Agriculture at a Crossroads

IAASTD

International Assessment of Agricultural Knowledge, Science and Technology for Development





综合报告的执行摘要

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Executive Summary of the Synthesis Report


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UNDP
UNEP
UNESCO
THE WORLD BANK
W.H.O. O.M.S.
WHO
GLOBAL ENVIRONMENT FACILITY

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Executive Summary of the Synthesis Report

This summary was approved in detail by the Governments attending the IAASTD Intergovernmental Plenary in Johannesburg, South Africa (7-11 April 2008).

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Contents

Foreword

The objective of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) was to assess the impacts of past, present and future agricultural knowledge, science and technology on the:

- reduction of hunger and poverty,
- improvement of rural livelihoods and human health, and
- equitable, socially, environmentally and economically sustainable development.

The IAASTD was initiated in 2002 by the World Bank and the Food and Agriculture Organization of the United Nations (FAO) as a global consultative process to determine whether an international assessment of agricultural knowledge, science and technology was needed. Mr. Klaus Töepfer, Executive Director of the United Nations Environment Programme (UNEP) opened the first Intergovernmental Plenary (30 August-3 September 2004) in Nairobi, Kenya, during which participants initiated a detailed scoping, preparation, drafting and peer review process.

The outputs from this assessment are a Global and five Sub-Global reports; a Global and five Sub-Global Summaries for Decision Makers; and a cross-cutting Synthesis Report with an Executive Summary. The Summaries for Decision Makers and the Synthesis Report specifically provide options for action to governments, international agencies, academia, research organizations and other decision makers around the world.

The reports draw on the work of hundreds of experts from all regions of the world who have participated in the preparation and peer review process. As has been customary in many such global assessments, success depended first and foremost on the dedication, enthusiasm and cooperation of these experts in many different but related disciplines. It is the synergy of these interrelated disciplines that permitted IAASTD to create a unique, interdisciplinary regional and global process.

We take this opportunity to express our deep gratitude to the authors and reviewers of all of the reports—their dedication and tireless efforts made the process a success. We thank the Steering Committee for distilling the outputs of the consultative process into recommendations to the Plenary, the IAASTD Bureau for their advisory role during the assessment and the work of those in the extended Secretariat. We would specifically like to thank the cosponsoring organizations of the Global Environment Facility (GEF) and the World Bank for their financial contributions as well as the FAO, UNEP, and the United Nations Educational, Scientific and Cultural Organization (UNESCO) for their continued support of this process through allocation of staff resources.

We acknowledge with gratitude the governments and organizations that contributed to the Multidonor Trust Fund (Australia, Canada, the European Commission, France, Ireland, Sweden, Switzerland, and the United Kingdom) and the United States Trust Fund. We also thank the governments who provided support to Bureau members, authors and reviewers in other ways. In addition, Finland provided direct support to the Secretariat. The IAASTD was especially successful in engaging a large number of experts from developing countries and countries with economies in transition in its work; the Trust Funds enabled financial assistance for their travel to the IAASTD meetings.

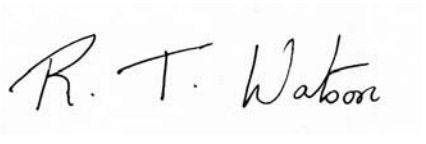
We would also like to make special mention of the Regional Organizations who hosted the regional coordinators and staff and provided assistance in management and time to ensure success of this enterprise: the African Center for Technology Studies (ACTS) in Kenya, the Inter-American Institute for Cooperation on Agriculture (IICA) in Costa Rica, the International Center for Agricultural Research in the Dry Areas (ICARDA) in Syria and the WorldFish Center in Malaysia.

The final Intergovernmental Plenary in Johannesburg, South Africa was opened on 7 April 2008 by Achim Steiner, Executive Director of UNEP. This Plenary saw the acceptance of the Reports and the approval of the Summaries for Decision Makers and the Executive Summary of the Synthesis Report by an overwhelming majority of governments.

Signed:

Co-chairs
Hans H. Herren
Judi Wakhungu

Director
Robert T. Watson



Preface

In August 2002, the World Bank and the Food and Agriculture Organization (FAO) of the United Nations initiated a global consultative process to determine whether an international assessment of agricultural knowledge, science and technology (AKST) was needed. This was stimulated by discussions at the World Bank with the private sector and nongovernmental organizations (NGOs) on the state of scientific understanding of biotechnology and more specifically transgenics. During 2003, eleven consultations were held, overseen by an international multistakeholder steering committee and involving over 800 participants from all relevant stakeholder groups, e.g., governments, the private sector and civil society. Based on these consultations the steering committee recommended to an Intergovernmental Plenary meeting in Nairobi in September 2004 that an international assessment of the role of AKST in reducing hunger and poverty, improving rural livelihoods and facilitating environmentally, socially and economically sustainable development was needed. The concept of an International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) was endorsed as a multithematic, multi-spatial, multi-temporal intergovernmental process with a multistakeholder Bureau cosponsored by the FAO, the Global Environment Facility (GEF), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Bank and World Health Organization (WHO).

The IAASTD's governance structure is a unique hybrid of the Intergovernmental Panel on Climate Change (IPCC) and the nongovernmental Millennium Ecosystem Assessment (MA). The stakeholder composition of the Bureau was agreed at the Intergovernmental Plenary meeting in Nairobi; it is geographically balanced and multistakeholder with 30 government and 30 civil society representatives (NGOs, producer and consumer groups, private sector entities and international organizations) in order to ensure ownership of the process and findings by a range of stakeholders.

About 400 of the world's experts were selected by the Bureau, following nominations by stakeholder groups, to prepare the IAASTD Report (comprised of a Global and five Sub-Global assessments). These experts worked in their own capacity and did not represent any particular stakeholder group. Additional individuals, organizations and governments were involved in the peer review process.

The IAASTD development and sustainability goals were endorsed at the first Intergovernmental Plenary and are consistent with a subset of the UN Millennium Development Goals (MDGs): the reduction of hunger and poverty; the improvement of rural livelihoods and human health; and facilitating equitable, socially, environmentally and economically sustainable development. Realizing these goals requires acknowledging the multifunctionality of agriculture: the challenge is to simultaneously meet development and sustainability goals while increasing agricultural production.

Meeting these goals has to be placed in the context of a rapidly changing world of urbanization, growing inequities, human migration, globalization, changing dietary preferences, climate change, environmental degradation, a trend toward biofuels and an increasing population. These conditions are affecting local and global food security and putting pressure on productive capacity and ecosystems. Hence there are unprecedented challenges ahead in providing food within a global trading system where there are other competing uses for agricultural and other natural resources. AKST alone cannot solve these problems, which are caused by complex political and social dynamics, but it can make a major contribution to meeting development and sustainability goals. Never before has it been more important for the world to generate and use AKST.

Given the focus on hunger, poverty and livelihoods, the IAASTD pays special attention to the current situation, issues and potential opportunities to redirect the current AKST system to improve the situation for poor rural people, especially small-scale farmers, rural laborers and others with limited resources. It addresses issues critical to formulating policy and provides information for decision makers confronting conflicting views on contentious issues such as the environmental consequences of productivity increases, environmental and human health impacts of transgenic crops, the consequences of bioenergy development on the environment and on the long-term availability and price of food, and the implications of climate change on agricultural production. The Bureau agreed that the scope of the assessment needed to go beyond the narrow confines of science and technology (S&T) and should encompass other types of relevant knowledge (e.g., knowledge held by agricultural producers, consumers and end users) and that it should also assess the role of institutions, organizations, governance, markets and trade.

The IAASTD is a multidisciplinary and multistakeholder enterprise requiring the use and integration of information, tools and models from different knowledge paradigms including local and traditional knowledge. The IAASTD does not advocate specific policies or practices; it assesses the major issues facing AKST and points towards a range of AKST

options for action that meet development and sustainability goals. It is policy relevant, but not policy prescriptive. It integrates scientific information on a range of topics that are critically interlinked, but often addressed independently, i.e., agriculture, poverty, hunger, human health, natural resources, environment, development and innovation. It will enable decision makers to bring a richer base of knowledge to bear on policy and management decisions on issues previously viewed in isolation. Knowledge gained from historical analysis (typically the past 50 years) and an analysis of some future development alternatives to 2050 form the basis for assessing options for action on science and technology, capacity development, institutions and policies, and investments.

The IAASTD is conducted according to an open, transparent, representative and legitimate process; is evidence based; presents options rather than recommendations; assesses different local, regional and global perspectives; presents different views, acknowledging that there can be more than one interpretation of the same evidence based on different worldviews; and identifies the key scientific uncertainties and areas on which research could be focused to advance development and sustainability goals.

The IAASTD is composed of a Global assessment and five Sub-Global assessments: Central and West Asia and North Africa – CWANA; East and South Asia and the Pacific – ESAP; Latin America and the Caribbean – LAC; North America and Europe – NAE; Sub-Saharan Africa – SSA. It (1) assesses the generation, access, dissemination and use of public and private sector AKST in relation to the goals, using local, traditional and formal knowledge; (2) analyzes existing and emerging technologies, practices, policies and institutions and their impact on the goals; (3) provides information for decision makers in different civil society, private and public organizations on options for improving policies, practices, institutional and organizational arrangements to enable AKST to meet the goals; (4) brings together a range of stakeholders (consumers, governments, international agencies and research organizations, NGOs, private sector, producers, the scientific community) involved in the agricultural sector and rural development to share their experiences, views, understanding and vision for the future; and (5) identifies options for future public and private investments in AKST. In addition, the IAASTD will enhance local and regional capacity to design, implement and utilize similar assessments.

In this assessment agriculture is used to include production of food, feed, fuel, fiber and other products and to include all sectors from production of inputs (e.g., seeds and fertilizer) to consumption of products. However, as in all assessments, some topics were covered less extensively than others (e.g., livestock, forestry, fisheries and the agricultural sector of small island countries, and agricultural engineering), largely due to the expertise of the selected authors. Originally the Bureau approved a chapter on plausible futures (a visioning exercise), but later there was agreement to delete this chapter in favor of a more simple set of model projections. Similarly the Bureau approved a chapter on capacity development, but this chapter was dropped and key messages integrated into other chapters.

The IAASTD draft Report was subjected to two rounds of peer review by governments, organizations and individuals. These drafts were placed on an open access Web site and open to comments by anyone. The authors revised the drafts based on numerous peer review comments, with the assistance of review editors who were responsible for ensuring the comments were appropriately taken into account. One of the most difficult issues authors had to address was criticisms that the report was too negative. In a scientific review based on empirical evidence, this is always a difficult comment to handle, as criteria are needed in order to say whether something is negative or positive. Another difficulty was responding to the conflicting views expressed by reviewers. The difference in views was not surprising given the range of stakeholder interests and perspectives. Thus one of the key findings of the IAASTD is that there are diverse and conflicting interpretations of past and current events, which need to be acknowledged and respected.

The Global and Sub-Global Summaries for Decision Makers and the Executive Summary of the Synthesis Report were approved at an Intergovernmental Plenary in April 2008. The Synthesis Report integrates the key findings from the Global and Sub-Global assessments, and focuses on eight Bureau-approved topics: bioenergy; biotechnology; climate change; human health; natural resource management; traditional knowledge and community based innovation; trade and markets; and women in agriculture.

The IAASTD builds on and adds value to a number of recent assessments and reports that have provided valuable information relevant to the agricultural sector, but have not specifically focused on the future role of AKST, the institutional dimensions and the multifunctionality of agriculture. These include: FAO State of Food Insecurity in the World (yearly); InterAcademy Council Report: Realizing the Promise and Potential of African Agriculture (2004); UN Millennium Project Task Force on Hunger (2005); Millennium Ecosystem Assessment (2005); CGIAR Science Council Strategy and Priority Setting Exercise (2006); Comprehensive Assessment of Water Management in Agriculture: Guiding Policy Investments in Water, Food, Livelihoods and Environment (2007); Intergovernmental Panel on Climate Change Reports (2001 and 2007); UNEP Fourth Global Environmental Outlook (2007); World Bank World Development Report: Agriculture for Development (2008); IFPRI Global Hunger Indices (yearly); and World Bank Internal Report of Investments in SSA (2007).

Financial support was provided to the IAASTD by the cosponsoring agencies, the governments of Australia, Canada, Finland, France, Ireland, Sweden, Switzerland, US and UK, and the European Commission. In addition, many organizations have provided in-kind support. The authors and review editors have given freely of their time, largely without compensation.

The Global and Sub-Global Summaries for Decision Makers and the Synthesis Report are written for a range of stakeholders, i.e., government policy makers, private sector, NGOs, producer and consumer groups, international organizations and the scientific community. There are no recommendations, only options for action. The options for action are not prioritized because different options are actionable by different stakeholders, each of whom have a different set of priorities and responsibilities and operate in different socioeconomic and political circumstances.

国际农业知识科学和技术促进发展评估(IAASTD)

综合报告的执行摘要

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各国政府声明

出席2008年4月在南非约翰内斯堡举行的最后政府间全体会议的各国政府赞扬IAASTD所进行的工作以及这个独立的多利益相关方和多学科进程的独特性质，同时确认该团队在探讨内容广泛的复杂性问题方面应对了巨大挑战。出席该会议的各国政府还确认：全球级别报告和次全球级别报告是许多科学工作者、专家、发展专题人员进行研究后得出的结论，虽然在农业知识与科技促进发展的重要性方面提出了总体性的共识，但也在某些问题上提出了各种不同意见。

各国都认为上述报告对理解农业知识与科技促进发展作出了宝贵而重要的贡献，同时还认为有必要进一步理解未来面对的各种挑战。评估报告是一个建设性的活动和重要的贡献，各国政府未来必须给予重视，从而确保农业知识与科技在减少饥饿与贫困、改善农村生活与人类健康、促进公平的、在社会、环境、经济上可持续的发展和可持续性目标方面充分发挥其潜力。

根据以上声明，下列政府认可《综合报告摘要》。

亚美尼亚、阿塞拜疆、巴林、孟加拉国、伯利兹、贝宁、不丹、博茨瓦纳、巴西、喀麦隆、中华人民共和国、哥斯达黎加、古巴、刚果民主共和国、多米尼加共和国、萨尔瓦多、埃塞俄比亚、芬兰、法国、冈比亚、加纳、洪都拉斯、印度、伊朗、爱尔兰、肯尼亚、吉尔吉斯斯坦、老挝人民民主共和国、黎巴嫩、阿拉伯利比亚民众国、马尔代夫、摩尔多瓦共和国、莫桑比克、纳米比亚、尼日利亚、巴基斯坦、巴拿马、巴拉圭、菲律宾、波兰、帕劳共和国、罗马尼亚、沙特阿拉伯、塞内加尔、索罗门群岛、斯威士兰、瑞典、瑞士、坦桑尼亚联合共和国、东帝汶、多哥、突尼斯、土耳其、乌干达、英国、乌拉圭、越南、赞比亚（58国）

下列国家政府认可以上声明，但不完全同意《综合报告摘要》，其保留意见列入本文的附录。

澳大利亚、加拿大、美利坚合众国（3国）

国际农业科技促进发展评估(IAASTD)综合报告摘要

人类依靠科学和技术提高农业增产能力取得巨大成就，但伴随成就而来的一些意外的社会及生态后果却没有得到足够的关注。在人们普遍认识到这一点的时候，国际农业科技与发展评估（IAASTD）也适时而至。现在已经是时候去反思这些后果，规划各种政策选择，以克服未来的挑战，或者更恰当地说，面对来自农业和全球化经济系统内部和外部约束性越来越强的环境条件，满足维持粮食和生计安全的需求。

这个普遍认识到的问题与IAASTD的目标直接相关：如何利用农业知识与科技（AKST）来减少饥饿和贫困，改善农村生计和促进公平、具有环境、社会和经济可持续性的发展。在IAASTD的背景下，我们认识到农业知识与科技对农业多功能性的重要性 ，以及与其他当地乃至全球问题结合考虑的重要性，包括生物多样性和生态系统服务功能的丧失、气候变化和水的供应。

在农业科学评估的历史上，IAASTD具有开创性，因为它既评估正规的科学和技术（科技），也评估当地及传统型知识，不仅评估生产和生产率，而且评估农业的多功能性，并且承认对于农业知识与科技的角色和性质，存在多种看法。多年来，农业科学的重点都是提供具体的技术以增加农场的生产率水平，国家实行的市场和制度安排则是推广应用新技术的主要推动力。普遍的模式是持续创新，降低农场的出场价格，以及实现成本的外部化。这种模式，不仅使第二次世界大战后工业化国家在农业知识与科技上取得巨大成就，而且推动了1960年代开始的绿色革命的普及。但是，面对当今的新挑战，正规的科技组织内部越来越认识到，目前的农业知识与科技模式需要修改。再也不能按部就班。这促使人们重新思考农业知识与科技在实现发展及可持续性目标中的角色：更好地融会各种不同的世界观和可能相互抵触的模式，立足于实现农业的多种功能，提出行动策略建议。

人类生活是由各种各样的需求和利益所组成的，因此对于可持续性，需要采取共同的模式，同时进行当地和国际性的合作。要实现可持续和公平的集体性结果，继续单纯地依赖个体选择的累加，是无法走出困境的。需要建立奖惩机制来影响个体的选择。此外，要解决贫困和气候变化等问题，需要超越个体利益的束缚，就各种尺度上的一致行动和治理达成集体协议。全球、区域、国家、地方各级的决策人必须清楚地认识到，挑战多种多样，存在多个理论框架和发展模式，并且在实现发展及可持续性目标方面存在范围广泛的多种选择。我们对挑战的看法以及我们在历史的这个节点上作出的选择，会决定我们如何去保护地球和保障未来。

发展及可持续性目标应该结合考虑：（1）当前的社会和经济不平等以及战争和冲突的政治不确定性；（2）可持续生产及获得足够粮食的不确定性；（3）世界粮食价格走势的不确定性；（4）以石油为基础的能源使用成本的变化；（5）出现新的自然资源竞争者；（6）慢性疾病不断增加，部分是因营养不良、食品质量不良和食品不安全所导致；（7）不断变化的环境条件，以及对于人类维持全球生态系统服务功能（产品提供、调节、文化和支持）的责任，意识越来越强烈。

当今这个世界，发展不对称，对自然资源的使用不可持续，农村及城市贫困持续存在。长期以来，最贫困和最弱势人群发展的权利和机会都很有限，通常受全球变化负面后果的影响也是最大的。

正规技术的产生和应用步伐一直快慢不均。北美和欧洲（NAE）及新兴经济体中已经通过正规农业知识与科技实现显著规模效应者，将继续垄断农业出口和延伸价值链。迫切需要根据农业生态和社会及文化的差别，实现农业知识与科技的多元化，加强农业知识与科技。改革农业知识与科技，减少贫困，为农村贫困人口（特别是无地农民、城市非正规就业及流动就业的工人）提供更好的生计选择，是重大的挑战。

在所有地区，如何解决贫困以及向受害于内部和区域间不平等的贫困人口提供可选择的生计，都是头等问题。目前认为，当前不断加剧的粮食安全危机，其复杂性不同于1960年代的粮食安全危机，剧烈程度也可能存在差别。不同相关者（包括国家、民间和私营部门相关者）的政治和经济立场不一致，影响其在解决生产、社会和环境系统间关系的根本问题方面的能力和意愿。

如果承认当前挑战和接受现有的行动选择，决策者就必

须关注范围广泛的利益相关者的具体需求，并为此作出长期的承诺。要应对未来的挑战、机遇和不确定性，必须承认知识系统和人类在科学、技术、实践和政策方面的聪明才智。为此，需要转向采用非等级结构的发展模式。

农业知识与科技面临的挑战是，满足各种生态系统下小型农业经营的需求，并且在区域生产率的改进潜力很小，可能承受气候变化的负面影响最大的地区，为小型农业经营创造现实的发展机会。多功能农业系统为农业知识与科技带来的主要挑战包括：

- 如何改善农村的社会福利和个人生计增强农业的倍数效应？
- 如何协助边缘化利益相关者，使之保持农业和粮食系统的多样性，包括其文化特征？
- 如何提供安全的水，维持生物多样性，保持自然资源基础和减小农业对人和环境的影响？
- 如何在提高粮食、纤维和生物燃料生产的可持续生产率及多样性的同时，维持和增进环境及文化服务功能？
- 如何有效协调日益多元化的知识提供者共同产生知识，有效管理各种公共及私营农业知识与科技组织安排之间的信息流动？
- 如何让边缘化的雨浇地的产出进入当地、国家和全球市场？

行动选择

要成功实现发展及可持续性目标，响应新的重点任务和不断变化的情况，农业知识与科技需要有根本性的转变，包括科学、技术、政策、制度、能力发展和投资。要实现这个转变，必须认识到并更加重视农业的多功能性，考虑各种社会及生态背景下农业系统的复杂性。要推广农业知识与科技的综合发展和推广模式，需要新的制度及组织安排。另外，还需要承认农业社区、农业家庭和农民既是生产者，也是生态系统的管理者。要实现转变，必须改变对价值链上所有相关者的激励机制，从而尽可能实现外部效应的内部化。就发展及可持续性目标而言，这些政策和制度改革应该主要着眼于在以往的农业知识与科技模式中获得服务最少的群体，即资源匮乏的农民、妇女和少数民族。[1]此外，发展还取决于小型农户在多大程度上能实现农业以外的就业，协助推动总体经济增长。大中型农户依然是农业知识与科技重要的高回报服务对象，特别是在可持续土地利用及粮食系统方面。

对任何技术都必须评估潜在的环境、健康和社会影响，并实施适当的监管框架。农业知识与科技有助于根本性改善粮食安全，提高农业系统的社会及经济绩效，为可持续的农村和社区生计以及更广泛的经济发展奠定基础。农业知识与科技可协助复原退化的土地，降低与粮食生产及消费相关的环境和健康风险 ，以及可持续地增加产量。

要取得成功，必须增加对农业知识与科技的公共投资，制定扶持性的政策框架，重新评价传统及当地知识的价值，并对知识的生产和分享采取基于系统的多学科整体模式。此外，成功还取决于国际发展动向和事件在多大程度上增强对发展及可持续性目标的重视，以及能够在多大程度上获得必要的资金和合格的工作人员。

多功能性

“多功能性”这个词有时候用于贸易和保护主义方面。本文的用法仅限于：农业的各种职能和功能具有不可避免的相关性。多功能性这个概念认为：农业是一项多产出活动，所生产的不仅是商品（食品、饲料、纤维、生物），而且包括非商品产出，例如生态系统服务、环境美观性、文化遗产等等。

IAASTD采用经合发组织提出的工作定义，该定义将多功能性与农业生产流程积极产出的具体特征联系起来，包括： (i) 农业同时产出多种商品和非商品； (ii) 某些非商品产出可能具有外部效应或公共货物的特征，然而这些货物的市场运作不良或者根本不存在。

在全球贸易谈判中，对于这个词的运用一直存在争议，其焦点是：为了使农业完成其多种功能，是否有必要提供“贸易扭曲性”农业补贴。一方认为，目前农业补贴、国际贸易、相关政策框架的状况不利于过渡到公平的农业和食品贸易关系，也不利于实现可持续性粮食于农业系统，而且对自然资源、农业生态、人类健康与营养产生了不良影响。另一方则认为，如果通过贸易方面的方式来解决这些问题，就会削弱农业贸易的效率，从而进一步导致不良的市场扭曲状态；这一方希望采取其他办法来解决外部化成本以及对环境、人类健康与营养的不利影响。

贫困与生计

改善农村生计的重要选择包括：让小型农户能够获得更多的土地和经济资源，以及进入利润丰厚的当地城市市场及出口市场；以及提高当地增加值和小型农户和农村劳工所分享的价值比例。在实现发展及可持续性目标领域，一个有力的工具是增强农民在土壤、虫害、疾病媒介物和遗传多样性管理以及自然资源保护方面的创新能力。要将农民的知识和外部知识结合起来，需要在农民、科学工作者和其他利益相关者之间建立新的合作关系。

1. 博茨瓦纳

改善生计的政策选择包括：提供小额信贷和其他金融服务；确保资源及土地使用权和所有权的法律框架；公正的冲突解决机制；以及知识产权（IPR）制度和相关工具的不断进步和积极使用。需要增进信任，重视农民的知识农业及自然生态多样性，建立农民管理药用植物的制度、当地种子系统和资金集合制度[2]。每项选择在当地实施时，在依赖于区域和全国性的问责保障机制。提高小型农户国内农场出场价格的选择包括：财政政策和关于竞争的政策；普及农业知识与科技；建立新的商业模式；以及增强政治力量。

粮食安全

粮食安全战略需要综合应用各种农业知识与科技模式，包括制定粮食储备管理、预警、监督和流通制度。生产措施可以为粮食安全创造条件，但是需要结合考虑人们获取粮食的渠道（自产、交换及公共分配）和吸收所消耗营养物的能力（提供足够的水、完善的卫生条件和充足的影响），以提供完整的粮食安全。

> 粮食安全　[是指]所有人在任何时候都能在物质、社会和经济上获得足够、安全和富有营养的食物，满足其饮食需求和食物喜好，维持积极而健康的生活。（粮农组织，《2001年粮食不安全状况》）。
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> 粮食主权是指人民和主权国家以民主方式自行决定农业及粮食政策的权利。[3]

农业知识与科技可实现可持续的农业增产，具体是通过：推广当地和正规的农业知识与科技，培育和推广适应各地具体条件的高产品种；拓宽资金获取渠道；改进土壤、水及营养物的管理及保持；收获前和收获后的虫害管理；以及提高小型农场的多元化程度。粮食安全的政策选择包括：雨浇地区种植高价值作物；增加出口，包括有机农产品和公平贸易产品；降低小型生产者的交易成本；加强本地市场；以及提高食品安全和质量。针对价格冲击和极端气候事件，需要建立全球性的监督和干预体系，以便及时预测严重的粮食短缺事件和价格引发的饥饿。

农业知识与科技投资可提高基本口粮的可持续生产率（基本口粮包括往往是穷人来种植和消费的受忽视作物）。此外，在投资上也可着眼于能够向穷人提供更多粮食、土地、水、种质和更先进技术的制度改革和政策。

环境可持续性

农业知识与科技系统需要能够在保持农业系统的自然资源基础和生态产品提供功能的前提下，增进可持续性。可选择方法包括：改进营养物、能源、水和土地的使用效率；增进对土壤-植物-水动力学的理解；提高农场多元化程度；支持农业生态系统，加强田间和景观尺度上的生物多样性保护和利用；促进畜牧、林业和渔业的可持续管理；对于作物生产区和自然栖息地，加强对整体农业生态功能运行机制的理解；减少农业对气候变化的影响，以及减小气候变化对农业的负面影响。

政策选择包括：结束对不可持续做法有鼓励作用的补贴，利用市场和其他机制来调节和实现农业/环境服务收偿使用，加强自然资源管理，提高环境质量。这方面的例子有：促进综合虫害管理和具有环境压力承受能力的种质管理的鼓励措施，向农民和当地社区支付生态系统服务费，促进和鼓励替代市场（例如绿色产品）、可持续林业及渔业做法和有机农业的认证制度以及加强当地市场。长期性的土地和水使用权/所有权、风险降低措施（安全网、信贷、保险等）和建议采用技术的可赢利性，是采用可持续做法的前提条件。需要建立资金集合制度和重视参与和民主的治理模式。

通过农业知识与科技提高可持续性和降低负面环境影响的投资机会包括：为有机和低投入体系提供更先进的技术；培育耐温和耐虫害的品种；研究农业生态系统服务功能与人类福祉之间的关系；对生态系统服务功能的经济和非经济评估；提高水利用效率，减少水污染；对现有和新出现的虫害及病原体采取生物控制措施；农业化学品的生物替代物；以及降低农业部门对化石燃料的依赖性。

人类健康和营养

健康、营养、农业和农业知识与科技之间的相互关联性影响到个体、社区和国家实现可持续性目标的能力。相互关联性来源于多种影响人口健康的压力源。需要采取广泛性的模式来确定如何正确利用农业知识与科技，以提高粮食安全和食品安全，减少各种传染病（包括新出现和反复爆发的疾病，例如疟疾、禽流感等）和慢性疾病，以及降低与职业有关的风险、伤害和死亡。建立稳健的农业、公共卫生和禽畜侦测、监测、监控和响应系统，有助于确定健康状况不佳带来的真正负担，提出具有成本效益、促进健康的战略和措施。此外，还需要投资维持和改进当前的系统和监管制度。

- 提高粮食安全:推行促进饮食多元化和增加微量营养素摄入量的政策和计划；以及开发和推广使用粮食生产、加工、保存和流动方面的现有技术和新技术。
- 提高食品安全：建立有效、协调一致和积极主动的国家和国际食品安全体系，确保动物、植物和人类的健康，例如投资建设足够的基础设施、

2.美国
3.英国

公共卫生及兽医能力、鉴别和控制生物及化学危害的立法框架；以及农民与科学家合作鉴别、监督和评估风险。

- 传染病负担：为了减轻负担，可加强农业、兽医和公共卫生系统的协作，增强系统能力，整合食品链各环节的跨部门政策和计划以减少传染病的传播，以及开发和推广应用新的农业知识与科技以鉴别、监督、控制和治疗疾病。

- 慢性病负担：为了减轻负担，在政策上要认识到改善人类健康和影响的重要性，包括通过食品标签和健康索赔方面的立法、国际协议和监管条例对食品生产进行监管，以及建立鼓励生产和消费对健康有利食品的机制。

- 职业卫生：为了改善职业卫生状况，可制定和实施健康及安全监管条例（包括童工法律和杀虫剂监管条例），解决跨国界问题（例如非法使用有毒农业化学品），以及进行健康风险评估，明确权衡提高生计好处、环境与增进健康之间的利弊关系。

公平

要通过农业知识与科技促进公平，需要投资开发适合具体情况的技术，以及向农民和其他农业人口提供非正规和正规的职业教育。将正规的科学和技术与当地及传统型知识都视作农业知识与科技系统的组成部分，在这样的环境下，可以让范围广泛的生产者和自然资源管理者更公平地获得技术。需要对科学机构、大学和研究机构建立激励机制，以扶持不同种类的农业知识与科技合作模式。关键的选择包括公平获取和使用自然资源（特别是土地和水）、对多功能性（包括生态系统服务功能）给予鼓励和回报的机制以及解决农业社区的脆弱性问题。此外，对农业知识与科技治理和相关组织的改革也非常重要，因为在社区层次的科学知识普及、技术机会的下放以及将农民关系的问题纳入研究重点设定和农民服务设计方面，这些组织扮演着至关重要的角色。要增进公平，各发展相关者，包括农民、农村劳工、银行、民间组织、商业公司和公共机构，必须发挥协同作用。在关于知识产权、基础设施、关税和社会及环境成本内部化的决策中，利益相关者的参与也非常重要。以小型生产者和城市贫民为重点（城市农业；城市消费者与农村生产者之间的直接联系纽带），以发展创新的当地网络为目标的新治理模式，以及政府权力下放，将有助于加强协同作用和互补能力。

优先投资于公平发展（例如扫盲、教育和培训），减少民族、性别和其他方面的不平等，对发展目标有促进作用。为了衡量投资回报率，相关指标必须提供比GDP更多的信息，并且要反映环境和公平方面的改进。使用不公平度指标来筛选农业知识与科技投资和进行结果监督，可以加强问责。例如，除了较为传统的增长、通货膨胀和环境指标外，基尼系数也可作为政策评估的一个公开标准。

投资

要实现发展及可持续性目标，必须为农业研究与发展和相关知识系统提供更多的经费，提高经费筹集机制的多元化，例如：

- 公共投资：全球性、区域性、国家和当地的公共货物进行公共投资；粮食安全及食品安全、气候变化和可持续性。为了提高日益稀缺的土地、水和生物资源的使用效率，需要对法律及管理能力的研究与发展进行投资。

- 对农业知识系统进行公共投资：促进交互式的知识网络（农民、科学工作者、行业及其他知识领域的相关者）；普及信息及通信技术；生态、进化、粮食、营养、社会和复杂系统科学；有效的跨学科；核心农业科学的能力；以及改进粮食系统各环节的终身学习机会。

- 如果存在广泛利用知识的方法，但是市场风险高，则应开展公私合作，以加强应用知识和技术的商业化，联合提供研发经费。

- 建立足够的激励和回报机制，鼓励私人及民间对有利于发展及可持续性目标的研发活动进行投资。

- 作为对这些投资的补充，许多发展中国家可能有必要定向增加对农村基础设施、教育和卫生的投资。

面对新的全球挑战，迫切需要增强、改造以及在可能的情况下新建政府间的独立科学网络，以处理下列问题：农业生产的气候预测；新出现疾病造成的人类健康风险；根据农业系统的变化（人口迁移），重新组织安排生计；粮食安全；以及全球林业资源。

主题

综合报告论述了对实现IAASTD的目标有关键意义、八个与农业知识与科技有关的主题：生物能源、生物技术、气候变化、人类健康；自然资源管理；贸易和市场；传统和当时知识以及基于社区的创新；以及妇女在农业中的作用。

生物能源

化石燃料成本不断攀升，能源安全问题，气候变化得到重

视，对经济发展的潜在正面影响，促使公众对生物能源寄以厚望。生物能源包括传统的生物能源，生物质发电、照明和取暖，以及下一代液体生物燃料。经济性和正面及负面的社会和环境外部效应差别很大，具体取决于生物质的来源、转化技术的类型和当地的具体情况。

发展中国家的千百万人口做饭和取暖依靠传统生物能源（例如薪柴），特别是在撒哈拉以南非洲和南亚地区，这主要是因为缺乏廉价的替代能源。对传统生物能源的依赖性带来了很大的环境、健康、经济和社会挑战。需要作出新的努力，以改进传统生物能源，加速向可持续性更高的能源形式过渡。

第一代生物燃料主要是以农作物（例如玉米和甘蔗）为原料的生物乙醇和生物柴油。生物燃料的成本只有在特别有利的情况下才具有竞争力，近年来产量迅速增加，主要是因为有生物燃料扶持政策。农作物用于生产燃料，可能会导致粮食价格上涨，削弱世界各地减少饥饿的工作。如果小型农户被边缘化或被迫离开土地，负面的社会影响可能会被加剧。从环境角度看，在净能源平衡和温室气体排放水平都存在很大的差异、不确定性和争论。长远看，对粮食价格的影响是可以降低的，但是第一代生物燃料大规模增产要占用大量的土地和水，由此导致的环境影响很可能会持续存在，需要加以解决。

下一代生物燃料（例如纤维素乙醇）和生物质液化技术，所使用的原料比第一代生物燃料更为丰富，成本更为低廉。单位能源产量占用的农业土地可能会因此减少，生命周期内温室气体排放量也会减少，有可能会减轻第一代生物燃料造成的环境压力。但是，下一代生物燃料技术目前还没有得到商业化生产的检验，环境和社会影响依然不确定。例如，使用原料和农业残留物生产生物燃料，可能会与将有机质留在可持续农业生态系统内的需求发生冲突。

生物发电和生物取暖是利用可再生能源的重要形式，与液体生物燃料和化石燃料相比，一般效率更高，温室气体排放更少。某些情况下，发酵器、气体发生器和直接燃烧装置可得到成功的应用（例如在不通电的地区）。生物发电和生物取暖有推广潜力，但是需要通过研发来降低成本，提高运行可靠性。无论是什么形式的生物能源，决策者都应参照能够实现的效益和其他可持续能源选择，对对社会、环境和经济成本作详细的全成本核算。

生物技术[4]

IAASTD采用《卡塔赫纳生物安全议定书》对生物技术的定义。生物技术的内涵很广泛，从常规的发酵和动植物繁育技术，到近年来组织培养、辐射、基因组学和标记辅助育种（MAB）或标记辅助选择（MAS）方面的创新，以及强化自然育种，对活生物体的操控均属于生物技术。最新的生物技术，称为“现代生物技术”，包括使用体外改造的DNA或RNA，以及融合来自不同分类科属的细胞，这些手段可以克服自然的生理性繁殖障碍或重组障碍。使用重组DNA技术制造转基因片段，然后插入染色体组，是目前最具争议的问题。最新的现代生物技术手段甚至无须改变DNA即可操纵遗传物质。

生物技术一直处在变化的最前沿。变化非常迅速，涉及的领域繁多，并且相关者之间缺乏透明的沟通。因此，对现代生物技术的评估落后于发展；得到的信息可能很零散而且相互抵触，而利害方面存在无法避免的不确定性。关于现代生物对环境、人类健康和经济的风险及效益，有许多目前还处于未知状态，因此众说纷纭，没有定论。

常规的生物技术，例如育种技术、组织培养、培植和发酵，得到普遍的接受和应用。1950年至1980年，在遗传修饰生物体（GMO）出现之前，即使不使用化肥，现代小麦品种的增产最高也可达到33%。基因约束领域的现代生物技术得到了广泛采用；例如，2000年工业酶市场达到15亿美元。现代生物技术在基因约束领域以外的应用，例如遗传修饰作物的使用，争议性要大得多。例如，部分遗传修饰作物数年的数据表明，增产效果差异很大，有些地方可增产10%至33%，在其他地方则产量下降。

生物技术研发的高层次驱动因素，例如知识产权框架，决定了提供什么产品。生物技术吸引了对农业的投资，但是也导致农业资源所有权的集中化。现代生物技术受到重视，可能会引起教育和培训计划的改变，减少其他核心农业科学领域的专业人员数量。明天的教育和培训机会是由今天的学生决定的，因此这种情况可能具有自我增强性。

转基因专利制度的采用带来了其他问题。专利等工具会导致成本增加，限制农民个人或公共研究机构进行实验，并可能对提高粮食安全和经济可持续性的当地做法造成破坏，发展中国家尤为如此。在这方面，现行知识产权工具特别令人担忧，最终会对留种、交换、销售以及获取独立研究界对影响进行分析和长期实验所需要专有材料造成抑制作用。农民会面临新的挑战：如果相邻农田内种植的非遗传修饰作物中发现遗传修饰作物，并导致种植非遗传修饰作物的农民丧失市场认证资格和损失收入，种植遗传修饰作物的农民要承担责任；种植传统作物的农民，如果所种作物中发现转基因，则可能要向遗传修饰种子生产商承担赔偿责任。

采用针对具体问题的生物技术研发模式，投资重点通过

4. 中国和美国

参与式的透明流程来确定，倾向于用多功能性解决方案来解决当地的问题。这些流程要求向公众提供新型的支持，让公众参与评估现代生物技术的技术、社会、政治、文化、性别、法律、环境和经济影响。生物技术应用于保持当地的专门人才和种质，使当地社区保留进一步的研究能力。此类研发的重点将是参与式育种项目和农业生态学，这是非常需要的做法。

气候变化

气候变化恰逢对粮食、饲料、纤维和燃料的需求日益增加之际，可能会对农业赖以存在的自然资源基础造成不可逆转的损害。气候变化与农业之间是双向影响的关系；农业在几个方面加剧气候变化，而且气候变化总体上对农业有负面影响。

在中高纬度地区，局部气温小幅度上升可能会小幅度提高作物的产量；在低纬度地区，气温小幅度上升则可能会造成减产。世界许多地方已经出现一些负面影响；气温如果进一步上升，会在所有地区造成越来越大的负面影响。缺水和水供应的时间性对生产的约束性会越来越大。由于气候变化，必须从新的角度来看待缺水，以应对降水增加和极端降水，季节内和季节间降水差异变大，以及所有类型生态系统的蒸发蒸腾率都增加的局面。极端季候事件（洪水和干旱）越来越多，预计频率和严重程度都会增加，可能会对所有地区的粮食及林业生产、粮食安全造成严重后果。未来因为宜居土地和淡水等自然资源而发生冲突的可能性非常大。气候变化正在影响植物、入侵物种、虫害和疾病媒介物的分布，许多人类、动物和植物疾病的发生范围和发生率都有可能增加。

为了减少温室气体排放，需要采取综合模式，规定公平的监管框架、差异化责任和中期目标。减排行动越早，力度越大，浓度就会越快达到稳定。减排措施无疑具有关键意义。气候系统存在惯性，减排措施发生作用有时间上的滞后。但是，气候的进一步变化无法避免，适应气候变化也非常重要。针对气候变化和促进可持续发展的行动，有一些重要目标是共同的，例如公平获取资源和适当的技术。

已经确定一些“双赢”的气候变化减缓机会，包括：土地使用模式，例如放慢农业向自然栖息地扩张的速度；造林、再造林、农林复合经营、农业生态系统和复原利用不足或退化的土地及牧场，以及土地使用选择，例如对农业土壤封存碳、减少氮肥的使用、提高氮肥使用效率；以及有效管理粪便，使用可增强禽畜消耗效率的饲料。监管和投资机会方面的政策选择包括：采用经济手段，鼓励通过减少毁林和森林退化和加强管理的方式，保持和增加森林面积；以及发展和利用可再生能量来源。任何后京都议定书制度都应该扩大范围，包含所有农业活动，例如减少因毁林和土壤退化而造成的排放，以充分利用农业和林业部门提供的机会。

人类健康

尽管健康、营养、农业和农业知识与科技之间存在明显和复杂的关联性，农业政策并非总是明确将改善人类健康作为目标。农业和农业知识与科技可能影响到的健康问题范围很广泛，包括营养不足、慢性疾病、传染病、食品安全和环境及职业健康。农民健康状况不佳，会降低农业生产率和发展及推广适当农业知识与科技的能力。营养不足和营养过剩都可能造成健康状况不佳。最近数十年全球粮食产量增加，但营养不足依然是一个重大的全球公共健康问题，全球疾病负担的15%来自营养不足。蛋白质能量和微量营养素营养不良依然是挑战，国家之间和国家内部的差异性很大。实行增加饮食多样性的政策和计划，开发和推广使用粮食生产、加工、保存和流通方面的现有技术和新技术，可以提高粮食安全。

农业知识与科技政策的做法提高了产量，创造了粮食加工的新机制。饮食质量和多样性下降和低营养密度的廉价食品，与全球肥胖症和慢性疾病发生率不断上升有关。饮食长期不合理，是慢性疾病的主要风险因素，而慢性疾病是全球最大的致死因素；80%的死亡发生在发展中国家。需要关注消费者和重视饮食质量，将两者作为主要的生产驱动因素，而不仅仅是关注数量或价格。策略包括通过财政政策（税收、贸易制度）鼓励有益健康的食品，以及对食品的生产和标示进行监管。

随着粮食供应的全球化（随之而来的是粮食流通和加工企业的集中化）和消费者意识的不断提高，需要建立有效、协调一致和主动型的国家食品安全体系。农业知识与科技可以解决的健康问题包括食品系统中存在的以及与大规模家禽畜养殖有关的杀虫剂残留、重金属、激素、抗生素和各种添加剂。

无论是内销还是外销，都必须加强食品安全措施，可能带来很大的成本。有些国家可能需要援助以支付食品控制成本，例如监控和检验成本，以及与市场拒绝被污染商品相关的成本。在生态系统与人类健康上采取广泛性的模式，可促进鉴别动物、植物和人类健康风险和确定适当的农业知识与科技应对方案。

农业的职业死亡人数全世界每年至少有170,000人：占死亡事故的一半。机械和设备（例如拖拉机和收割机）操作人员的伤亡率最高，特别是农村劳工。其他重要的健康危险包括农业化学品中毒、人畜共患疾病、药剂中毒或过敏、以及噪音、振动和人机工程危险。要改善职业健康，必须制定和执行健康及安全监管法规，更加重视健康防护。政策上应明确权衡生计好处和环境及职业健康风险。

许多新出现和反复爆发的传染病，其发生率和发生范围受作物种植和畜牧养殖系统集约化的影响。如果疾病在人类或动物群体内广泛传播，或从动物传染源传播到人类宿主，可能会产生严重的社会经济影响。 导致疾病爆发的许多因素将继续存在，甚至加剧。整合食品链各环节的政策和计划，有助于减少传染病的传播；必须制定稳健的侦测、监测、监控和响应计划。

自然资源管理[5]

自然资源（特别是土壤、水、动植物多样性、植被、可再生能量来源、气候和生态系统服务功能）对于社会系统的结构和功能以及环境可持续性而言，是最根本的资本，是地球上生命的命脉。全球农业发展的关注领域历来很狭窄，以提高生产率为中心，而不是站在更有整体性的角度，将自然资源管理与粮食及营养安全相结合。最好是采取整体性或系统性的模式，原因是这种模式可以解决与粮食及其他生产系统在不同生态环境、地点和文化中的复杂性相关的棘手问题。

对于自然资源管理中的破坏性利用问题，例如因为使用化肥和自然过程而导致土壤肥力下降，农业知识与科技往往有很清楚的解决办法。但是，要解决自然资源挑战，需要背景、技能和重点任务各不相同的利益相关者采取新的和创新的模式。但是，要在多个不同尺度上和跨越不同的社会及物质环境进行合作，这方面的能力发展还不充分。例如，农民与研究人员或决策者之间几乎不存在进行双向学习的机会。因此，农民和民间人士很少参与制定自然资源管理政策。与私营部门进行基于社区的合作，目前还处于发展的早期阶段，是未来一个很有希望的新方式。

以下是自然资源管理方面建议优先考虑的行动选择：

- 利用现有的农业知识与科技，鉴别和消除一些因自然资源管理不当带来的导致生产率下降的根源原因，并采取多学科联合作业模式发展新的农业知识与科技，以进一步理解自然资源管理的复杂性。在这个过程中，需要采取具有成本效益的方式对自然资源资本的利用趋势进行监控。
- 增加投资（研究、培训及教育、伙伴式合作政策），促进对自然资源退化的社会成本和生态系统服务功能的价值的认识，从而增强自然资本。
- 推广“农业知识与科技-自然资源管理示范研究中心”模式，以协助降低自然资源管理的破坏性利用程度，以及通过研发、监控和政策制定方面创新的双向学习机制，制定更合理的资源弹性、保护和再生策略。
- 创造基础环境，以增强自然资源管理能力，增进利益相关者及其组织对自然资源管理的理解，从而与公共及私营部门合作确定自然资源管理政策。
- 发展农业知识与科技人员网络（非政府组织、农民组织、政府、私营部门），促进长期性的自然资源管理，从而提高自然资源的公益性效益。
- 全球化与当地化相结合，将当地产生的自然资源管理知识和创新与公共及私营农业知识与科技联系在一起。

如果各利益相关者在不同尺度上积极参与，发展并以创造性方式使用农业知识与科技，就可以逆转滥用自然资本的行为，为子孙后代的利益而合理使用和恢复水体、土壤、生物多样性、生态系统服务功能、化石燃料、大气质量。

贸易和市场

通过市场和贸易政策，提高农业及农业知识与科技系统推动发展的能力、加强粮食安全、提高环境可持续性，以及协助小型农作部门实现赢利，发挥减贫先锋的作用，是世界各地都面临的紧迫挑战。

农业贸易可以为穷人带来机会，但是现行方法导致国家之间和国家内部存在严重的分配问题，而且许多情况下都是不利于小型农户和农村生计。这些国家要从农业贸易中获益，必须通过政策框架的差异化和制度安排来解决这些分配上的差异。目前越来越让人担心的是，在本国的基本制度和基础设施到位之前，向国际竞争开放本国农业市场，会损害农业部门，并对减少贫困、粮食安全和环境造成潜在的长期负面影响。[6]

改革贸易政策，提高全球贸易系统的公平性，不仅对可持续性及发展目标有积极的作用，而且提供特别及差别待遇，在减少与贸易有关的同时，增强穷人实现粮食安全及发展目标的能力。保持国家政策的灵活性，可以让国家能够平衡贫穷消费者（城市贫民和无地农民）和小型农户的需求。提高小型农户在全球、区域和当地市场链中所占的价值比例，对于实现发展及可持续性目标有重要意义。此外，通过扶持性的贸易政策，小型农作部门和农业企业也能获得新的农业知识与科技。[7]

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5. 捕捞渔业和林业在自然资源管理方面受到的重视不如其他方面
6. 美国
7. 加拿大和美国

发展中国家可以获益于：取消对其拥有比较优势之产品的壁垒；降低工业化国家不断攀升的加工后初级商品关税；为最不发达国家提供更深入的优惠市场准入；增加对农村基础设施和产生公共货物农业知识与科技的公共投资；以及改善贫穷生产者的信贷渠道、农业知识与科技资源获取和市场准入。要推进发展议程，必须补偿因为降低关税而损失的收入。

农业产生很严重的环境外部效应，其中许多是因为市场无法通过评估环境及社会损害的价值来促使人们去实现可持续性。农业知识与科技逆转这一趋势的潜力很大。为了使农业知识与科技在降低农业的环境影响方面发挥更大作用，可以采取下列市场和贸易政策：取消扭曲资源利用行为的补贴；对外部效应征税；更合理地界定财产权；以及建立农业环境服务的有偿使用机制和市场，包括发放碳融资，以鼓励可持续农业。

农业部门的治理质量和透明度，包括利益相关者更多地参与农业知识与科技决策，具有重要意义。加强发展中国家的贸易分析和谈判能力，为评估拟签订贸易协议的利弊提供更好的工具，对于改善治理有重要意义。

传统型知识和本地知识以及基于当地社区的创新方法

如果农业知识与科技同时针对因地点不同而不同、并且不断演变的生产、赢利性、生态系统服务功能和粮食系统，则需要整合正规、传统型知识和当地知识。在实现可持续性及发展目标所需要的实践知识积累和知识产生能力中，传统型知识和当地知识占很大的一部分。土著和当地社区的传统型知识、特征和做法得到《联合国生物多样性公约》的肯定，被认为是体现了适宜保护和可持续利用生物多样性的生活方式；此外，还被认为是地域特有文化和特征中所蕴涵物质世界与非物质世界有目的互动的产物。当地知识是指存在于世界各地农村人群当中的能力及活动。

传统型知识和当地知识是发展变化的，有时未必正确，但已经产生了广泛的积极影响，并且有详尽的记载。在知识产生、技术发展和创新中进行参与式的协作，可以为基于科学的技术发展增添价值，例如安第斯的农民-研究人员团体、参与式植物育种项目、野生和半野生树种的驯化以及水和土壤管理。

有助于实现可持续性及发展目标、行之有效的行动选择包括：当地和传统生物材料保护、开发和利用中的协作；鼓励科学工作者与正规研究机构与当地和土著居民及其组织合作，以及发展这方面的能力；加强关于土著及当地知识以及专业和基于社区的档案保管的科学教育；以及评估该等知识和做法。对于进行适合文化特点的整合，现代信息及通信技术（ICT）在有效协作中扮演的角色具有关键意义，值得给予更多的投资和支持。世界知识产权组织在进行国际知识产权制度的谈判，为有效处理涉及传统型知识、遗传资源和基于社区的创新的情况提供更大的范围，谈判的进展为有效协作和整合创造了条件。土著及当地居民的知识和基于社区的创新被盗用的事例说明，有必要分享关于现有的专门制度和监管框架的信息。

妇女在农业中的作用

男女分工（男女之间由社会构造成的关系）是世界各地现有农作系统的一个组织要素，也是正在进行的农业结构改造的决定性因素。农业市场自由化和农业工作重组的当前趋势，以及环境及可持续性问题的出现，正在重新定义性别与发展之间的关系。在农业生产和收获后活动中，妇女占劳动力的比例在20%至70%之间；在许多发展中国家，妇女的参与程度正在越来越高，特别是因为外向型灌溉农业的发展，外向型灌溉农业对包括流动工人在内的女性劳动力的需求不断增加。

这些发展变化在某些方面带来了好处，但是总体而言，世界各地最大比例的农村妇女依然面对健康及工作条件不断恶化、教育机会和自然资源控制权有限、就业不稳定和低收入的局面。造成这种局面的因素很多，包括：农业市场竞争日趋剧烈，对廉价灵活劳动力的需求随之增加；自然资源承受的压力越来越大，关于自然资源的冲突越来越多；政府对小型农场和支持不断减少；以及经济资源发生对大型农业企业有利的重新配置。其他因素包括与自然灾害及环境变化有关的风险越来越大，水供应状况恶化，职业及健康风险不断加剧。

自第一届世界妇女大会（1975年）召开以来，作为发展进程的一部分，为了更好地解决性别问题，在国家和国际性政策方面取得了进展，但是依然需要采取紧急行动，在农业知识与科技政策和做法中实现性别及社会公平：

- 增强公共机构和非政府组织的能力，以了解妇女以不断变化的形式参与农业活动的情况以及妇女与农业知识与科技的关系；
- 重视向妇女提供获得教育、信息、科学和技术及推广服务的渠道；
- 通过法律措施、适当的信贷计划、支持妇女创造收入的活动和加强妇女组织及网络，改进妇女对经济和自然资源的使用权、所有权和控制权；
- 在市场制度和政策上，在价值链中明确赋予妇女

农民团体优先地位，从而增强妇女从市场化机会中获益的能力；

- 支持农村地区的公共服务和投资，以改善妇女的生活及工作条件；
- 技术发展政策上优先针对农村妇女需求，肯定妇女在粮食生产和生物多样性保护反面的知识、技能和经验；
- 评价农业做法和技术的影响，包括杀虫剂对妇女健康的影响，以及减少使用量和接触量的措施；
- 确保在所有层次农业知识与科技决策中的男女平衡；以及
- 建立问责机制，就上述领域的进展对农业知识与科技组织进行问责。

附录A

对整个报告的保留意见

澳大利亚：澳大利亚确认IAASTD行动和报告是一个及时而重要的多利益相关方和多学科研究，旨在评估和加强农业知识与科技在应对全球发展挑战方面的作用。然而，该报告提出了许多评论和看法，澳大利亚无法同意报告中的所有见解和方案。因此，澳大利亚认为该报告是一个有益的贡献，将用于考虑未来通过农业知识与科技确保经济增长、缓解饥饿与贫困的重点和范围。

加拿大：加拿大政府确认IAASTD作者、秘书处、利益相关方所进行的重要工作，同时认为《综合报告摘要》是对有关政策辩论的重要而宝贵贡献，而且这方面的辩论有必要在国家和国际级别的进程中继续下去。虽然加拿大政府确认通过妥协进程取得了很大进展，但仍存在一些需要更有证据、更均衡、更客观分析的说法和观点。然而，加拿大政府仍建议提请各国政府注意《综合报告摘要》，据以考虑农业知识与科技的重要性及其在促进经济增长和减少饥饿与贫困方面的巨大潜力。

美利坚合众国：美国与其他国家政府一致认为农业知识与科技在实现IAASTD目标方面具有关键性的重要作用。我们赞扬报告作者、编辑人员、共同主席、秘书处所作的不懈努力。我们欢迎IAASTD让来自各种利益相关方的人士首次会聚一堂，共同完成这项极为重要的工作。我们对各方发表的不同意见和有益的辩论表示尊重。

鉴于美国对于报告有具体和实质性的担忧之处，因此无法对其表达毫无保留的认可，而且我们已经指出这些担忧之处。

美国认为《评估报告》有可能促进更多讨论和研究。此外，我们确认报告对于各国政府思考农业知识与科技在提高可持续性经济增长率和减少饥饿与贫困所发挥作用方面作出了积极的贡献。

对个别段落的保留意见

1. 博茨瓦纳指出：这个问题在非洲撒哈拉以南地区尤其突出。

2. 美国希望把这句话改写成：“在尚未充分制定关于国际知识产权的国家政策并大力进行国际知识产权管理的国家，不断推进国际知识产权制度的进步。”

3. 英国指出：目前对于粮食主权尚未制定国际定义。

4. 中国和美国认为：这个部分没有做到完全不偏不倚，而且不够全面。

5. 美国希望这个段落增加下面这句话：通过向国际竞争者开放国家农业市场，能够带来经济上的好处，但如果没有基本的国家机构和基础设施，也可能在减少贫困、加强粮食安全、保护环境方面造成长期性不利影响。

6. 加拿大和美国希望采纳以下这句话：“通过提供援助帮助受贸易开放影响的低收入国家适应和利用贸易开放，对于推进发展工作具有至关重要的意义。”

Annex B

Reservations on Executive Summary

Australia: Australia recognizes the IAASTD initiative and reports as a timely and important multistakeholder and multidisciplinary exercise designed to assess and enhance the role of AKST in meeting the global development challenges. The wide range of observations and views presented however, are such that Australia cannot agree with all assertions and options in the report. The report is therefore noted as a useful contribution which will be used for considering the future priorities and scope of AKST in securing economic growth and the alleviation of hunger and poverty.

Canada: The Canadian Government recognizes the significant work undertaken by IAASTD authors, Secretariat and stakeholders and notes the Executive Summary of the Synthesis Report as a valuable and important contribution to policy debate which needs to continue in national and international processes. While acknowledging considerable improvement has been achieved through a process of compromise, there remain a number of assertions and observations that require more substantial, balanced and objective analysis. However, the Canadian Government advocates it be drawn to the attention of governments for consideration in addressing the importance of AKST and its large potential to contribute to economic growth and the reduction of hunger and poverty.

United States of America: The United States joins consensus with other governments in the critical importance of AKST to meet the goals of the IAASTD. We commend the tireless efforts of the authors, editors, Co-Chairs and the Secretariat. We welcome the IAASTD for bringing together the widest array of stakeholders for the first time in an initiative of this magnitude. We respect the wide diversity of views and healthy debate that took place.

As we have specific and substantive concerns in each of the reports, the United States is unable to provide unqualified endorsement of the reports, and we have noted them.

The United States believes the Assessment has potential for stimulating further deliberation and research. Further, we acknowledge the reports are a useful contribution for consideration by governments of the role of AKST in raising sustainable economic growth and alleviating hunger and poverty.

Reservations on Individual Passages

1. Botswana notes that this is specially a problem in sub-Saharan Africa.
2. The USA would prefer that this sentence be written as follows "progressive evolution of IPR regimes in countries where national policies are not fully developed and progressive engagement in IPR management."
3. The UK notes that there is no international definition of food sovereignty.
4. China and USA do not believe that this entire section is balanced and comprehensive.
5. The USA would prefer that this sentence be reflected in this paragraph: "Opening national agricultural markets to international competition can offer economic benefits, but can lead to long-term negative effects on poverty alleviation, food security and the environment without basic national institutions and infrastructure being in place."
6. Canada and USA would prefer the following sentence: "Provision of assistance to help low income countries affected by liberalization to adjust and benefit from liberalized trade is essential to advancing development agendas."

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—Professor Bob Watson, director, IAASTD

The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), on which *Agriculture at the Crossroads* is based, was a three-year collaborative effort begun in 2005 that assessed our capacity to meet development and sustainability goals of:

- Reducing hunger and poverty
- Improving nutrition, health and rural livelihoods
- Facilitating social and environmental sustainability

Governed by a multi-stakeholder bureau comprised of 30 representatives from government and 30 from civil society, the process brought together 110 governments and 400 experts, representing non-governmental organizations (NGOs), the private sector, producers, consumers, the scientific community, multilateral environment agreements (MEAs), and multiple international agencies involved in the agricultural and rural development sectors.

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