodiversity and a balanced mix of traditional and modern technologies to increase food security and sustainable agriculture.

The Panel has taken as a basis that the fundamental ethical commitment of FAO is to promote policies and measures that can ensure humanity's freedom from hunger and the access of everyone to adequate food and nutrition, as stated in the Organization's Constitution and subsequent commitments. A necessary component of that commitment is

to promote conservation and sustainable management of natural resources for present and future generations.

The ethical concerns related to food and agriculture are thus essentially twofold. One is to promote conditions in which sufficient food is produced and distributed in ways that ensure that everyone has access to adequate food; the other is to promote policies and measures ensuring ecological sustainability of food production, including in fisheries, and similar sustainability in the practice of forestry.

Ethics require that people go beyond self-interest to care for others. The Panel has agreed in its earlier sessions that the major avenue to this is through contractarian ethics, which combines duty-based and utilitarian approaches. Ethics may be approached through the agreement of rationally self-interested and socially responsible individuals on guidelines for social interaction and governance.

The most elaborate and globally relevant ethical guidelines are found in the Universal Declaration of Human Rights, founded on a careful balance between deontological and utilitarian principles. It constitutes the agreed global value framework that spans cultures, religions and ideologies, and is therefore the most widely recognized contractarian reference for global ethical assessment.

The world has the ability to produce sufficient food, but has not found ways to ensure its adequate distribution and consumption. The Panel considers it an ethical imperative to remedy the unacceptable gaps in access shown by the fact that hundreds of millions suffer from hunger and malnutrition in a world of plenty, and to ensure sustainable production. For the gap to be closed, measures have to be taken in many fields, all of which can give rise to their own ethical issues.

In its first session, the Panel opened up the general discussion of ethical issues in food and agriculture. It has since explored specific aspects in greater detail. A major focus of attention has been the ethical issues arising in food and agriculture from economic globalization and the intensification of agriculture. A second and related issue has been the exploration of ethical aspects of the global emergency of hunger.

A third focus has been on the ethical requirement to avoid the risks of, while sharing the benefits of, biotechnologies as part of the advancement of science, which also involves an examination of the ethical issues related to intellectual property rights including the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) and the International Union for the Protection of New Varieties of Plants (UPOV) and their relations to farmers' rights.

Ethical considerations of decision-making in relation to genetically modified organisms from the perspective of the consumer, food safety and the environment are closely related to this issue.

The Panel has examined a wide range of specific topics including: ethical issues in fisheries; the ethics of food safety; ethical issues in food aid; ethical perspectives on animal welfare and the intensification of animal production; the issues surrounding global goods, global services and privatization; and intellectual property rights. Details about the considerations and recommendations can be found in the three preceding reports of the Panel. ●

Considerations at the fourth session

At its fourth and final session, the Panel continued and deepened its examination of the most pressing issues, many of which are related to problematic or controversial aspects of globalization, such as the loss of crop biodiversity, the ethical imperative of ensuring to all the fundamental right to be free from hunger, the realization of the right to food for all, the challenges and potential

benefits of biofuel (with a focus on liquid biofuel for transport [agrofuel]), intellectual property rights (IPRs) in food and agriculture, and problems related to food marketing and public nutrition policies.

ON GLOBALIZATION AND INTENSIFICATION OF AGRICULTURE

On economic globalization: salient aspects for food and agriculture

Right from its first session in 2001, the Panel has highlighted the fact that far too many of the world's people remain marginalized, and the gap between the poorest and the most affluent groups is growing. There are serious power imbalances arising from the concentration of economic power in the hands of a few. Benefits accrue more to what has been called the North, while poverty is extensive in the South. Annex 5 of this report includes a brief, independent presentation of a Southern perspective on globalization, written by Panel member Tewelde Berhan Gebre Egziabher from Ethiopia. While not all members of the Panel share all the views reflected in that annex or would have used other terms, we have found it important to include, in his own words, these reflections by this eminent environmentalist scholar from the South.

Existing international mechanisms are too weak and institutions are not yet in place to ensure that these imbalances are properly addressed. Therefore, the Panel expresses the hope that United Nations (UN) Member States will cooperate more than in recent years through the UN system, including FAO, to develop a rule-based framework for global governance founded on ethical considerations. Increased linkages with civil society, facilitated by modern communication technologies such as e-mail and the Internet, can strengthen the decentralized global governance system that is now emerging.

The term "globalization" is itself a subject of controversy. However, the Panel notes that *economic* globalization involves the dismantling or reduction of national import regulation measures, a parallel dismantling or reduction of regulations and restrictions on foreign investment, and a weakening of national restrictions on foreign commercial service operations. It accelerates major changes in local food systems, which become increasingly vulnerable to external threats (as shown in the recent food price crisis).

The effect is the growing strength and worldwide operations of transnational corporations and investors, and an increasing global trade in agricultural goods. Inequality between trading partners has often resulted in unequal accrual of benefits.

The Panel observes that this is accompanied by growing economic inequality, internationally and domestically, with a strong impact on access to food. Although the

considerable increase in agricultural productivity could easily keep up with global population growth, the absolute number of people who are hungry or undernourished has not been reduced. Only the share of the world population that is hungry has to a very limited extent diminished. The growing inequality has also led to unequal exposure to the future harmful effects of global warming and to unequal capacities to adapt to the consequences of global warming.

In the light of these observations, it is an ethical imperative to question the direction and implementation of the process of economic globalization.

On intensification of agriculture and industrialization of animal production

The Panel notes that there is an accelerating intensification of agriculture, with numerous ethical problems involved. The intensification of agriculture includes mechanization of agricultural cultivation and elaboration and utilization of new forms of biotechnology. It has led to greater use of high-yielding seeds or seeds that are pest-resistant. It further involves increased use of chemicals for fertilizers and pesticides, and a growing use of water for cultivation. A related issue is the industrialization of animal production (discussed during the third session of the Panel) and aquaculture fish production. The emergence and growth of production of liquid biofuel for transport is one of the more recent steps in the intensification of agriculture. This aspect warrants particular ethical reflection as there might be a conflict with food production. Therefore, it was discussed in some depth at the fourth session (below).

On the linkages between economic globalization and intensification of agriculture

While intensification of agriculture is a necessary consequence of the growing demand for food from an increasing world population, the particular direction of the intensification in recent decades has been driven by the major agents of economic globalization. There is an expanding role of large corporations producing seeds, chemical fertilizers and pesticides for these markets. This causes an increasing dependence of farmers, including smallholders involved in cash production, on these corporations.

The Panel further notes that the combined effect of economic globalization and agricultural intensification has a negative impact on sustainability, on greenhouse gas (GHG) emissions and global warming, on competition for water, on pollution, and on soil degradation. It has also led to the marginalization and exclusion of households that have not been able to participate in the changes owing to insufficient or denied access to natural resources and capital.

The Panel also notes that there is a growing role and influence of global food processing and retailing corporations. In reflecting on ethical issues concerning the role of the corporate intermediaries in the expanding food chain from producer to consumer, there are several aspects that should be subjected to critical ethical examination: the relatively small share of the final price of the food product that goes to the peasant farmer; the difficulties of small-scale farmers in adapting to changes in the marketing system; the negative environmental impact of long-distance transport; the high transaction and

distribution costs; insufficient regulation to ensure access for all; and insufficient measures to ensure that food marketing facilitates the consumption of healthy diets.

The Panel further notes that the use by developed countries of subsidies (including export subsidies) causes a lopsided intensification of agriculture, weakening the possibilities of local farmers in developing countries to compete even within their own national markets.

The need for more balanced agricultural development

The harmful consequences mentioned above are not unavoidable. They are the result of weak or non-existent public regulations, whose absence has also facilitated a growing influence of international speculation in food and related products. These harmful consequences could have been avoided or reduced if there had been proper regulation in place to prevent speculation in land and in food prices, which has been responsible for a significant part of the recent soaring food prices. Restrictive regulations should also include a better system of legal and physical security of the tiller of the land against exploitation, deprivation of land and forced evictions, and offer protection against plantation-type agro-industrial expansion.

The Panel has taken great interest in the International Assessment of Agricultural Science, Knowledge and Technology for Development (IAASTD), which has been supported by FAO and the World Bank. The assessment, in which hundreds of scientists and other experts from nearly all parts of the world have been involved, was presented in a final report in April 2008 (IAASTD, 2009) and was endorsed by more than 60 countries. It is the latest and most authoritative assessment of the role of science and technology in agriculture and should form the basis for ongoing discussions on the potential role of agricultural technologies. It provides valuable insights and recommendations recognizing the need for complementary and diversified approaches to sustainable agriculture, and pointing out that agricultural models based on small farming can present important alternatives appropriate for a human-rights-based food security.

Account must be taken of the relative shortage of natural resources as a result of population growth, overconsumption in parts of the world, land degradation and increasing urbanization. In some regions where people have in the past been able to feed themselves, this will for many not be possible in the future. Some outmigration from environmentally stressed areas is unavoidable and will present the dual problem of adequate emergency measures and an intensified production of food at prices affordable to those who need it.

Recommendations

The Panel recommends that more support be given to small-scale food production, particularly for issues regarding access to or control over seeds, water, infrastructure, information, credit and marketing, and that in place of almost unregulated international trade in agriculture, the primary emphasis be put on fair trade regulated in ways that benefit primarily those that are food-insecure, while focusing on traditional food culture and on traditional crops produced for local markets.

The Panel also recommends that measures be adopted to counteract pressure towards acceptance of genetically modified crops, and in this respect urges that due attention be given to the precautionary principle and to the potentially negative social impacts, particularly for smallholders, of the use of such crops. More attention should be given to assessing the potential of existing biodiversity.

The Panel recognizes that intensified agricultural production will be required in order to meet the increasing needs of a growing population and to compensate for production lost in environmentally stressed areas, but recommends that measures be adopted to ensure that the intensification of production at all times protects the poor and food-insecure and ensures environmental sustainability.

THE LOSS OF CROP BIODIVERSITY IN THE CHANGING WORLD

Globalization and crop genetic diversity

The accelerating increase in communication is mixing ideas, technologies, cultures and even people throughout the world. This process seems to be taking us towards one homogenous global culture. However complex this evolving global culture might turn out to be, it is inevitable that we will have lost much of the content of our former diversity in the process of achieving it. We have already witnessed a high level of attrition in our crop genetic diversity. And yet, the very process of globalization is changing the world's environment through monocultures, rainforest clearing for biofuel targeted agriculture, etc., which in turn increases the need for crop genetic diversity to adapt agriculture to the changing environmental conditions. If human survival into the indefinite future is to be assured, globalizing humanity has to put all its efforts into increasing crop genetic diversity and not fatalistically accept its accelerating decrease.

The southern parts of Europe constitute a part of the Mediterranean Vavilovian Centre. This is now part of the industrialized world, also often referred to as the North. The rest of the industrialized world is relatively unimportant as a source of crop genetic diversity. All the other important Vavilovian centres are in the developing world, also referred to as the South. Thus, geographically speaking, the problems of conserving crop genetic diversity are problems of the developing world although the erosion of crop genetic diversity concerns humanity as a whole. Because of these and related reasons, the difficulties in the actions that are required in order to maintain crop genetic diversity remain intimately linked to the problems of development that the South is facing in this era of economic globalization. The fact that globalization is led by the North while crop genetic diversity is mostly in the South confounds the responsibilities for the failure to protect diversity and makes it difficult to solve these problems, even if there is the political will to do so. Usually, in fact, there is insufficient national, let alone global, will to take all the needed action. Industrialization of agriculture and changes in food habits are emerging as the main factors in accelerating the global erosion of crop genetic diversity. The very process of globalization, which is exacerbating the erosion of crop genetic diversity, is also making that very diversity

essential for the continuation of human well-being into the future. The climate is changing and a commensurate increase in crop genetic diversity is required in order to adapt to that change.

In the second half of the twentieth century, many scientists and scientific institutions realized that the world's future food supply was in danger because of crop genetic erosion and that something had to be done. The simplistic action was to store in gene banks the crop genetic diversity that would have disappeared otherwise. There are now many gene banks around the world that are trying to save as much crop genetic diversity as they can. Many problems have been confronted in the past and their success has sometimes been limited. However, some of the national gene banks and the institutions of the Consultative Group on International Agricultural Research have in recent times increasingly been able to preserve agrobiodiversity. It is time to move forwards to use these gene banks for sustainable agriculture practices.

More recently, genetic engineering appeared to hold the promise to synthesize any desired crop variety in laboratories, although single gene transfers are still the main features. However, some of the thus newly synthesized varieties have emerged with unforeseen problems (see e.g. New Scientist [2005]) on the abandoning of transgenic peas because of their allergenic impact). In addition, there is ample evidence in scientific literature that transgenics from crops can be incorporated in the genomes of wild relatives through cross-pollination and thus, for example, make some weeds pernicious (Chèvre et al., 1997; Mikkelsen, Andersen and Jørgensen, 1996). For these reasons, genetically engineered crop varieties have now become highly controversial in many parts of the world.

In many parts of the developing world, e.g. Ethiopia, there are vibrant farming communities that are still increasing crop genetic diversity, both through breeding new farmers' varieties of existing crops and by domesticating altogether new crop species. However, when the whole trend is considered, erosion is far greater than generation of crop genetic diversity even within the developing countries in Vavilovian Centres, let alone globally.

Agricultural intensification and crop genetic diversity

The strategy used in the type of agricultural intensification that is referred to as the green revolution is based on the use of irrigation and chemical fertilizers to provide a homogenous environment so that a crop variety selected for the purpose produces an evenly high yield throughout the cultivated land. In this way, crop varieties that had been adapted to the diversity of environmental conditions that had existed in an area prior to its coming under industrial agriculture are being eliminated. The resulting extensively grown monocultures become susceptible to disease and pest epidemics. According to the World Resources Institute et al. (1998), soil is now being eroded globally at a rate that is 16–300 times faster than at which it is being formed, and much land is lost owing to salinization (Brown and Flavin, 1997; Pretty, 1995).

Changes in food habits and crop genetic diversity

Globalization has induced a tendency towards uniformity in eating habits. A report

prepared for the United Nations Environment Programme (UNEP) states that although about 7 000 species of plants have been used as human food in the past, urbanization and marketing have now reduced them. Only 150 crops are now commercially important, with rice, wheat and maize accounting for 60 percent of the world's food supply. The genetic diversity within each crop has also been eroding fast. For example, only nine varieties account for 50 percent of the wheat produced in the United States of America and the number of varieties of rice in Sri Lanka has dropped from 2 000 to less than 100 (Board on Agriculture of the National Research Council, 1993, pp. 23–25).

Partly as a reaction to the erosion of crop genetic diversity and even more because of a growing realization that industrial agriculture pollutes the environment and is, in the view of the Panel, unsustainable in the long run, the organic movement is now growing globally. This will help slow the erosion of crop genetic diversity. However, the organic movement that is being generated in response to the globalizing processes is not making sufficient linkages with those local farming communities that have not yet been engulfed by the process of globalization. However, these two sectors have commonalities and could strengthen each other.

Genetic engineering - not a universally accepted source of crop genetic diversity

Adherents of genetic engineering, a special kind of biotechnology, have mistakenly asserted that it will create new varieties that could solve many or all agricultural cultivation problems. This assertion has swayed even the United Nations Development Programme, which wrote in 2001 that biotechnology “offers the only or the best ‘tool of choice’ for marginal ecological zones ... home to more than half of the world's poorest people” (UNDP, 2001). However, no varieties that increase agricultural production compared with their non-genetically engineered counterparts have so far been produced through genetic engineering. In one study using data collected by US Department of Agriculture, it was found that in most cases the yields from the genetically modified crops were lower (Fernandez-Cornejo and McBride, 2002), which does not exclude that the genetically modified crops may be economically more profitable.

On the negative side, genetically modified plants may have unexpected impacts that harm human and animal health, agriculture and the environment. In order to prevent such unexpected impacts, from the food safety perspective, the Codex Alimentarius Commission (2003a, 2003b) has developed *Principles for the Risk Analysis of Foods derived from Modern Biotechnology and Guidelines for the Conduct of Food Safety Assessment of Foods derived from Recombinant-DNA Plants*, which can be used by governments when they approve genetically modified crop varieties for use as food. The Cartagena Protocol on Biosafety could help in providing protection against possible adverse effects on the conservation and sustainable use of biodiversity arising from the transfer, handling and use of genetically modified organisms, but major producers of genetically modified crops, e.g. Canada and the United States of America, are not parties to the Protocol.

There are reports of biopharming with transgenic crops - planting crops genetically modified to produce pharmaceuticals or other chemicals - in the United States of America.

This means that we may face a future when food crops are likely to be permanently contaminated with medicines or even other chemicals through cross-pollination with the varieties planted for biopharming. We may lose some crops completely because of unfortunate events that result in extensive cross-pollination of this nature. The fact that the countries where biopharming is being developed are generally not parties to the Cartagena Protocol on Biosafety complicates the problem.

Contemporary globalization processes are eroding crop genetic diversity faster than ever. Climate change, a product of the very process of globalization, is also changing the environment rapidly. To continue feeding ourselves and to enable future generations to feed themselves, agriculture must keep adapting to the changes in the environment as fast as they occur. To be sure that agriculture can keep changing as fast as necessary, we need more crop genetic diversity than we have ever had. If we stopped atmospheric pollution immediately, the Earth's climate would still change, although it would probably stabilize after some time. Even if we were able to stop polluting the atmosphere immediately, we would still need the widest possible crop genetic diversity. This makes it necessary to conserve all the crop genetic diversity that we have as well as to regain in full the capacity to generate the crop genetic diversity that we have partly lost in the last 100 years.

Recommendations

It is recommended that FAO:

- Promote sufficient funding of existing gene banks and the building of new ones as needed for ex-situ crop genetic diversity conservation in order to:
 - a) maintain all existing unique collections, ensuring that they are all always viable and accessible for breeding;
 - b) regenerate all existing unique collections without genetic drift changing their unique identities;
 - c) build new unique collections before they disappear for ever.
- Encourage the growing organic movements to make their agricultural production systems crop genetic diverse so as to match the environmental diversity of the land that is under cultivation.
- Encourage the establishment of mutually supportive linkages between the primarily subsistence farming communities in the South and the growing commercial organic farms that are primarily in the North for developing agricultural systems suited to the diversity of environments so as to maximize both production and crop genetic diversity.
- Promote the in-situ conservation of crop genetic resources by organic farmers, both primarily subsistence and commercial, both in the North and in the South – by subsidies if required.
- Help organic farmers, both commercial, primarily in the North, and subsistence, in the South, in research and development for maximizing both crop genetic diversity and yields in the diverse environmental conditions of the changing Earth - this is also needed because agrochemicals are becoming expensive over time.

- Object to the patenting of crop varieties when this makes use of crop genetic diversity from subsistence farming communities but restricts the resulting varieties to circulate only among the rich, and when natural cross-pollination passes patented genes from genetically modified crop varieties to non-modified varieties. Consequently, Article 27.3(b) of the TRIPS Agreement should be revised by the World Trade Organization (WTO).
- Promote critical research addressing problematic aspects of biotechnology developments. The old tradition of countering mistakes with the truth through publishing in scientific literature is the only reliable way of protecting the public interest.
- Object to biopharming using food crops, and seek to have it prohibited. Even biopharming with non-crop plants should be kept to a minimum and under strictly contained conditions in order to ensure environmental safety.

ON HUNGER AND THE RIGHT TO FOOD

In its first report (2000), the Panel noted that the fundamental ethical commitment of FAO is to ensure humanity's freedom from hunger and to promote the access of everyone to adequate food, as stated in the Organization's Constitution and subsequent commitments. This concern has been pursued at all subsequent sessions of the Panel. On World Food Day on 16 October 2007, the Director-General of FAO stated: "We must place the human being at the centre of our attention, our policies and our actions." This Panel fully endorses this statement and hopes that Member States of FAO will see this as a core concern in the reform of the organization.

The right to food and food security

As defined by the UN Committee on Economic, Social and Cultural Rights, the right to adequate food is realized when every man, woman and child, alone or in community with others, has physical and economic access at all times to adequate food or means for its procurement.

FAO defines food security as a "situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life."

The vast majority of states have recognized that everyone has a fundamental right to be free from hunger (*International Covenant on Economic, Social and Cultural Rights*, Article 11.2 [UN, 1966]). States Parties to the International Covenant on Economic, Social and Cultural Rights have undertaken to respect, protect and fulfil the right to food. *Respect* by refraining from taking measures that might deprive individuals of their right to food, for example, confiscating land or deviating watercourses used for agriculture, without justification and without adequate compensation. *Protect* by ensuring that individuals are not deprived of their access to food by third parties; for example, ensuring that permits for industrial activities (such as forestry operations) do not impede access

to food or livelihoods. *Fulfil* by facilitating actions and pursuing policies that will contribute to the gradual realization of the right to food. Moreover, all those individuals who, for reasons beyond their control, are unable to meet their needs, must be provided with food or the means to procure food.

The Heads of State and Government, gathered in 1996 at the World Food Summit (WFS) at the invitation of FAO, reaffirmed the right of everyone to have access to safe and nutritious food, consistent with the right to adequate food and the fundamental right of everyone to be free from hunger. The participating States therefore committed themselves to implementing policies aimed at eradicating poverty and inequality and improving physical and economic access by all, at all times, to sufficient, nutritionally adequate and safe food and its effective utilization. They pledged their political will and their common and national commitment to achieving food security for all and to an ongoing effort to eradicate hunger in all countries, with an immediate view to reducing the number of undernourished people to half the then level by no later than 2015.

Regrettably, over the 12 years since the WFS, there has been no progress in reducing the number of hungry people. On the contrary, it has increased. At the time of the WFS, the number of undernourished people in developing countries was estimated to be 823 million people. At the end of 2008, the number stands at 967 million. This is a devastating failure.

One important aspect of the WFS Declaration in 1996 was the recognition that hunger is not primarily caused by a scarcity of food, but by a lack of access for hundreds of millions to food that exists or could be produced because they do not have the necessary assets to produce their own food or the means to procure it. The fact that many are hungry in spite of abundance means that insufficient measures are taken to prevent the occurrence of hunger.

The food crisis is not new. The problem is structural. There is an urgent need to address the root causes of hunger, the structural problems and the governance dimension. This requires coordinated international action by international agencies and other international organizations and bodies, and FAO must be expected to take a lead in this.

Required state action to ensure to everyone the right to be free from hunger

The UN Committee on Economic, Social and Cultural Rights (the Committee) has pointed out that States Parties to the International Covenant on Economic, Social and Cultural Rights (the vast majority of the international community) are required to take whatever steps are necessary to ensure that everyone is free from hunger and as soon as possible can enjoy the right to adequate food. This requires the adoption of a national strategy to ensure food and nutrition security for all, based on human-rights principles that define the objectives to be pursued, together with the formulation of targeted policies and the setting of the corresponding benchmarks for progressive realization. The strategies should identify the resources available to meet the objectives and the most cost-effective way of using them. Appropriate institutional mechanisms should be devised to secure a representative process towards the formulation of a strategy, which should set out the responsibilities and time frame for the implementation of the necessary measures.

The strategy should give particular attention to the need to prevent discrimination in access to food or resources for food, guaranteeing full and equal access to economic resources, particularly for women, and including measures to respect and protect self-employment and work that provides a remuneration ensuring a decent living for wage earners and their families, and to maintain registries on rights in land (including forests).

The Committee requires states to take appropriate steps to ensure that activities of the private business sector and civil society are in conformity with the right to food.

The Committee also emphasizes that even where a state faces severe resource constraints, whether caused by a process of economic adjustment, economic recession, climate conditions or other factors, measures should be undertaken to ensure that the right to adequate food is especially fulfilled for vulnerable population groups and individuals.

Finally, the Committee calls on appropriate UN programmes and agencies to assist, upon request, in drafting the framework legislation and in reviewing the sectoral legislation. FAO has an important role to play in this regard because of its considerable expertise and accumulated knowledge concerning legislation in the field of food and agriculture. The United Nations Children's Fund (UNICEF) has equivalent expertise concerning legislation with regard to the right to adequate food for infants and young children through maternal and child protection, including legislation to enable breastfeeding, and with regard to the regulation of marketing of breastmilk substitutes.

Guidelines for the realization of the right to food and FAO's Right to Food Unit

In their implementation of their obligations to realize the fundamental right of everyone to be free from hunger and the right to adequate food, states should draw on the *Voluntary Guidelines to Support the Progressive Realization of the Right to Adequate Food in the Context of National Food Security* (the Guidelines), adopted by the 127th Session of the FAO Council in November 2004 (FAO, 2005).

Of particular importance in this context is Guideline 8, which deals with access to resources and assets: "States should facilitate sustainable, non-discriminatory and secure access and utilization of resources, and protect the assets that are important for people's livelihoods. States should respect and protect the rights of individuals with respect to resources such as land, water, forests, fisheries and livestock without any discrimination. Where necessary and appropriate, States should carry out land reforms and other policy reforms in order to secure efficient and equitable access to land and to strengthen pro-poor growth. Special attention may be given to groups such as pastoralists and indigenous people and their relation to natural resources."

Guideline 8 further focuses on the need to provide opportunities for work providing adequate remuneration, to promote and protect the security of land tenure, to seek to ensure that everyone has access to water in sufficient quantity and quality, to prevent the erosion and ensure the conservation of genetic resources for food and

agriculture, to prevent water pollution and protect the fertility of land and to promote sustainable management of fisheries and forestry. States should also create or encourage services that facilitate more efficient food production for all farmers, in particular poor farmers, and address local constraints such as shortages of land, water and farm power.

The Guidelines also deal with food safety and consumer protection (Guideline 9), nutrition (10), education and awareness raising (11), national financial resources (12), support for vulnerable groups (13) and the establishment of safety nets (14). Guideline 15 deals with international food aid and Guideline 16 with natural and human-made disasters, including measures to ensure that refugees and internally displaced persons have access at all times to adequate food, and in cases of disaster to provide assistance to those in need.

The Guidelines are important because they were adopted by governments themselves and they have outlined the very practical steps that have to be taken to realize this right. The Guidelines may open up a new era by realizing the right to food. All governments should be encouraged to embrace the Guidelines immediately and start taking the steps contained therein.

When the FAO Council adopted the Guidelines in November 2004, it also called for adequate follow-up to the Guidelines through mainstreaming and the preparation of information, communication and training material. FAO's Strategic Framework for 2000–2015 (FAO, 1999) stipulates that the Organization is expected to take fully into account “progress made in further developing a rights-based approach to food security” in carrying out its mission of “helping to build a food-secure world for present and future generations.” The right to food was later defined in programming documentation as one of nine FAO priorities.

For this purpose, FAO's Right to Food Unit was established in order to contribute to the realization of the human right to adequate food, through it being respected, protected and fulfilled everywhere. Its task is to engage in the follow-up of the WFS Declaration and Plan of Action, the Guidelines follow-up, and to encourage and stimulate research, information and awareness, capacity strengthening and country assistance.

The ethical imperatives: recognize responsibility, ensure adequate mapping and implement an adequate response

The realization of the fundamental right of everyone to be free from hunger will not be achieved unless states recognize their responsibility in this respect and unless there is cooperation worldwide to assist those states whose resources are too limited. However, hunger exists in many countries whose overall resources are more than sufficient; therefore, the hunger is not always a result of limited national resources but frequently reflects a lack of appropriate priorities.

For states to be able to address hunger, they must also have the will to map the reality existing in their own country, to identify who are food-insecure and why, and on that basis to make a targeted policy to remove the obstacles hindering access to food for all.

It is essential to discard the widespread but mistaken conception that, if there is general economic growth, hunger will disappear. While in some cases the reduction of hunger is positively associated with economic growth, in other cases it is not. It depends on the way in which the economic growth is structured and on the recognition of responsibility by authorities. Without a sense of responsibility, there is also little effective mapping of food insecurity

Misperceptions and generalizations concerning the benefits of economic growth could be well illustrated by the debate on the social consequences of biofuel – on the one hand, the projected ideal benefits, which do not stand up to scientific scrutiny, and on the other hand, the lack of attention to harmful consequences, such as the eviction and marginalization of farmers lacking firm legal tenure and an increase in food prices without any buffering for those who are becoming more impoverished.

Many development projects, not only those related to biofuel, have a negative side. Some people or groups are further impoverished while others grow richer. However, these do not have to be the consequences of development or economic growth if the measures are more properly targeted to address those who are vulnerable, with a proper understanding of the causes of their vulnerability, and supported by the adoption of measures directly targeted to remove those causes or at least to avoid making them worse.

Attention should also be given to emergency projects, which often prioritize distribution of inputs with limited attention to social and environmental considerations. A code of conduct for humanitarian actors (including donors) that addresses these concerns should be developed.

The importance of mapping, setting benchmarks and monitoring

In the realization for all of the fundamental right to be free from hunger, what needs to be investigated first is exactly who (which groups) are food-insecure and why they are so.

This requires statistical disaggregation between rural and urban parts of the population, between men and women, between different racial or ethnic groups, between the indigenous peoples and the dominant part of the population, between castes and outcasts, and between the regions of the country that are in the central areas of economic development and those that are in the periphery.

However, that is not all. It also requires contextual information and assessment as to why particular groups are insecure, whether their situation has worsened compared with what it was before, and what has caused that deterioration. Causal analysis of malnutrition for specific vulnerable groups will allow the effective integration of food, health and care responses for sustainable livelihoods.

The focus should be on households where those who were supposed to be the “breadwinners” are unable to have physical and economic access to food or the means for its procurement; but households that are food-insecure are often part of a wider group or category of persons.

FIVIMS and the Right to Food Unit of FAO

FIVIMS was established following the 1996 WFS at the request of Member States, intended as a key step towards achieving the WFS Plan of Action goals in the fight against hunger in the world. FIVIMS stands for Food Insecurity and Vulnerability Information and Mapping System, and its potential function is to achieve a full mapping of food insecurity and vulnerability through disaggregated information that makes it possible to identify with precision those groups that are food-insecure in terms of lack of assets or income, as well as on other grounds.

FAO plays a major role in the operationalization and implementation of FIVIMS and has devoted considerable effort to making it a useful instrument in fulfilling the commitments made by states at the WFS.

Through the FIVIMS activities at the national and regional levels, states are encouraged and helped to carry out a more careful identification and categorization of the food-insecure and vulnerable population groups, improving understanding through cross-sectoral analysis of the underlying causes, and using evidence-based information and analysis to advocate for the formulation and implementation of policies and programmes that enhance food security and nutrition.

If food insecurity and vulnerability (FIV) information systems at the national and subnational levels could be strengthened and better integrated, they would provide better and more up-to-date information to the policy-makers and members of civil society concerned with food security issues at all levels in the country.

One problem is that many states, be it for reasons of lack of resources or limited commitments, have not cooperated to the degree hoped for. As a consequence, we are still far from a fully satisfactory map of those who are food-insecure, and we know even less about why exactly those groups have come into that problematic situation of insecurity or why they are unable to escape from it.

At the global level, efforts are made through FIVIMS to promote coordinated action among partner agencies in support of best practices in the development of national and regional FIV information and mapping systems. This has the potential to strengthen a global map of who the food-insecure and vulnerable people are, how many and where, and, hopefully, on that basis to have a better understanding of why those people are food-insecure or vulnerable.

Better information and knowledge on the underlying causes could lead to targeted action to ensure eradication of extreme poverty and hunger, provided there is a genuine recognition of responsibility to respect, protect and fulfil the right of everyone to be free from hunger.

Efforts have been made by FAO to use FIVIMS in the realization of the Millennium Development Goal 1 on the eradication of extreme poverty and hunger.

One such initiative was the project Strengthening Information Systems to Guide Action and Monitor Progress towards the Millennium Development Goals, part of the Food Security Cluster of the 2003 FAO–Netherlands Partnership Programme, which focused on the production of an analytical review of the coverage of FIV issues in Common Country Assessment (CCA) and Poverty Reduction Strategy Paper (PRSP) documents.

The main objective of this review was to encourage the inclusion of the FIVIMS approach into these strategic papers for a more complete integrated analysis of the countries' situations, and hence a better targeting of national sustainable development policies and programmes. Fifty CCA and 25 PRSP reports were examined in relation to their coverage of FIV information and cross-sectoral analysis. The review had three main conclusions: (i) both CCAs and PRSPs suffer a general deficiency in their analysis of the extent and the underlying causality of FIV and of poverty of specific population groups; (ii) in both types of country reports, there is a lack of consistency between, on the one hand, priority setting and analysis, and, on the other hand, policies, strategies and interventions aimed at alleviating FIV and poverty; and (iii) CCA reports and PRSPs start with different perspectives, but both result in similar policies, strategies and interventions irrespective of whether or not FIV or poverty is identified as a development priority.

The role of non-governmental organizations and networks

In recent years, there has been a strong growth of non-governmental organizations devoted to the promotion of the right to food. A pioneering role has been played by the FoodFirst Information and Action Network (FIAN), an international organization defending the human right to food with members in more than 60 countries in Africa, America, Asia and Europe. It works for the right of small farmers and landless peoples to feed themselves, for an end to world hunger and for food sovereignty. It organizes action alerts in cases of violations of the right to food (for example, eviction of farmers from land that they need to feed themselves).

An academic and professional network for the promotion of the human right to food has been promoted by the Norwegian-based International Project on the Right to Food in Development. Under the auspices of the Cátedra de Estudios Sobre Hambre y Pobreza at Cordoba University in Spain, international efforts are under way to expand the interaction between the academic community, the committed non-governmental organizations and the international agencies in promoting the right to food.

The International Alliance Against Hunger is a voluntary association of local, national and international institutions and organizations with a common mission – to eradicate world hunger and poverty through a combination of political will and practical action. The International Alliance Against Hunger also supports individual countries in setting up national alliances that will focus on their specific needs. So far, it has not fully grasped the opportunity to link up its work to the right to food and thereby facilitate the identification of responsibility and proper mapping. It is important that it mainstreams human rights, including the right to adequate food, and makes full use of the strategies for national implementation set out by the UN Committee on Economic, Social and Cultural Rights, and of the Guidelines adopted by governments under FAO auspices in 2004.

Recommendations

The Member States of FAO should ensure that the progressive realization of the right to food shall be a strategic objective of FAO in the context of the organization's reform, and should strengthen its Right to Food Unit.

FAO should encourage states to develop national plans regarding the right to food based on strategies that comply with the recommendations in General Comment 12 of the UN Committee on Economic, Social and Cultural Rights (UN, 1999).

FAO should redouble its efforts to persuade governments to conduct a thorough mapping of FIV, and in particular a mapping and assessment of changes taking place, with adequate disaggregation and causality investigation. This mapping should be incorporated into the preparation procedures of both CCA reports and PRSPs in order not only to support a comprehensive and well-structured analysis but also to pursue an effective and appropriately targeted policy for the eradication of food insecurity for the vulnerable groups identified by FIVIMS.

FAO should motivate states to address the social and political marginalization of vulnerable groups, to recognize the causes of their vulnerability and to take appropriate action.

In particular, FAO should encourage states to prioritize the effective support, in all forms, to local, agro-ecological models of small-scale farming production as a way to overcome hunger, as recommended by the IAASTD. In particular, states should be encouraged to:

- prioritize the promotion of small farmer agriculture and the livelihoods of indigenous peoples, giving special attention to the role and situation of women in food production;
- take measures to promote and protect the security of land tenure, especially with respect to women and vulnerable groups, with special attention to equitable land distribution, with agrarian reform if necessary, as mentioned in Article 11(2) of the *International Covenant on Economic, Social and Cultural Rights* and Guideline 8B of the Guidelines;
- support mechanisms to prevent the erosion and ensure the conservation and sustainable use of genetic resources for food and agriculture, including the promotion of traditional knowledge, biodiversity, and local and underutilized marginalized crops;
- take measures to strengthen local markets, shortening the chain from food production to food consumption;
- promote small-scale agriculture as an important source of employment and livelihood.

The Legal Department of FAO should, in cooperation with Right to Food Unit and with the UN High Commissioner for Human Rights, promote stronger national legislation against all forms of discrimination in access to food and improve the machinery for the enforcement of such legislation.

The Legal Department of FAO should encourage states to recognize the right to food in national legislation and make it judicially enforceable, and provide technical assistance for that purpose.

The Legal Department of FAO should, in cooperation with the Right to Food Unit, encourage states to develop legislation preventing enforced eviction of peasant farmers and strengthen their legal tenure of the land they have traditionally tilled.

FAO should, in cooperation with UNICEF and the World Health Organization (WHO),

promote measures that ensure that corporations comply with the WHO Code of Conduct on Marketing of Breast-milk Substitutes.

FAO should, in cooperation with the WTO, explore whether rules concerning international trade in agriculture cause any problems for state implementation of the right to food, and should press for changes if such incompatibility can be identified.

FAO should enhance the cooperation with the non-governmental organizations committed to freedom from hunger, and should encourage the International Alliance Against Hunger to take the right to food as a basis for its work.

ETHICAL ISSUES ARISING FROM AGROFUEL PRODUCTION (LIQUID BIOFUEL USED FOR TRANSPORT)

During the last decade, much interest has focused on biomass refined into biofuel (mainly ethanol and biodiesel) and used to power transport vehicles. It has been widely claimed that the use of biofuel for this purpose can contribute to the solution of a range of problems, both environmental and social in nature. In the following, the term “agrofuel” will be used to refer to large-scale, commercial production of liquid biofuel for transport. This is in order to distinguish this production from local usages of biofuel, whether in solid, liquid or gas form, for local use, which have entirely different social and economic consequences than does agrofuel for transport.

In the face of the growing threat of global warming caused by GHG emissions, it has been argued that agrofuel can partly or wholly replace petrol and lead to a significant reduction in such emissions. Another often-made claim is that agrofuel (most often referred to as biofuel) can provide a renewable, and therefore sustainable, energy source with positive consequences for the environment. Some also claim that production of agrofuel can increase agricultural incomes for the rural poor in developing countries.

If such achievements could indeed be realized, there would be a very strong ethical argument in favour of agrofuel production, but most of these claims are not justified. It is necessary to make a realistic assessment of any claims made in favour of agrofuel.

In recent years, grave concerns have emerged and, during the last year, have grown particularly in strength and significance. There are well-documented claims that there can be serious harmful environmental and social consequences of agrofuel production and that these have been grossly underestimated. It also appears that the alleged benefits of agrofuels have been exaggerated. The growing concerns are strikingly reflected in the title of a recent working paper for the Organisation for Economic Co-operation and Development: *Biofuels: is the cure worse than the disease?* (Doornbosch and Steenblik, 2007).

This debate has received increasing attention owing to the food crisis caused by a steep increase in prices without a corresponding increase in income for the food-insecure. One cause of this crisis arises from the production of agrofuel, which competes with food production for the use of land and water.

Agrofuel (liquid biofuel produced through agricultural processes) is primarily produced as ethanol or biodiesel. The feedstocks for ethanol are generally sugar cane and

maize, and to a lesser extent wheat, sugar beet and cassava. The feedstocks for biodiesel are oil-producing crops, such as rapeseed, palm oil and *Jatropha*.

Brazil pioneered the production of agrofuel well before the Second World War, using parts of its vast sugar-cane plantations for the production of ethanol. The second major producer is the United States of America, starting its production of ethanol from maize in the 1980s. Around the turn of the millennium, the European Union (EU) became heavily involved, mainly using rapeseed, and to a lesser extent soybean and sunflower oil, for biodiesel production. In 2006, Indonesia developed its own policy on the production and use of agrofuel.

The EU and the United States of America consume all of their own agrofuel production internally, but they are far from meeting their own targets of consumption through self-production. Therefore, they will be increasingly dependent on imports from developing countries if they are going to rely heavily on agrofuel. Demand in the EU and the United States of America for agrofuel has motivated substantial production in other countries, particularly in Indonesia and Malaysia, which both engage in biodiesel production from palm oil. Indonesia has also focused on agrofuel production from *Jatropha* plantations as part of a strategy to meet its own agrofuel needs.

As of today, agrofuel contributes only a tiny part to overall energy supply. In 2007, it provided only 0.36 percent of the total energy consumption in the world. To achieve this very modest fraction of the total energy use, 23 percent of United States coarse grain production was used to produce ethanol and about 47 percent of EU vegetable oil production was used to produce biodiesel (FAO, 2008a). It is estimated that in 2008 the ethanol share of the gasoline fuel market in the United States of America will be about 4.5 percent, with one-quarter of the coarse grain production in the country devoted to agrofuel. The US National Academies of Sciences made a calculation, using 2005 as an example, showing that even if all the corn and soybeans produced in the United States of America in 2005 had been used for bioethanol production, this would have replaced only 12 percent of the country's gasoline demand and 6 percent of its diesel demand (Muller, Yelden and Schoonover, 2007).

If consumption of agrofuel were scaled up enough to reduce the need for fossil fuel (petrol) significantly, enormous land areas would be required, with serious impacts on the environment and food security.

Environmental and social consequences of agrofuel production

Environmental harm

Monocultural production of feedstock for agrofuel can harm the environment in a number of ways. With the possible exception of sugar-cane production for ethanol, there is increasing evidence that when the whole life cycle of the production, distribution and use of agrofuel is taken into account, and when direct and indirect effects are counted, agrofuel production actually increases GHG emissions and thereby intensifies rather than mitigates global warming. In an article in *Science*, Fargione *et al.* (2008) presented research conclusions showing that: "Converting rainforests, peatlands, savannas, or grasslands to produce food crop-based biofuels in Brazil, Southeast Asia, and the United States creates

a 'biofuel carbon debt' by releasing 17 to 420 times more CO₂ than the annual greenhouse gas (GHG) reductions that these biofuels would provide by displacing fossil fuels."

The Joint Research Centre of the European Commission is now largely endorsing the view that large-scale agrofuel production raises rather than reduces GHG emissions. It has done so partly on the grounds that the GHG effects of the use of nitrogen fertilizers have been underestimated and partly because land-use changes could release such quantities of GHGs that they would negate the savings from EU agrofuels (De Santi, 2008).

Compounding these negative environmental effects of agrofuel production is the claim by critics that monoculture production is harmful to biodiversity, which in turn has considerable consequences for the necessary food diversity required for adequate diets. Furthermore, the production of agrofuel causes both competition for water and the pollution of remaining water resources. Palm oil for biodiesel is heavily dependent on water. The *Jatropha* bush is less dependent on water and can grow in marginal and dry areas, but its yield is low compared with when it is grown in more fertile land or with more access to water. It is likely that, even with *Jatropha*, the competition for water will be severe if large-scale commercial production is envisaged. Pesticides connected with agrofuel production are also reported to contaminate remaining water resources and give rise to health problems.

Impact on food security

The second issue with large-scale production of agrofuel is the impact on food security. In their paper prepared for the OECD, Doornbosch and Steenblik (2007) have argued that government policies around the world to replace oil with ethanol and other liquid agrofuels could draw the world into a "food-versus-fuel" battle. They focused in particular on the impact on food prices: "Any diversion of land from food or feed production to production of energy biomass will influence food prices from the start, as both compete for the same inputs." It is not only the conversion of traditional agricultural land that may spark the "food-versus-fuel" battle. Following conversion, areas such as forests and marginal land previously used as common-property resources, and which are traditional suppliers of food, fodder, fuelwood, building materials and other locally important resources, are now no longer available to communities.

Putting it starkly, the "food-versus-fuel" game makes it possible for a car owner in a developed country to fill a 50-litre tank with agrofuel produced from 200 kg of maize, enough to feed one person for one year (UN, 2007). The purchasing power of the car owner is vastly higher than that of a food-insecure person in a developing country; in an unregulated world market, there is no doubt who would win this game.

A major problem arising from extensive agrofuel production is its impact on the soaring food prices, which cause millions more people to suffer from hunger. One of the reasons for the impact on food prices is the price linkage between agrofuel and fossil fuel. This linkage has led to large-scale speculation in the futures market, and also speculation in land investments.

Concentration, eviction and the transformation of living conditions in rural areas are among the results of liquid agrofuel production and these have serious consequences for food security. Production of feedstock for agrofuel is by its very nature best suited for large tracts of land, and it is a monoculture production, with all its negative implications. Large-scale monoculture production opens the land for foreign and outside investors on an unprecedented scale. Traditional, small-scale agriculture in developing countries is not attractive for investors, but agrofuel is, as long as there is a guaranteed market. The implication of this is ominous – it may lead to a process of marginalization or eviction of smallholders to an unprecedented degree, either transforming them into badly paid workers or adding them to the swelling number of urban poor. The long-term consequences can be even more serious than the impact of the soaring food prices. The impact of marginalization of local communities on food security is examined more closely below in the case of Indonesia.

There are many other problems associated with the production of agrofuel. These include the particularly negative effect that the process of land concentration, monoculture and eviction or marginalization is likely to have on women's role in agriculture. In many developing countries, women have the most important role in both the production and preparation of food. An FAO study has analysed the risks that women will face if large-scale production of feedstock for agrofuel goes ahead (FAO, 2008b). The study argues that agrofuel production might contribute to the socio-economic marginalization of women and female-headed households in several ways. For example, large-scale plantations for such production require an intensive use of resources and inputs to which smallholder farmers, particularly female farmers, traditionally have limited access.

The above analysis should not be construed to imply that biofuel production is always harmful. It has only addressed large-scale agrofuel (liquid biofuel production for transport), where the main threats are land grabbing, concentration of land and competition with food production. Liquid biofuel produced for other purposes can have clearly positive consequences under certain specified conditions. It can provide improved access to modern forms of energy (electricity and other forms) in rural areas, and have positive impacts on food security (e.g. fewer health problems through reducing the use of fuelwood, access to water through bioenergy-propelled water pumps, and simple drying devices that reduce crop losses). Very encouraging examples are reviewed in a recent study (FAO–PISCES, 2009).

It is also not excluded that larger agrofuel projects can have a beneficial impact when organized in a proper way and provide safeguards to protect the poor and food-insecure, avoid harmful displacement of water resources, and ensure environmental sustainability by avoiding pollution and net increases in GHG emissions.

When more integrated food and energy systems (IFESs) are used, this can be an efficient means to reduce risks and promote opportunities related to liquid biofuel development. Integrated food energy systems are designed to integrate, intensify and thus increase the simultaneous production of food and energy in two ways:

- *By combining the production of food and fuel feedstock on the same land through mixed cropping and/or agrosilvipastoral systems. One example is the agropastoral system*

proposed by a public–private consortium project aimed at developing palm oil plantations in savannahs in Brazzaville (Congo). It involves integrating food crops between rows of oil-palm trees during the first years of the plantation, and switching to livestock grazing under the shade of the plantation at a later stage. A combination with the second type of IFES mentioned below, through the use of cattle manure to supply energy to the biodiesel processing plant, could even be envisaged.

- *By transforming the by-products of one system into the feedstocks for the other.* In this case, the major goal of the IFES is to maximize synergies between food crops, livestock, fish production and sources of renewable energy (e.g. biodigestion of by-products or waste). This is achieved by the adoption of agro-industrial technologies that allow maximum utilization of by-products, diversification of raw materials, waste production on a smaller scale, and encouraging recycling and economic utilization of residues, for harmonization of energy and food production.

Such systems can be fairly simple, such as the production of biogas at the farm level, or rather sophisticated, with recycling of waste as both energy feedstock and animal food, using residues for the production of biofuels. There are examples where leftovers from corn used to produce ethanol are afterwards used to feed the livestock, whose dung in turn is used to produce biogas, which generates electricity used in the ethanol plant and also for milk production.

Conclusion

Two key lessons stand out from the harmful environmental effects described above and from the soaring food prices that are having a devastating impact on vulnerable people. The first is that food availability is becoming an increasingly serious problem caused by land diversion to agrofuel production and by changing food habits in more affluent societies. Increased production will be necessary, but it will not address the problems of those who have no access to land and cannot afford the food on the market. Future intensification of agricultural production or expansion to formerly uncultivated land should focus on food production, not on agrofuel production, unless it can be combined with food production. The second lesson should be based on the awareness that prices will remain high for a long time, even though somewhat reduced from the present level. Taking into account the fact that hundreds of millions of people in developing countries will not be able to buy the food they need at such high prices, alternatives must be found. Initiatives should focus on two aims.

The first aim is to ensure adequate land and protect the assets of small farmers and peasants so that they may produce the necessary food for themselves, their families and the local market with low input costs. The second is to ensure that possibilities for small-scale and organic farmers are expanded significantly and receive national and international support.

For this purpose, certain forms of biofuel might turn out to be highly useful and should be welcomed. Efforts are now being made in some countries such as Indonesia to develop energy-sufficient local villages, where *Jatropha* production on a small scale is used to produce biofuel to power small electric generators providing local electricity. There are

other developments of a similar nature in other developing countries. These are indeed highly welcome developments because they contribute to an all-round local social and cultural development, and do not have the destructive consequences of large-scale plantations for commercial agrofuel.

Recommendations

To avoid the harmful environmental and human consequences and maximize the possible benefits from biofuels, international guidelines should be urgently developed for agrofuel production. The exact form of the guidelines is a matter to be explored through international negotiations. This is of increasing urgency as a result of the food crisis. Existing guidelines on special crops that can be used to produce agrofuel should be assessed for their strengths and weaknesses. All guidelines should complement, not contradict, one another and should not impose an unnecessary burden on those who produce biofuel in a socially and environmentally satisfactory way, particularly for purposes other than agrofuel.

With regard to the content of international guidelines for agrofuel production, FAO should encourage the following courses of action:

- Give priority to projects based on small-scale farming, possibly through cooperative arrangements, with a combination of biofuel and food production for local consumption, and projects that ensure stable and healthy working conditions, which ensure adequate dignity and independence of the worker.
- Avoid production of agrofuel in ways that lead to increased GHG emissions, when direct and indirect impact is taken into account, and/or production that diverts water from existing users and prevents previously existing access to water for drinking and sanitation, and/or which degrades the soil or pollute water or the local air conditions (e.g. by burning).
- Avoid introducing non-native species that carry risks of invasion before appropriate safeguards are adopted – full application of the precautionary principle is required.
- Abstain from measures that evict users of the land without negotiation and acceptable alternatives for the users, whether they have recognized tenure or not.
- Abstain from production of agrofuel wherever it can undermine previously existing opportunities for women to produce food or have access to fuelwood. Should agrofuel production be introduced in a given locality, alternatives must be established in advance that safeguard access for the local population to land for food production and to fuelwood or other means of cooking and heating to at least the same extent as before the introduction of agrofuel production.
- Establish legally binding certification schemes to ensure that the above requirements have been fulfilled and implement a reliable monitoring system to ensure that the international certification is effective and enforced.
- Develop adequate international regulation of financial markets to prevent the negative consequences of speculation associated with hedge funds and futures markets caused by the price link between agrofuel and fossil fuel.

ON INTELLECTUAL PROPERTY IN FOOD AND AGRICULTURE

During its four sessions, the Panel has examined with great concern the impact of the TRIPS Agreement, the system of protection sought by UPOV, and farmers' rights.¹

Among the core ethical issues in food and agriculture arising from the TRIPS Agreement are:

- the increasing risk of a transfer of important knowledge from the common domain (public goods) to the private domain, often controlled by corporations;
- the likely negative impact of the TRIPS Agreement on the livelihood of poor farmers;
- the uncertain impact on sustainable access to affordable, safe, nutritious food for consumers with limited income;
- the environmental impact, including the effect on biodiversity.

Intellectual property rights in agriculture

Intellectual property protection has been extended in the last 25 years to a wide range of information, materials and products relevant to food and agriculture. The US Supreme Court decision in *Diamond v Chakrabarty* influenced national legislation and case law in many jurisdictions, opening the door for the patentability of living organisms, including microbes, plants and animals and their parts and components. In addition, the TRIPS Agreement and, more recently, a growing number of free trade agreements (FTAs) promoted by the United States of America, European Free Trade Association (EFTA) and the EU have propelled the expansion of intellectual property protection to biological materials, particularly plants. Since 1995, 40 countries have adhered to the UPOV Convention for the Protection of New Varieties of Plants, which until then had had a membership essentially limited to developed countries.

The extension of IPRs to agricultural inputs and products raises a number of ethical concerns.

The foundations of intellectual property rights

A number of arguments based on natural justice or morality have been articulated to promote an expansion of IPRs in agriculture and other areas. The granting of IPRs has been historically justified on three different types of grounds:

- *Natural-rights-based proprietorism*: Under different variants (including theological and non-theological), this approach gives property interests a moral primacy. Property rights, including on abstract objects, are deemed to pre-exist the state and

¹ The TRIPS Agreement is Annex 1C of the *Marrakesh Agreement Establishing the World Trade Organization*, signed in Marrakesh (Morocco) on 15 April 1994 (see www.wto.org/english/tratop_e/trips_e/t_agm0_e.htm).

The International Union for the Protection of New Varieties of Plants (UPOV) is an intergovernmental organization with headquarters in Geneva (Switzerland). It is based on the International Convention for the Protection of New Varieties of Plants, as revised since its signature in Paris on 2 December 1961. The objective of the Convention is the protection of new varieties of plants by an intellectual property right (see www.upov.int/export/sites/upov/en/publications/conventions/1991/pdf/act1991.pdf). The Thirty-first Session of the FAO Conference adopted the finalized text of the International Treaty on Plant Genetic Resources for Food and Agriculture (available at www.planttreaty.org). This treaty is the outcome of several years of negotiations to revise the International Undertaking on Plant Genetic Resources, in harmony with the Convention on Biological Diversity.

to be simply recognized as a matter of natural justice. In some of its formulations, this theory or creed is grounded on the idea that a person who is first connected to an object with economic value is entitled to appropriate it.

- *Distributive justice*: Intellectual property rights, namely patents, have been regarded by some as a reward that the society is morally obligated to give to whoever introduces a new creation or invention. Although this conception is not based on the pre-existence of rights, it considers the granting of such rights a moral imperative, regardless of the economic and social implications of such a grant. It shares with the natural rights theory a strong individualistic bias.
- *Instrumentalism*: This approach conceives IPRs as a tool that society creates to attain objectives of its own choice. In fact, IPRs emerged several centuries ago as rule-governed “privileges”. Although they interfered in the negative liberties of others, such privileges were justified as necessary to achieve the objectives of certain societies. Under an instrumentalist conception, knowledge is by its very nature a public good and IPRs withhold the use of information from the common pool for practical reasons, not as recognition of pre-existing rights or as a morally due reward.

A properly applied instrumentalist approach should allow countries to design their IPR policies in accordance with their own conditions and objectives, including in the area of agriculture. However, in the last 25 years, a proprietary approach, sometimes associated to moral reward arguments, has influenced national legislation and case law as well as international developments. Some of the best examples of the influence of proprietaryism may be found in the area of IPRs applied to plants, animals, microbiological organisms and their parts and components, such as cells and genes.

Intellectual property rights and trade barriers

A large part of the population in developing countries depends on the production and sale of agricultural products. In accordance with the *World Development Report 2008*, agriculture is called to play a central role in achieving the Millennium Development Goal of halving extreme poverty and hunger by 2015. Gross domestic product originating in agriculture is deemed to be about four times more effective in reducing poverty than that originating outside the sector (World Bank, 2007).

The expansion of agricultural exports may contribute, if appropriate income distribution policies are in place, to reducing poverty and global income inequalities. During the Uruguay Round of the General Agreement on Tariffs and Trade, developed countries demanded acceptance of the TRIPS Agreement by developing countries as a quid pro quo to reduce their barriers to agricultural trade. In recent FTAs signed between the United States of America, EFTA, EU and several developing countries, the offer of preferential access to agricultural markets has also been the key card used to break such countries’ resistance to admit TRIPS-plus standards of IPR protection. TRIPS-plus standards are likely to have negative impacts, *inter alia*, on access to medicines, educational materials and technologies essential for development.

The Panel has also observed cases in which IPRs have been exercised by their title-holders in ways that generate inequitable outcomes. Overly broad claims interpretation and abusive measures at the border may result in developing countries losing income necessary to reduce poverty and implement development programmes.

Patents on living forms

Many national laws have recognized the possible conflict between the granting of patents and morality. Thus, the TRIPS Agreement expressly permits WTO members to “exclude from patentability inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect *ordre public* or morality, including to protect human, animal or plant life or health or to avoid serious prejudice to the environment, provided that such exclusion is not made merely because the exploitation is prohibited by their law.” (Article 27.2). The TRIPS Agreement also allows countries to exclude plants and animals from patentability (Article 27.3(b)).

The idea of appropriation of living forms through patents may be morally unacceptable, particularly when IPRs involve living forms found in nature and a private monopoly would impede access to a public good. In these cases, the very granting of a patent may be immoral, even where the commercial exploitation were morally unobjectionable.

Appropriation of traditional knowledge

Several cases of inequitable appropriation through patents of traditional and indigenous knowledge have been reported. The legal fiction that considers “novel” (and, hence, susceptible of being patented) unpublished traditional/indigenous knowledge generated and used in a foreign country has ethically unacceptable consequences. As elaborated by the Committee on Economic, Social and Cultural Rights in its General Comment 17 on Article 15(c) of the *International Covenant on Economic, Social and Cultural Rights*, the moral and material interests of peoples, communities or other groups in their collective cultural heritage constitutes a fundamental right that needs to be protected by states (UN, 2006).

Test data protection

Undisclosed test data related to agrochemicals that contain new chemical entities should, under certain circumstances, be protected against unfair competition in accordance with international rules (Article 39.3 of the TRIPS Agreement). Although these rules do not require the granting of exclusive rights, in some countries and, notably, in the context of FTAs recently established with some developing countries, such test data cannot be used or relied on for at least ten years (from the date of marketing approval) even in cases where the relevant product is off-patent. This form of “data exclusivity” restrains competition and leads to higher prices for inputs that farmers in developing countries need, eventually making them uncompetitive and forcing them out of production. Such exclusivity may in practice amount to another impoverishing trade barrier, as morally objectionable as other barriers that restrict agricultural exports from poor countries.

Recommendations

FAO should promote awareness among policy-makers and the judiciary that, by its very nature, knowledge is a public good and that IPRs are tools that society uses to promote innovation and creation. The recognition of such rights is not a matter of natural justice or moral rewards. Any reform of IPR regimes should clearly identify its objectives and possible beneficiaries, and be undertaken after a careful assessment of the development impact of the new proposed rules.

Noting that the relentless march towards increased levels of IPR protection puts at risk agricultural production and exports necessary for social and economic development, FAO should object to coercion of developing countries aimed at adopting TRIPS-plus standards that are inconsistent with these countries' development needs, such as the obligation to grant patents on plants or data exclusivity. Similarly, IPR holders should be called on to exercise their rights in accordance with ethically acceptable norms, and not to impose undue barriers to trade in agricultural products originating from developing countries.

In determining patenting policies, FAO should call on governments to assess cautiously the ethical implications of the appropriation of living forms, and be aware of the room available under the TRIPS Agreement to prevent the patenting of morally unacceptable subject matter as well as, more generally, of animal and plants. Some of the situations that would require an ethical review include:

- unpredictable or undesirable dissemination of organisms or genes claimed in patent applications that may affect agricultural development and sustainability;
- the acquisition of patent rights that may stimulate the development of technologies that generate suffering of animals or risks to the sustainability of farming practices and agriculture;
- the patentability of materials discovered in nature, not "invented" by the applicant;
- patents on genes that cover all possible functions thereof, including those not discovered by the patent applicant;
- overly broad patent claims such as those drafted in functional terms (covering all ways of addressing a problem), which extend protection to entire species or reach back to parent breeding lines or unimproved germplasm contained in relatives of a patented cultivar;
- patents covering plant varieties that prevent their use as a source of further varietal improvement;
- patents over plant materials that restrict farmers' rights to save and re-use seeds in accordance with their traditional practices;
- the use of border measures in a way that unduly restrains legitimate trade in agricultural products, particularly from developing countries.

FAO should request governments to review patent policies that allow the appropriation of indigenous/traditional knowledge. They should, in particular, adopt measures to ensure the effective protection of the interests of indigenous peoples relating to the expressions of their cultural heritage and traditional knowledge.

More generally, the system under the TRIPS Agreement should be improved through

measures to ensure that there is no misappropriation of genetic resources in the public domain by enterprises and plant breeders. Patents should be given only for a genuine invention that has created a biological product significantly different from any that existed before, and the patent should cover only the inventive step itself, nothing beyond it.

Intellectual property rights, including on test data for agrochemicals, should be implemented in a way that contributes to agricultural production and poverty reduction through access to required inputs at affordable costs. Governments should avoid implementing legal regimes that create exclusivity over the use of such data.

FOOD SECURITY TO MEET DIETARY NEEDS FOR ACTIVE AND HEALTHY LIVES; ETHICAL CONSIDERATIONS IN CONNECTING ELEMENTS OF FAO'S MANDATE

FAO is required under its Constitution of 1945 to collect, analyse, interpret and disseminate information relating to nutrition, food and agriculture. For many years, initiatives focusing on these various elements followed their own, specialized and mostly unrelated paths. In the FAO Secretariat, nutrition was left more or less isolated in a division conducting its work rather independently of what happened in the other parts of the organization. In the light of the implications for people's diet and nutrition of globalization processes as discussed below, the recent institutional reform within FAO, which has placed nutrition together with consumer protection in the Agricultural and Consumer Protection Department, should encourage stronger linkages with production issues besides emphasis on consumer protection for good nutritional health in the age of globalization.

In 1996, the Heads of State and Government at the WFS agreed on a definition of food security in a way that points to an explicit connection between the various mandates of FAO according to its Constitution.

... Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. ...

World Food Summit Plan of Action, Para. 1 (FAO, 1998)

The food security concept thus defined can serve to connect the fundamental tasks of the Organization related to food production, distribution and access, encompassing the interests of both producers and consumers, and the concern with sustainable environment. The Panel recommends that FAO use the food security definition systematically and encourage Member States to do so in the formulation of their agricultural as well as their food and nutritional policies.

In particular, the recognition that agricultural production should aim at providing "nutritious foods" to meet the "dietary needs" underlines the fact that a primary purpose of agriculture and food handling is to facilitate matters so that all people can eat satisfactorily in the pursuance of health and absence of disease and thereby lead an active (implying also productive) life. This should guide the production/processing/distribution chain and serve as a point of departure for checking whether developments in agricultural and food supply policies really serve the meaning and purpose expressed in the 1996

definition. A second major purpose of agriculture is to provide an adequate livelihood and income for rural people, focusing on their ability to feed themselves and having the necessary means to procure what they cannot themselves produce as well as to cover their other basic needs.

Most agricultural and rural planning has assumed that these goals would be the result over time of agricultural development, possibly by a trickle-down effect in the long run. It should, however, be an immediate concern. As the British economist John Maynard Keynes said in 1923: “The long run is a misleading guide to current affairs. In the long run we are all dead.” Waiting for things to happen can, particularly for young children, be disastrous even in the short run. Their “window of opportunity” for healthy nutritional development is set from their life within the womb of the mother until they are two years of age.

The IAASTD (2009) finds it important to put consumers and their dietary and nutritional needs and preferences at the centre of what should drive the decisions on agricultural policy and food production, and hints what might happen if this is not done:

Despite the evident and complex links between health, nutrition, agriculture, and AKST² improving human health is not generally an explicit goal of agricultural policy. AKST policies and practices have increased production and new mechanisms for food processing. Reduced dietary quality and diversity and inexpensive foods with low nutrient density have been associated with increasing rates of worldwide obesity and chronic disease. Poor diet throughout the life course is a major risk factor for chronic diseases, which are the leading cause of global deaths. There is a need to focus on consumers and the importance of dietary quality as main drivers of production, and not merely on quantity or price. Strategies include fiscal policies (taxation, trade regimes) for health-promoting foods and regulation of food product formulation, labelling and commercial information.

Johns and Sthapit (2004), who work with plant genetic resources, have examined the profound dietary changes and drawn attention to negative implications of the rapid changes in nutrition and health priorities in developing countries through the processes of the “nutrition transition” as further discussed below. They point out that:

Healthy diets for populations depend on availability and accessibility, within a context that promotes and supports healthy behaviors, of a variety of plant and animal foods. Although both these resources and positive behaviours are characteristic of traditional food systems, contemporary trends simultaneously erode biodiversity and the sociocultural context in which it is conserved.

Dietary change and nutritional health – a challenge to integrated public nutrition policies

The Panel has considered three dimensions of dietary change and consequences for nutrition-related health, and corresponding ethical implications for public nutrition measures for which FAO should serve as ambassador:

- poverty-related malnutrition in the “nutrition transition”, including the global rise of obesity and related chronic diseases;

² AKST: agricultural knowledge, science and technology.

- the role of the corporate food sector in marketing non-healthy foods and recent attempts to control their behaviour;
- “nutrigenetics” and “nutrigenomics” for personalized diets – legitimate tools in forming individual tailor-made food choices, or diverting attention from public nutrition responsibilities?

Poverty-related malnutrition in the “nutrition transition”, including the global rise in obesity and related chronic diseases

The WHO has defined “malnutrition” as encompassing all forms of ill health from inappropriate eating, thus undernutrition, overnutrition (especially of cheap energy-dense, nutrient-poor foods with resulting obesity [conditioning many chronic diseases]), and micronutrient deficiencies. The WHO warns that undernutrition and overnutrition problems and diet-related chronic diseases already account for more than half of the world’s diseases and hundreds of millions of dollars in public expenditure. Chronic non-communicable diseases account for tens of millions of deaths worldwide due to heart disease, stroke, cancer, diabetes and obesity.

A complex range of factors interacts to determine the nature and course of this evolving epidemic of chronic non-communicable diseases, which includes changes in food consumption patterns, habitual diets and life styles – together called the “nutrition transition”. While these diseases used to be associated with industrialized countries and the better-off in developing countries, they are now clearly associated with poverty for large numbers of people. Such diseases can now be seen side by side with undernutrition, especially of children, in the same family. Increased consumption of cheap calories from fat and sugar combined with a more sedentary lifestyle, particularly associated with urbanization, has led to a rapid rise in obesity.

Scientific documentation is found in the report of a group of independent experts jointly commissioned by the WHO and FAO and released in 2003 (WHO–FAO, 2003). The report led to the Global Strategy on Diet, Physical Activity and Health, adopted by the World Health Assembly in May 2004, which seeks to deal with these challenges and to which FAO has contributed.

Ethics require attention to the factors causing rising obesity, especially in regard to the diet of children and adolescents in the nutrition transition. The upward trend in obesity and associated diet-related non-communicable diseases in developing countries would undermine gains in development and efforts to tackle hunger and malnutrition. While hunger and poverty remain overriding priorities, the growing incidence of obesity in developing countries through the globalization of consumption and lifestyles of developed countries raises new challenges for the right to food and nutrition.

According to the WHO, there are now more than one billion overweight people in the world, and obesity is considered a world epidemic. Two out of three overweight and obese people now live in developing countries, the vast majority in emerging markets and transition economies.

By 2010, more obese people will live in developing countries than in the developed world.

Findings of a study in China revealed a disturbing increase in overweight and obesity from data collected in a national nutrition and health survey in 2002 (Wu, 2006). About 20 percent of the world's overweight or obese are Chinese.

Unhealthy diets and physical inactivity are among the leading causes of cardiovascular disease, type-2 diabetes and certain types of cancer. There are multiple reasons for the increase in overweight and obesity in developing countries (changes in diet, physical activity, health and nutrition).

The Panel notes that, according to its Constitution, FAO shall “promote and, where appropriate ... recommend national and international action with respect to scientific, technological, social and economic research relating to nutrition, food and agriculture and to the improvement of education and administration relating to nutrition, food and agriculture, and the spread of public knowledge of nutritional and agricultural science and practice.”

The role of the corporate food sector in marketing non-healthy foods, especially to children, and attempts to control their behaviour

Irresponsible marketing behaviour by some parts of the transnational corporate food industry and related advertising companies has been found to contribute to malnutrition caused by marketing cheap, energy-dense and nutrient-poor diets, and thereby to the growing prevalence of obesity in most parts of the world, which is in turn associated with many so-called chronic nutrition-related diseases: diabetes, cardiovascular diseases, cancer and high blood pressure.

Other factors are at play, such as sedentary lifestyles with diminished physical activity (especially during urbanization).

Of particular concern is the marketing pressure directed at children and youth for whom exposure to such marketing can establish eating patterns and physiological processes that may be difficult to change later:

As a result of increasing evidence that advertising induces children to eat too much of the wrong kinds of food, food marketing has emerged as an obvious target for action. Food (including beverage) companies have come under increasing pressure to produce more nutritious products and to market them more responsibly, and many have promised to do so. No agency, however, holds food companies accountable for such promises. (Lewin, Lindstrom and Nestle, 2006)

Some recent studies have observed and concluded:

- The overwhelming majority of food product advertisements seen on television by United States children and adolescents are of poor nutritional content (Powell *et al.*, 2007).
- Branding of foods and beverages influences young children's taste perceptions. The findings are consistent with recommendations to regulate marketing to young children (Robinson *et al.*, 2007).
- The practice of “supersizing” (presenting the option of larger portion sizes at minimal additional cost) started by the United States food industry in the 1970s, and now widely criticized, is spreading to developing countries (Witkowski, 2007).
- With regard to the spread of global retailers such as Carrefour and Wal-Mart – the combination of greater availability and variety (of food products) with lower prices

at the wholesale and retail levels makes it possible for less affluent consumers to increase their energy intake (Witkowski, 2007).

- A Consumers International report (2004) for India, Indonesia, Malaysia, Pakistan, the Philippines and Republic of Korea found a substantial increase in commercials for foods high in fat, sugar and salt. In India, 40–50 percent of television advertisements shown during children’s programming were for food. In Malaysia, Pakistan and the Philippines, the percentages varied between 50 and 75 percent.

It is important to take note of the following considerations:

- The marketing activities have a strong impact on shaping preferences of young children and adolescents, according to recent evidence-based studies both in industrialized and developing countries, and the impact is stronger the more aggressive is the marketing behaviour.
- Voluntary or self-regulatory initiatives in the advertising and marketing of food and beverage products have been shown not to be effective.
- Claims of “healthy” foods or “free”, “low” or reduced calories, total fat, saturated fat, sodium or sugar are often inadequate or even misleading.
- “Science-based” standards and criteria are often fraught with economic considerations and the interests of industry, as seen in the sugar debate triggered by the WHO–FAO report *Diet, Nutrition and the Prevention of Chronic Diseases* (WHO–FAO, 2003);
- There are often double standards in the level of information provided to consumers in developed and developing countries.

A “European Network on reducing marketing pressure on children” was established under the auspices of the WHO Regional Office for Europe in collaboration with the Government of Norway in January 2008 and now counts 14 countries in the region as members, with a few UN agencies (including FAO) and voluntary organizations as observers. The members want to work together to find ways to reduce the marketing pressure on children for energy-dense, micronutrient-poor foods and beverages. Two working groups have been established to work on, respectively: (i) ways in which marketing regulation may be carried out in practice, including an examination of the content of regulations, aims and various approaches to regulation; and (ii) monitoring systems, entailing an assessment of various ways to monitor marketing, both in terms of extent and how marketing is done.

“Nutrigenetics” and “nutrigenomics” for personalized diets – legitimate tools in affecting individual choices, or diverting attention from public nutrition responsibilities?

The newest and so far most exotic approach to choices of food and nutrients according to needs is that informed by the variation in individual persons’ gene expression vis-à-vis dietary factors (GeneWatch, 2006). Nutrigenomics refers to the application of genomics in nutrition research, enabling associations to be made between specific nutrients and genetic factors, e.g. the ways in which foods or food ingredients influence gene expression. Nutrigenetics is the study of how individual differences at the genetic level influence response to diet. These individual differences may be at the level of single nucleotide

polymorphisms, i.e. variations in a single base pair, rather than at the gene level. To some extent, the terms are used interchangeably.

GeneWatch UK asserts that the *focus* of commercial interest in nutrigenomics is in achieving two overlapping aims:

- developing new food products that can be marketed as providing health benefits to consumers (“functional foods”);
- *individualizing* diet, tailoring our diets to our genes and perhaps to other biological measurements.

The implied *health strategy* behind nutrigenomics depends on several assumptions:

- “*personalized nutrition*”, based on individual biological differences, should be the ultimate aim of nutrition research;
- people’s risk of obesity and of developing chronic diseases is different depending on their individual genes and other biological factors, and these differences can be identified and the risks quantified;
- people should therefore be tested to find out their genetic make-up, and perhaps monitored for other biological changes, and advised to eat different foods (or take different supplements) depending on the results;
- doing as indicated above will reduce their individual risk of common diseases and also reduce the incidence of obesity and chronic conditions in the population as a whole;
- people will want to take genetic tests, and perhaps other types of tests as well, and will change their diets as a result;
- this approach to health will be affordable, cost-effective and socially acceptable.
- Ethical issues fall into several categories. Below, the Panel lists and comments on those it finds most important.

Why nutrigenomics? Might an emphasis on nutrigenomics distract from other key issues, such as the right to food?

Insofar as nutrigenomics requires large amounts of investment, a “personalized diet” may be implemented primarily in richer countries, where it would not directly be a threat to the right to food. However, poorer countries may still be liable to domination by the companies involved.

Might nutrigenomics be used for public health goals?

A focus on personalized nutrition is arguably not a strategy most likely to further public health goals. Public health goals would rather need to focus on prevention and management of nutrition-related diseases, so identifying susceptible population and focusing on their needs. Identification of the potential impact on global food security would be an important prerequisite. Problematic is also the presentation of potentially confusing advice in the media on healthy consumption, especially when new technologies are involved.

Could nutrigenomics be used to benefit particular population groups?

A focus on population groups might be more helpful than an emphasis on personalized nutrition, analogous to the strategy for pharmacogenomics outlined by Daar and Singer

(2005) where they criticize the “boutique” model of drug development and argue for resuscitation of abandoned drugs, informed by genomic research, for population groups (sorted by geographical ancestry) in developing countries. Although the flaws in this proposal have been pointed out by Holm (2006), there is an analogous point to be made about the difference between a “boutique” approach to food and one that focuses on groups, whether these are defined in terms of geographical ancestry or in some other way, e.g. groups who are undernourished or who are suffering from eating disorders. Here the relationship between nutrigenomics and taste becomes relevant. Given individual differences in perceptions of bitterness, which may have a genetic basis as well as being due to differences in age and ethnicity, the identification of these factors may facilitate the development of food products particularly suited to particular population groups.

The different kinds of groups at stake need to be considered. There are groups identified by disorders, such as (in the nutrition context, groups of patients with single-gene disorders such as phenylketonuria); then there are groups identified as being at higher than average risk of developing diet-related diseases (e.g. diabetes type 2), where there may be multiple factors involved; groups with allergies, and so on.

However, populations may also be categorized according to nutritional status, e.g. undernourished or not, overeating (who may still be undernourished) or not, or according to specific needs of other sorts – nutrigenomics may be regarded as particularly helpful, for example, for sportspersons. There may also be applications relating to taste and appreciation of food. These could also have health-related side-effects, such as enhancement of taste experiences for those who need to be encouraged to eat more. This may be useful in designing food products for particular population groups. Elderly people, for example, may have specific needs in this regard.

What is the relevance of cultural differences?

This question has two aspects. The first is that nutrigenomics itself might be seen as expressive of a particular cultural perspective, with optimal or enhanced health as an aim. This might be described as a form of “health-ism”. In principle, however, there is no reason why nutrigenomics should aim at health rather than, for example, an increased enjoyment of taste, although this could also be culturally specific.

An additional point might be whether nutrigenomics research results from one culture, with one specific set of standard staple foods, can be transferred to other cultures with completely different sets of staple foods or whether gene–environment interactions are sufficiently complicated to undermine transferability. There might be a risk of providing harmful advice.

What would be the requirements for an ethically robust policy on nutrigenomics?

There would need to be a secure evidence base, establishing the associations between genetic factors and dietary response; this would require large-scale biobank research applicable to the context in which results are to be implemented. In research priorities, public health dimensions should be prioritized, including research into population

variation in response to diet in affluent and poor populations. Food and health should be recognized as individual and collective rights.

Public health strategies should also involve environmental strategies including sustainable food production (i.e. not over-emphasizing genetic aspects, while giving them their due), as well as investigation of other technological possibilities such as functional foods.

There is reason for FAO to be aware of these developments as they will no doubt continue. Otherwise, few direct actions are foreseen for the Organization as such, except to be aware that parts of the commercial sector in both pharmaceuticals and nutrition are tempted to promote new but merely insignificant and costly “solutions” to very complex problems regarding household food security and nutritional health.

Preserving or resurrecting closer interfaces between producers and consumers

In several developed countries, including the United States of America, “farmers’ markets” have increasingly become an integral part of the urban/farm linkage and have continued to rise in popularity, mostly owing to the growing consumer interest in obtaining fresh products directly from the farm. These markets enable farmers to develop a personal relationship with their customers, and cultivate consumer loyalty with the farmers who grow the produce. Reportedly, there are more than 4 300 farmers’ markets operating throughout the United States of America.

Attention to *integrated* food production–processing–distribution–consumption systems is necessary, and would make the many proposals for closer alliances between producers in the South and the North more realistic and meaningful.

In developing countries, the typical local markets in many rural and partly also in urban settings are traditional farmers’ markets. The distribution chains in many towns and cities also have their processing links in terms of street vendors. These realities are now under threat both as a source of income for some and as a neighbourhood site of access to food without too many interfering “value-adding” links that increase the transaction costs for the consumer and therefore also reduces the price obtained by the producer.

Local solidarity partnerships between producers and consumers appear to be spreading worldwide with a view to: maintaining and expanding peasant agriculture; enhancing local, regional and national protection of the access to food (often referred to as food sovereignty); improving health through food and fight against hunger and malnutrition; developing social networks of solidarity between producers and consumers and between people in urban and rural communities; and combating exclusion and poverty through the building of solidarity networks whether in rural peasant or urban contexts, or by bringing them together.

Recommendations

Taking into account the implications for people’s diet and nutrition of several dimensions of the globalization processes, the Panel recommends that FAO place a stronger emphasis on consumer protection for good nutritional health in the age of globalization. This should

address *both* the production issues and measures to protect consumers, with a view to promoting their human right to adequate food and good nutritional health.

FAO has a clear ethical commitment to promote a diverse diet including traditional foods, which are generally balanced and high in nutrition. Taking into account that resources invested by the food industry to market their products can outweigh the resources of national governments to promote nutritional education and communication, FAO should encourage worldwide cooperation in developing market regulations that reduce marketing pressure for energy-dense, micronutrient-poor foods and beverages, particularly in regard to children.

FAO should be aware of the criticisms raised against the trends towards nutrigenomics, and should encourage its promotion only in cases where it can be used for the benefit of specific population groups, whether these are defined in terms of geographical ancestry or in some other way – e.g. undernourished or suffering from eating disorders.

FAO should encourage policies and studies that make it possible to *retain and strengthen, where appropriate, farmers' markets* in developing countries to serve as the closest link between the sites of production and the points of purchase for consumers. ●

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Annexes



Annex 1

TERMS OF REFERENCE of the Panel of Eminent Experts on Ethics in Food and Agriculture

The Panel of Eminent Experts on Ethics in Food and Agriculture shall advise the Director-General on ethical issues in food and agriculture, including forestry and fisheries. The Eminent Experts shall be appointed by the Director-General under the terms of Article VI.4 of the FAO Constitution and Rule XXXV of the General Rules of the Organization and the guidance provided by the Conference.

Composition

The Panel shall consist of eight Eminent Experts designated in their personal capacity by the Director-General, in accordance with established procedures and practices for a period of four years. The Eminent Experts shall be of recognized competence in ethics, philosophy, humanities or a relevant economic, legal or scientific discipline with experience of ethics, and be of high moral authority and international or regional standing. The Panel shall, as far as practical, represent varied geographical, cultural and religious backgrounds.

Terms of Reference

1. The Panel of Eminent Experts shall reflect on and promote reflection on ethical issues arising from food production and consumption practices and on agricultural development, including forestry and fisheries, in the context of food security and sustainable rural development and in an environment of rapid global change.
2. The Panel shall, in particular, consider ethical issues relating to the interests of present and future generations regarding the sustainable use of natural resources, the safeguarding of biodiversity and the balanced mix of traditional and modern technologies to increase food security and sustainable agriculture.
3. Based on the above considerations, the Panel shall:
 - a. promote an overall sense of international responsibility with regard to the development of necessary policies and instruments aimed at maximizing global benefits, while minimizing risks, arising from the application of modern technologies to food and agriculture;
 - b. seek to increase the awareness of States, intergovernmental organizations,

- nongovernmental organizations, civil society and public opinion worldwide with regard to ethical issues in food and agriculture in order to promote international understanding and appropriate action on such issues, bearing in mind that different communities have different cultural values;
- c. advise on possible international, regional or national action or the preparation of instruments, as appropriate, to respond best to ethical issues arising from food and agriculture, with due regard to interdependence among generations, among countries and between food security and other community needs;
 - d. encourage exchange of information on all issues of an ethical nature arising out of food and agriculture.
4. The Panel may consider any other issue related to the above.
 5. In its consideration of the above, the Panel shall advise the Director-General on the possible role and policies of FAO. ●

Annex 2

BIOGRAPHICAL NOTES **on the Panel of Eminent Experts on Ethics in** **Food and Agriculture** **2004–07**

Francisco J. Ayala (United States of America)

Francisco Ayala was a member of the Panel of Eminent Experts on Ethics in Food and Agriculture 2000–03. He was born in 1934 in Madrid, Spain, but has been a United States citizen since 1971. He is Professor of Biological Sciences and of Philosophy at the University of California at Irvine, and a former president and chair of the Board of the American Association for the Advancement of Science. He was a member of President Clinton's Committee of Advisors on Science and Technology. In 2002, he received the National Medal of Science from President Bush. He is the author of more than 850 articles and 20 books. His scientific research focuses on population and evolutionary genetics, including the origin of species, genetic diversity of populations, the origin of malaria, the population structure of parasitic protozoa and the molecular clock of evolution. He also writes about the interface between religion and science, and on philosophical issues concerning epistemology, ethics and the philosophy of biology.

Ruth Chadwick (United Kingdom)

Ruth Chadwick is Professor of Bioethics and Director of the ESRC Centre for Economic and Social Aspects of Genomics at Lancaster University. She holds a B.Phil. in Philosophy and a D.Phil (on "The ethics of eugenics and genetic engineering"), both from Oxford University; and an LLB from London University. She held positions in Liverpool, Cardiff and Preston before moving to Lancaster in 2000. She has coordinated a number of projects funded by the European Commission, including the Euroscreen projects (1994–96; 1996–99) and co-edits the journal *Bioethics* and the online journal *Genomics, Society and Policy*. She is Chair of the Ethics Committee of the Human Genome Organisation and a member of the Food Ethics Council, the Advisory Committee on Novel Foods and Processes and the Biotechnology and Biological Sciences Research Strategy Panel on Biosciences for Society. She was editor-in-chief of the award-winning *Encyclopedia of Applied Ethics* (1998). She is an academician of the Academy of the Learned Societies for the Social Sciences and a partner in the North West Genetics Knowledge Park.

Chee Yoke Ling (Malaysia)

■ Born in 1959, Chee Yoke Ling is a lawyer trained in international law, with a Masters of Law from Cambridge University and a first-class honours in Law from the University of Malaya. She is Legal Advisor to the Third World Network, an international coalition of organizations and individuals that aims to articulate the sustainable development needs and perspectives of developing countries at the global level. For more than 20 years, Chee Yoke Ling has been very active on a national level in policy research and advocacy, focusing on trade, environment and development issues, working with local communities. For the past ten years, she has been a key non-governmental organization player at the international level, representing the Third World Network in many international conferences and meetings, including at the United Nations, the Commission on Sustainable Development, and at several trade and investment seminars. Of particular concern in her work are the ecological, social and economic impacts of globalization, especially in the developing countries of the South.

Carlos María Correa (Argentina)

■ Born in 1949, Carlos María Correa is a lawyer and economist. He is a professor at the University of Buenos Aires and has taught in universities all over the world in legal and economical matters related to North–South cooperation. He is well known for his sensitivity to ethical issues and the interest of developing countries. He has, on several occasions, been a consultant in the negotiating process of the International Treaty on Plant Genetic Resources. He has also been a consultant in many other United Nations organizations. He has taught post-graduate international training courses, including in international trade and the World Trade Organization (graduate), political economy of science and technology (post-graduate), economics of intellectual property (post-graduate), patent law (post-graduate), and WTO multilateral trade agreements (post-graduate). He is Chair of the Genetic Resources Policy Committee of the Consultative Group in International Agricultural Research, a member of the World Health Organization Commission on Intellectual Property Rights, Innovation and Public Health, established by the World Health Assembly in February 2004, and director of the project on Intellectual Property and Development of the South Centre. He was one of the six members of the International Commission on Intellectual Property Rights established by the Government of United Kingdom (www.iprcommission.org), which culminated with the 2002 publication of its milestone report, *Integrating Intellectual Property Rights and Development Policies*, which included several chapters dedicated to agriculture and many ethical considerations. He was previously director of the United Nations Development Programme/United Nations Industrial Development Organization Regional Program on Informatics and Microelectronics for Latin America and the Caribbean (1991–95), Undersecretary of State for Informatics and Development of the Government of Argentina (1984–89), coordinator of the

Inter-Ministerial Group on Intellectual Property of the Argentine Government (1987–89) and a lawyer and private consultant, specialized in intellectual property, investment and negotiation of international transfer of technology agreements (1976–1984).

Souleymane Bachir Diagne (Senegal)



Born in 1955 in Saint-Louis, Senegal, Souleymane Bachir Diagne is Professor at the Department of Philosophy, Northwestern University, Evanston, United States of America. He obtained his Ph.D. (Doctorat d'État) from Sorbonne in 1988. He is a philosopher of logic, including mathematical logic, and has also taught philosophy at secondary level. He was Special Adviser to the President of Senegal for cultural and educational policy (1993–99) and Preceptor of the Institute for Advanced Study and Research in the African Humanities (April–June 1999). Among other affiliations, he is a co-director of *Ethiopiennes* (a Senegalese journal of literature and philosophy), a member of the editorial board of *Présence Africaine*, Member of the Council for the Development of Social Science Research in Africa, a member of the African Scientific Committee on Higher Education and a member of the “Conseil du Futur” (UNESCO). He has been the editor of and contributor to numerous books and the author of a great number of articles on African, Islamic and Southern philosophy, science and culture, among other issues.

Asbjørn Eide (Norway)



Member and Chair of the Panel of Eminent Experts on Ethics in Food and Agriculture from 2000, Asbjørn Eide is the former director and now senior fellow of the Norwegian Centre for Human Rights, University of Oslo, and a visiting professor at the University of Lund. He is the former Secretary-General of the International Peace Research Association. He is a member and former Chair of the United Nations Sub-Commission on the Promotion and Protection of Human Rights. He has been the Special Rapporteur of the Sub-Commission on the Right to Food as a Human Right, and Chair of the UN Working Group on Minorities. He has also been President of the Advisory Committee on National Minorities of the Council of Europe. He has published extensively on human rights issues and is Dr. juris h.c. of the University of Lund.

Cecilia A. Florencio (the Philippines)



Cecilia Florencio is a nutrition scientist and educator. She obtained her Ph.D. from Michigan State University. She holds the highest academic rank in the University of the Philippines, where she also chairs the University Council's Committee on Academic Integrity and Accountability. She is president of a human rights organization, FoodFirst Information and Action Network, the Philippines, and a member of the World Health Organization's Virtual

Network of Experts to Assist in the Implementation of the Global Strategy on Diet, Physical Activity and Health. She is a fellow of the International Union of Nutritional Sciences and member of the advisory board of several nutrition journals in Asia and United States of America. She is a former member of the Governing Board of the Philippine Nutrition Council and consultant in nutrition of international agencies and educational institutions, including the United Nations University. Her areas of research work are: development and evaluation of national/regional nutrition policies, plans and programmes; local people's knowledge; nutrition education and training; ethics in academe; and the human right to adequate food. Her most recent publication is the book *Nutrition in the Philippines: the past for its template, red for its color*.

Tewolde Berhan Gebre Egziabher (Ethiopia)

■
Tewolde Berhan Gebre Egziabher is a well-recognized, charismatic African leader in matters related to ethics, agriculture and the environment. He was born in 1940, graduated in 1963 from the University of Addis Ababa and took a doctorate from the University of Wales in 1969. He was Dean of the Faculty of Science at the University of Addis Ababa (1974–78), Keeper of the National Herbarium (1978–1983), President of Asmara University (1983–1991) and Director of the Ethiopian Conservation Strategy Secretariat (1991–94). Since 1995, he has been Director-General of the Environmental Protection Authority of Ethiopia. He has often represented his country and acted as spokesperson for the whole of Africa in international negotiations dealing with major international instruments, such as the Convention on Biological Diversity, its Cartagena Protocol on Biosafety, and the International Treaty on Plant Genetic Resources. In 2000, he received the Right Livelihood Award "... for his exemplary work to safeguard biodiversity and the traditional rights of farmers and communities to their genetic resources". ●

Annex 3

AGENDA

for the fourth session of the Panel of Eminent Experts on Ethics in Food and Agriculture

1. Opening and welcome statements
2. Adoption of the agenda and timetable
3. (a) Ethical issues in globalization (in relation to food and agriculture) from a Third World perspective
(b) The loss of crops in a changing world
4. Interfaces between combating malnutrition, marketing and promotion of food, and the shaping of diet and food practices
5. Ethical significance of the FAO *Voluntary Guidelines to Support the Progressive Realization of the Right to Adequate Food in the Context of National Food Security*
6. Bioenergy, food security and the right to food
7. Ethics and intellectual property in the context of food and agriculture

Annex 4

LIST OF DOCUMENTS

for the fourth session of the Panel of Eminent Experts on Ethics in Food and Agriculture

Draft provisional agenda

Annotated draft agenda

Ethical issues in globalization (in relation to food and agriculture) from a Third World perspective

The loss of crop genetic diversity in a changing world

Nutrigenomics (ngx) and personalised diet – points to consider

Ethical aspects of the right to food and freedom from hunger

Ethical aspects of bioenergy – a discussion paper

Ethical aspects of bioenergy: a discussion paper – outline

A preliminary review of ethical concerns regarding intellectual property rights in agriculture

Note on the interface between nutrition and food marketing/promotion practices

Annex 5

ETHICAL ISSUES ARISING FROM GLOBALIZATION: A PERSPECTIVE FROM THE SOUTH by **Tewelde Berhan Gebre Egziabher**

Globalization is rooted in the 500 years of history of Western Europe attempting, and succeeding in its attempts, to dominate the world. Western Europe coopted the rest of Europe into its ways, initially through force, but latterly through acculturation, so that now more or less the whole of Europe and the European diaspora in the other continents constitute the Western European global status quo. Japan managed to slip into that status quo in the nineteenth century. We call this process of transformation to become like Western Europe “development”. It is the present worldwide attempt to ape Western Europe through the process of development and become accepted by it that we have come to call globalization. Naturally, the rules of aping Western Europe are primarily set by Western Europe itself and its European diaspora.

Western Europe started the process of dominating the world by creating its own highly centralized states. It first fostered the dominance of the wife and children by the husband. The state then usurped authority from the local community, the clan and all higher categories of traditional human organization. This process enabled it to control the individual directly without involving any power stratum in between and to commandeer the male to fight its wars. However, its focused aggression needed an additional ingredient to enable it to dominate the world – that of excelling in technological innovation, especially at war. The industrial revolution provided it with the needed ingredient.

The assumption that makes us Southerners want to imitate Europe in development is that the change from our present state is going to lead to the improvement of our lives. But does change, even if apparently towards a dazzling state, always lead to improvement?

If it does not, we could change our ways to end up worse off than we had been. Given the globalizing ethos that is destabilizing the environment, the biggest uncertainties posed by development are those of whether the biosphere’s capacity to support life as we now know it, i.e. including us and other species, will become significantly impaired or not. If it does become impaired, could the human species, even with all that it can muster of what is left of its ethnic and cultural diversity, fail to adapt and thus become unable to continue into the changing indefinite future? To help us answer this crucial question, we need to remind ourselves briefly of the most fundamental traits of our species.

A single-celled organism carries out all the basic functions of life. It receives stimuli from the environment, and reacts to those stimuli in a manner that maximizes its chances of survival and reproduction.

A human being is made up of billions of cells that function in a coordinated manner. The

individual cells respond to stimuli and synchronize their reactions so that the human individual acts as a single purposeful unit in adapting to her/his environment.

A group of human individuals that sufficiently coordinates the minds of its members into synchronous action and reaction constitutes a society. A society thus collectively maximizes the chances of adaptation of its individual members, and hence its collective self, to the environment. In so doing, it contributes to maximizing adaptation to the biosphere and thus to the survival of the human species as a whole.

It is obvious, therefore, that if the human species is to continue adapting to environmental changes into the indefinite future, the individual human cells, the individual human beings, and the individual societies have to be safeguarded. So long as the individual human being is safe, so are the cells. However, an individual can be safeguarded at the expense of other individuals and, thus, a given human society and even the whole human species can become endangered by the whims of a powerful dictator.

A healthy human species with good prospects for a continuing successful adaptation to the changing environment and thus for survival into the indefinite future would thus:

1. In order to optimize survival at the cellular level, ensure availability to the individual of food, medication and appropriate working and living conditions, as well as protection from an unsuitable or harmful environment and from drugs that seriously distort the workings of the brain.
2. In order to optimize survival at the individual level, respect the basic human rights and curb all acts of other individuals and the society that would infringe upon them.
3. In order to enhance the chances of survival at the societal (national) level, coordinate into constructive single wholes the reactions of individuals in that society so that they can develop sensitive institutions to receive and react to signals of need, pain and dissatisfaction at the individual and societal levels. It must be pointed out, however, that as a rule, heterogeneity/diversity increases the chances of a species to survive conditions of changing environment, and homogeneity can lead to an evolutionary cul-de-sac. Therefore, even cooperative convergence may not necessarily be always adaptive even if it is harmonious. But cooperative tolerance of diversity certainly is.
4. In order to maintain societal diversity, coordinate at the global level the activities of societies (states, nations) into a single whole that nurtures and protects the diverse societal identities and fosters harmony in diversity among them without, however, tolerating barriers to interaction among them. This would maximize the chance of creative but coordinated action and, thus, the survival of the human species into the indefinite future. The human species can then act responsibly to continue helping itself and other species.

Therefore, to maximize the prospects for the survival into the indefinite future of humans and other species, the following steps will be required from both the world's states and from the United Nations Organization:

5. International trade, though essential as it is the motive force that is creating this globalizing world, should not be allowed to destroy cultural and economic diversity. The access to resources and the influence on societal norms that is now being enjoyed by multinational corporations without any limit should thus be regulated.

6. Effective steps should be taken to narrow the gap in the economic strengths of states across the globe, and in the personal incomes of people (citizens and resident foreigners alike) within the territories of states.
7. If goods and services continue to move freely across countries, so must the workers that produce them, including those involved in physical labour. As a less attractive alternative, the flow of goods and services has to be equally regulated so as to foster economic self-sufficiency in each country.
8. The mass media are important in disseminating views globally. Multinational corporations own most of them. Therefore, they use them to further their global control. The interests of mass media organizations must thus always be scrutinized and their activities regulated. Equally important is the need to foster mass media organizations that are not under the control of multinational corporations.
9. Private security companies are a threat to national sovereignty and cultural, social and economic diversity in the world and their proliferation should be stopped.
10. Confidential business information should be reduced to the absolute minimum lest it interfere with the dissemination of technical information and the growth of science and technology and lest, for lack of useful information to teach, it turn higher education irrelevant and eventually moribund and, thus, unnecessary to continue being given.
11. Conscious efforts should be made to devolve state power to local communities so that citizens are made to feel involved and, thus, motivated to continue diversifying their social, cultural and economic creativity. This will bolster the robustness of the human species to keep adapting to the now obviously inevitable changes that the future holds.
12. Disaffection by those who feel marginalized is likely to continue growing with globalization, and conscious and continuing alertness will be needed to spare the biosphere the use in desperation of chemical, nuclear and biological, especially biotechnological and nanobiotechnological, agents of destruction.
13. Failed states are a particular risk as havens for such disaffected destructive forces, and a global consensus should be developed on how to prevent states from failing and on how to help failed states to become effective, democratic, fostering diversity while at the same time preventing intergroup (interethnic, intercultural, interreligious, etc.) antagonisms and conflicts. ●



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