Agriculture and Development

A summary of the International Assessment on Agricultural Science and Technology for Development

IAASTD
International Assessment of Agricultural Science and Technology for Development

AGRICULTURE is closely linked to many concerns, including biodiversity loss, global warming and water availability. Despite significant increases in productivity, malnutrition and poverty still plague many parts of the world. This International Assessment of Agricultural Science and Technology for Development (IAASTD) focuses on how to make better use of agricultural science, knowledge and technology to reduce hunger and poverty, improve rural livelihoods, and foster equitable and sustainable development.

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What challenges does agriculture face today?

For decades, agricultural science has focused on boosting production through the development of new technologies. It has achieved enormous yield gains as well as lower costs for large-scale farming. But this success has come at a high environmental cost. Furthermore, it has not solved the social and economic problems of the poor in developing countries, which have generally benefited the least from this boost in production.

Today's world is a place of uneven development, unsustainable use of natural resources, worsening impact of climate change, and continued poverty and malnutrition. Poor food quality and diets are partly responsible for the increase of chronic diseases like obesity and heart disease. Agriculture is closely linked to these concerns, including the loss of biodiversity, global warming and water availability.

The International Assessment of Agricultural Science and Technology for Development (IAASTD) focuses on agriculture as the provider of food, nutrition, health, environmental services, and economic growth that is both sustainable and socially equitable. This assessment recognizes the diversity of agricultural ecosystems and of local social and cultural conditions.

It is time to fundamentally rethink the role of agricultural knowledge, science and technology in achieving equitable development and sustainability. The focus must turn to the needs of small farms in diverse ecosystems and to areas with the greatest needs. This means improving rural livelihoods, empowering marginalized stakeholders, sustaining natural resources, enhancing multiple benefits provided by ecosystems, considering diverse forms of knowledge, and providing fair market access for farm products.

What are the pros and cons of bioenergy?

Bioenergy is heat, electricity, or transport fuel produced from plant or animal materials. Millions of people still depend on traditional bioenergy like wood or charcoal for cooking and heating, which can be unsustainable and pose health risks.

In many developed countries, the rising costs of fossil fuels, as well as concerns about energy security and climate change, are generating new interest in other forms of bioenergy. For example, new liquid biofuels are made from crops or from agricultural and forestry residues. However, energy is needed to grow, transport and process bioenergy crops, causing considerable debate about their net benefit in terms of greenhouse gas reduction. Another major concern is that using crop land to produce fuel could raise food prices, drive small-scale farmers off their land and prolong hunger in the world.

Electricity and **heat** can also be obtained from plant residues and animal wastes, either by burning them directly or by first producing biogas then burning it. These renewable energy sources usually produce less greenhouse gas emissions than other fuels. They can be effective, for instance in places not connected to the electric grid.

Decision-makers should compare all forms of bioenergy to other sustainable energy options and carefully weigh full social, environmental and economic costs against realistically achievable benefits. Decisions in this context are heavily influenced by local conditions.

Can biotechnology help meet the growing demand for food?

Biotechnologies are techniques that use living organisms to make or modify a product. Some **conventional biotechnologies** are well-accepted, such as fermentation for bread or alcohol production. Another example is plant and animal breeding to create varieties with better characteristics or increased yields.

Modern biotechnologies change the genetic code of living organisms using a technique called genetic modification. These technologies have been widely adopted in industrial applications such as enzyme production.

Other applications remain contentious, such as the use of genetically modified (GM) crops created by inserting genes from other organisms. Some GM crops can bring yield gains in some places and declines in others. Because new techniques are rapidly being developed, longer-term assessments of environmental and health risks and benefits tend to lag behind discoveries. This increases speculation and uncertainty.

The possibility of **patenting** genetic modifications can attract investment in agricultural research. But it also tends to concentrate ownership of resources, drive up costs, inhibit independent research, and undermine local farming practices such as seed-saving that are especially important in developing countries. It could also mean new liabilities, for example if a genetically modified plant spreads to nearby farms.

Many problems could be solved if biotechnologies would focus on local priorities identified through transparent processes involving the full spectrum of stakeholders.

Biotechnologies are already widely used in agriculture.

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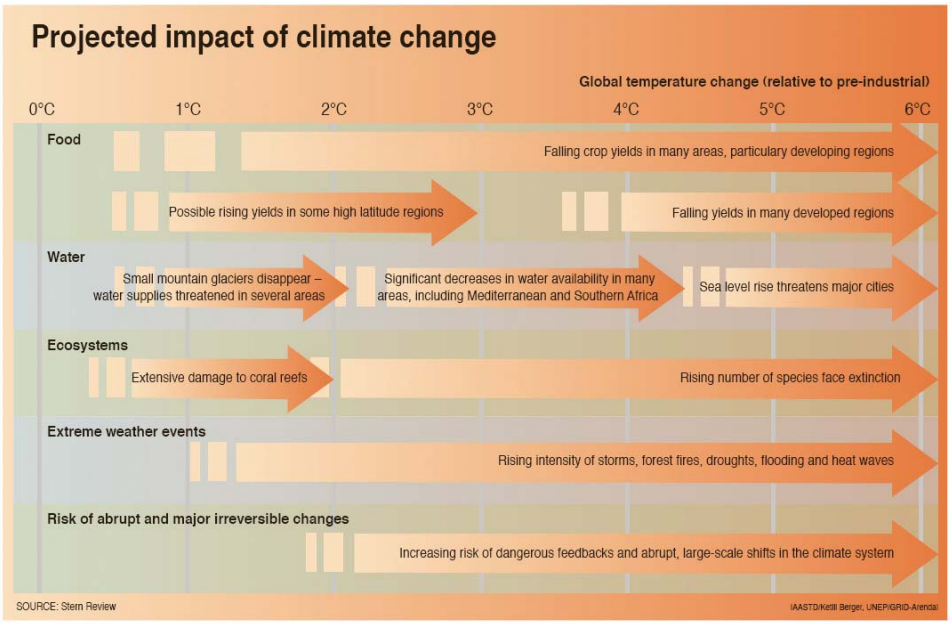
How is climate change threatening agriculture?

Agriculture has contributed to climate change in many ways, for instance through the conversion of forests to farmland and the release of greenhouse gases. Conversely, climate change now threatens to irreversibly damage natural resources on which agriculture depends.

The effects of global warming are already visible in much of the world. In some areas, moderate warming can slightly increase crop yields. But overall, negative impacts will increasingly dominate. Floods and droughts become more frequent and severe, which is likely to seriously affect farm productivity and the livelihoods of rural communities, and increase the risk of conflicts over land and water. Also, climate change encourages the spread of pests and invasive species and may increase the geographical range of some diseases.

Some land use management approaches can help mitigate global warming. These include planting trees, restoring degraded land, conserving natural habitats, and improving soil and fertility management. Policy options include financial incentives to grow trees, reduce deforestation and develop renewable energy sources. Agriculture and other rural activities must be integrated in future international policy agreements on climate change. However, since some changes in the climate are now inevitable, adaptation measures are also imperative.



How is food production affecting health?

Although food production has increased in recent decades, many people remain **undernourished**, a problem accounting for 15% of global disease. Many population groups still face protein, micronutrient and vitamin deficiency. Meanwhile, **obesity** and **chronic diseases** are increasing across the world because of people eating too much of the wrong foods. Agricultural research and policies should be devised to increase dietary diversity, improve food quality, and promote better food processing, preservation and distribution.

Global trade and growing consumer awareness have increased the need for proactive food safety systems. Health concerns include the presence of pesticide residues, heavy metals, hormones, antibiotics, and additives in the food system, as well as risks related to large-scale livestock farming.

Worldwide, agriculture accounts for at least 170 000 work-related deaths each year. Accidents with equipment like tractors and harvesters cause many of these deaths. Other important health hazards for agriculture workers include noise, transmissible animal diseases, and exposure to toxic substances such as pesticides.

Agriculture can contribute to the emergence and spread of infectious diseases. Therefore, robust surveillance, detection and response programs are critical across the food chain.

Can traditional knowledge contribute to agriculture?

Many effective innovations are generated locally, based on the knowledge and expertise of indigenous and local communities rather than on formal scientific research. Traditional farmers embody ways of life beneficial to the conservation of biodiversity and to sustainable rural development.

Local and traditional knowledge has been successfully built into several areas of agriculture, for example in the domestication of wild trees, in plant breeding, and in soil and water management. Scientists should work more closely with local communities and traditional practices should have a higher profile in science education. Efforts should be made to archive and evaluate the knowledge of local people and to protect it under fairer international intellectual property legislation.

This text is a faithful summary, by GreenFacts, of the Synthesis Report of the International Assessment on Agricultural Science and Technology for development. A web version of this summary, along with the full IAASTD Synthesis Report, can be found on www.greenfacts.org/en/agriculture-iaastd/.

How can agriculture make better use of natural resources?

Historically, agricultural development was geared towards increasing productivity and exploiting natural resources, but ignored complex interactions between agricultural activities, local ecosystems, and society.

These interactions must be considered to enable sustainable use of resources like water, soil, biodiversity and fossil fuels. Much of the agricultural knowledge, science and technology needed to resolve today's challenges are available and well understood, but putting them into practice requires creative efforts from all stakeholders.

Existing agricultural science and technology can tackle some of the underlying causes of declining productivity. But further developments based on a multidisciplinary approach are needed, starting with more monitoring of how natural resources are used. Other options for action include more research into how to use natural resources responsibly and efforts to foster public awareness of their importance.

Local market in Pisac, Peru.

Why haven't small farmers benefited more from global trade?

Small farmers and rural communities in developing countries have often not benefited from opportunities that agricultural trade can offer. Opening farm markets prematurely to international competition can further weaken the agricultural sector of a developing country, causing more poverty, hunger and harm to the environment in the long-term.

Trade reforms could make relations more equitable. Developing countries would benefit from key changes such as removing trade barriers on products for which they have a competitive advantage; lowering tariffs on imports of processed commodities; and improving their access to export markets.

The capacity of developing countries to analyze and negotiate trade agreements needs to be strengthened to allow better and more transparent decisions concerning the agricultural sector.

The environmental footprint of agriculture could be reduced by adapting market and trade policies, for instance by removing detrimental subsidies, changing taxation policies, and improving property laws.

What is the role of women in agriculture and development?

Current trends in globalization and rising environmental and sustainability concerns are redefining the relationship of women to agriculture and development.

The proportion of women involved in agricultural activities ranges from 20% to 70%, a number that is climbing in many developing countries, especially where agriculture is geared towards export.

Although some progress has been made, women continue to struggle with low income, limited access to education, credit and land, job insecurity, and deteriorating work conditions.

Growing competition has fueled demand for cheap, flexible labor, and conflicts over access to natural resources have added to the pressure. Poor rural households are increasingly threatened by natural disaster, environmental change and health and safety risks – this at a time of diminishing government support.

Conclusion: What are the options for action?

Fighting poverty and improving rural livelihoods

Small-scale farmers would benefit from greater access to knowledge, technology, and credit, and, critically, from more political power and better infrastructure. They need laws that secure access to land and natural resources as well as fair intellectual property rights.

Enhancing food security

Ensuring food security is not merely a matter of producing enough to eat: food must also be available to those who need it. Possible policy actions that can enhance access to food include reducing transaction costs for small-scale producers, strengthening local markets and improving food safety and quality. Global systems are needed to watch out for sudden price changes and extreme weather events that could lead to food shortages and price-induced hunger.

Using natural resources in a sustainable way

Agricultural sustainability means maintaining productivity while protecting the natural resource base.

Possible actions include: improving low impact practices such as organic agriculture and providing incentives for the sustainable management of water, livestock, forests, and fisheries. Science and technology should focus on ensuring that agriculture not only provides food but also fulfills environmental, social and economic functions such as mitigating climate change and preserving biodiversity. Policy-makers could end subsidies encouraging unsustainable practices and provide incentives for sustainable natural resource management.

Improving human health

Human health can be improved through efforts to diversify diets and enhance their nutritional value, through advances in technologies for processing, preserving and distributing food, and through better health policies and systems.

Food safety can be increased by investing in infrastructure, public health and veterinary capacity, and by developing legal frameworks for controlling biological and chemical hazards. Work-related health risks can be reduced by enforcing health and safety regulations. The spread of infectious diseases like bird flu can be limited through better coordination across the food chain.

Helping achieve equity in agriculture

Achieving greater equity in agriculture requires investment to bring technology and education to rural areas. Fair access to land and water is crucial. Stakeholders should be allowed to influence decisions about use and management of natural resources, access to land, credit and markets, intellectual property rights, trade priorities, and protection of the rural environment. Above all, farmers need to be rewarded for their labor with just and fair prices for their products.

GLOSSARY

Bioenergy – Renewable energy made from materials from biological sources. Wood, charcoal, manure and crop residues are all traditional forms of bioenergy. Bioenergy produced from crops like maize or sugarcane is known as biofuel, while biogas refers to the mixture of methane and carbon dioxide produced by the bacterial decomposition of organic wastes.

Biotechnology – Any technological application that uses biological systems, living organisms, or their derivatives to make or modify products or processes for specific use. Examples of biotechnology include traditional applications such as the making of bread, cheese, wine, and beer, and more modern ones such as cell culture, genetically modified foods or cloning plants and animals.

Genetically modified crops – Crops produced from organisms that have had their genome altered through genetic engineering.

Microcredit – The lending of very small amounts of money at low interest.

Micronutrient – Any essential nutrient, as a trace mineral or vitamin, that is required by an organism in minute amounts.

Renewable energy – Any naturally occurring, theoretically inexhaustible source of energy not derived from fossil or nuclear fuel. Examples include solar, wind and water power.

Sustainability – Characteristic or state whereby the needs of the present and local population can be met without compromising the ability of future generations or populations in other locations to meet their needs.

Transgene – A gene from one organism that has been incorporated into the genome of another organism. Often refers to a gene that has been introduced into a multicellular organism.

The International Assessment of Agricultural Science and Technology for Development (IAASTD)

The IAASTD addresses how to make better use of agricultural science, knowledge and technology to reduce hunger and poverty, improve rural livelihoods, and foster equitable and sustainable development.

Released on 15 April 2008, it represents a three-year effort by about 400 experts around the world working under the auspices of 30 governments and 30 representatives of civil society. The latter include nongovernmental organizations, producer and consumer groups and international organizations.

The assessment was sponsored by the United Nations, the World Bank and the Global Environment Facility (GEF), an independent financial organization that provides grants to developing countries. Five U.N. agencies were involved: the Food and Agricultural Organization (FAO), the U.N. Development Program (UNDP), the U.N. Environment Programme (UNEP), the U.N. Education, Science and Cultural Organization (UNESCO) and the World Health Organization (WHO). Additional individuals, organizations and governments participated in a peer review process.

IAASTD publications can be found at www.agassessment.org.

"If we do persist with business as usual, the world's people cannot be fed over the next half-century. It will mean more environmental degradation, and the gap between the haves and have-nots will further widen.
We have an opportunity now to marshal our intellectual resources to avoid that sort of future.
Otherwise we face a world no one would want to inhabit."

Professor Robert Watson,
Director of the IAASTD Secretariat

"On a global scale, we have been producing sufficient food for an ever growing population. But this has been done at a cost that has left deep physical, biological and social scars, that now need the full attention of the scientific, moral and political authorities.
This assessment highlights the present reality and identifies options for action in a candid and sober manner."

Dr. Hans R Herren,
World Food Prize Laureate, Co-Chair of the IAASTD

"We cannot continue to work independently in our silos. We have an array of agricultural knowledge, science and technology tools that can solve the pressing food security challenges that we face."

Professor Judi Wakhungu,
Co-Chair of the IAASTD

Facts on this leaflet

This leaflet is a faithful summary of the IAASTD Synthesis Report. It was produced by GreenFacts under contract with COM+ alliance and carefully reviewed by scientists who took part in the IAASTD process.

This summary can be found at www.greenfacts.org/en/agriculture-iaastd/

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