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THE STATE OF FOOD AND AGRICULTURE

PAYING FARMERS FOR ENVIRONMENTAL SERVICES

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Contents

Part II
World and regional review: a longer-term perspective

Part III
Statistical annex

TABLES

BOXES

FIGURES

MAPS

Foreword

Despite unprecedented global economic growth, 1.1 billion people continue to live in extreme poverty and more than 850 million people suffer from chronic hunger while ecosystems are being threatened as never before. Poverty reduction, food security and environmental sustainability have all moved to the top of a crowded international agenda, as reflected in the Millennium Development Goals. At the same time, the close relationships among poverty, hunger and ecosystem degradation are becoming ever clearer. Most of the world's poor people live in rural areas, many of them in marginal environments, and depend on agriculture for their livelihoods. Agricultural development is therefore crucial for alleviating poverty on a large scale. Such development would also require that the natural resource base on which the poor depend for their livelihoods be preserved and enhanced.

Services provided by ecosystems are essential, not only for poverty reduction, but indeed for human survival. The Millennium Ecosystem Assessment, as well as reports arising from other more recent studies such as *Water for food, water for life* (Comprehensive Assessment of Water Management in Agriculture, 2007) and *Livestock's long shadow: environmental issues and options* (FAO, 2006a), have painted a stark picture of current ecosystem degradation and the potential consequences of a continuation of current trends.

Agriculture often lies at the centre of the complex set of problems surrounding ecosystem degradation. It contributes to the problems and suffers from many of the consequences, but at the same time it offers possible solutions. Modern agriculture has been very successful in providing the ecosystem services for which markets exist – crops, livestock, fish, and forest products – in ever greater quantities. But the expansion of these services has often been achieved at a high cost to other ecosystem services, such as regulation of climate, water and biodiversity, which are necessary to sustain human life. Enhancing these services, while producing a further doubling of conventional output to meet the demands of a growing global population, is one of the great challenges facing world agriculture in the twenty-first century.

The State of Food and Agriculture 2007 highlights the potential of agriculture for enhanced provision of ecosystem services that are not usually compensated for by the market. When we think of farmers, we typically think of the food and fibre that they produce and that they either consume or sell on markets to generate an income. But the production processes can also result in impacts on other ecosystem services that are not traded in markets, referred to in this report as "environmental services". Some may be positive, such as groundwater recharge and scenic landscapes; others may be negative, such as water pollution by plant nutrients and animal waste, and soil erosion from poorly managed croplands or overgrazed hillsides. As agricultural production expands, these negative effects can develop into increasingly serious problems. A fundamental question concerns how farmers can be encouraged to reduce negative side-effects while meeting the growing demands for food and fibre. At the same time, changes in agricultural practices may also contribute to addressing environmental problems generated outside agriculture, for example, by offsetting greenhouse gas emissions from other sectors. A relevant question, therefore, is how farmers can be induced to increase their provision of this type of service.

Farmers constitute the largest group of natural resource managers on Earth. They both depend on and generate a wide array of ecosystem services. Their actions can both enhance and degrade ecosystems. Thus, understanding what drives their decisions is critical in designing new strategies that enhance ecosystem services and contribute to sustainable growth.

Paying farmers for the environmental services they provide is an approach that

has generated growing interest worldwide from policy-makers and non-governmental and private decision-makers. This strategy is akin to viewing environmental protection as a business transaction. This perspective is not without controversy, but it must be kept in mind that many services are degraded precisely because they are free to use but costly to provide.

Payments for environmental services have also attracted attention for their potential to mobilize new sources of finance to support sustainable environmental management in developing countries and to contribute to poverty reduction and agricultural development.

This report examines this approach to enhancing environmental services through the lens of managing agriculture to meet the agricultural and environmental demands of the future. In addition, it examines the potential of this mechanism to contribute also to poverty reduction. Of the numerous services to which agriculture can contribute, this report highlights three: climate change mitigation, enhanced quality and quantity of water provision and the preservation of biodiversity.

One of the points made in this report is that agriculture can be an important source of improvements in the environmental services provided to humanity by ecosystems. Agriculture employs more people and uses more land and water than any other human activity. It has the potential to degrade the Earth's land, water, atmosphere and biological resources – or to enhance them – depending on the decisions made by the more than 2 billion people whose livelihoods depend directly on crops, livestock, fisheries or forests.

Ensuring appropriate incentives for these people is essential. More and better information can influence farmers' decisions about their practices in ways that lead to environmental improvements, especially when changes in farming and land-management practices that enhance ecosystem services would also be profitable for the farmers themselves. However, should such changes imply a reduction in farmers' incomes, they will only be implemented through effectively enforced regulations or, voluntarily, when some form of compensation is provided. In the latter case, payments to farmers from the beneficiaries can provide an answer. The relative merits and effectiveness of the different approaches vary for different environmental services. Key challenges in implementing the payments approach lie in creating a mechanism for valuing the relevant service where none exists, identifying how additional amounts of the service can be provided most cost-effectively, and deciding which farmers should be paid for providing more of it and how much they should be paid.

Payments for environmental services can increase the incomes of farmers who produce the services. Other poor households may also benefit, for example from increased productivity of the soils they cultivate or improved quality of the water they drink. But the distribution of benefits depends on who produces the environmental services and where. Environmental service payments can contribute to alleviating poverty, but such poverty-reducing effects are neither automatic nor universal. In some cases, payments may also have adverse impacts on poverty and food security, for example if they reduce agricultural employment or increase food prices. Furthermore, the administrative costs of payment schemes that fully integrate the poorest farmers may be large, while other barriers, such as absence of clearly defined property rights, may prevent the poor from participating. A major challenge is to design payment schemes in such a way as to avoid negative impacts on the poor and to enable poor farmers to participate.

In order to maximize the benefits in terms of enhanced provision of environmental services, minimize the costs in terms of foregone production and income and ensure the broadest possible participation by poor farmers, careful analysis of the underlying science – both natural and social sciences – will be required, as well as innovative institutions.

Confronting the interrelated challenges of eradicating poverty and hunger and preserving the world's ecosystems will continue to require purposeful and decisive action on a range of fronts. Payments for environmental services are not widely

implemented in developing countries at present, and much work remains to be done to unlock their full potential. In conjunction with other tools, however, they hold significant promise as a flexible approach to enhancing the role of farmers worldwide in sustaining and improving the ecosystems on which we all depend. By clarifying the challenges that need to be addressed in implementing such an approach, it is my hope that this report will help illuminate the way forward.

Jacques Diouf
FAO DIRECTOR-GENERAL

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Abbreviations and acronyms

ASB	Alternatives to Slash-and-Burn
CATIE	Tropical Agricultural Research and Higher Education Center (Costa Rica)
CBD	Convention on Biological Diversity
CDM	Clean Development Mechanism
CER	certified emission reduction
CIFOR	Center for International Forestry Research
CRP	Conservation Reserve Program (United States of America)
EU	European Union
FSC	Forest Stewardship Council
GEF	Global Environment Facility
GDP	gross domestic product
ICRAF	World Agroforestry Centre
IFPRI	International Food Policy Research Institute
IPCC	Intergovernmental Panel on Climate Change
ISRIC	International Soil Reference and Information Centre
IUCN	World Conservation Union
LULUCF	land use, land-use change and forestry
NGO	non-governmental organization
OECD	Organisation for Economic Co-operation and Development
PES	payment for environmental services (programme)
PSA	Pago de Servicios Ambientales – Payments for Environmental Services (Costa Rica)
PSAH	Pago por Servicios Ambientales Hidrológicos – Payment for Hydrological Services (Mexico)
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe

UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USDA	United States Department of Agriculture
WHO	World Health Organization
WTO	World Trade Organization
WWF	World Wide Fund for Nature (formerly World Wildlife Fund)

Explanatory note

The statistical information in this issue of *The State of Food and Agriculture* has been prepared from information available to FAO up to July 2007.

Dates and units

The following forms are used to denote years or groups of years:

2004/05 = a crop, marketing or fiscal year running from one calendar year to another

2004–05 = the average for the two calendar years

Unless otherwise indicated, the metric system is used in this publication.

"Billion" = 1 000 million

Maps

The State of Food and Agriculture 2007 includes a set of four global and four regional maps produced by FAO using geographic data layers generated internally as well as externally. The maps are composed of intersections of data layers representing indicators of environmental service supply, agricultural production and productivity and poverty. They are intended to give an indication of the spatial distribution of agro-ecological and socio-economic conditions relevant to the potential supply of environmental services. The resolution of the maps is 5 arc-minute. The low resolution precludes any definitive conclusions about the actual on-the-ground conditions in specific sites. However, the maps can provide a broad indication of the geographic distribution of selected indicators. The maps are made available for viewing on Google Earth via the FAO GeoNetwork and can be accessed using the URL for each map. JPEG images of the maps can also be downloaded from the GeoNetwork. Further technical information on the data layers used in constructing each map can be obtained from: http://www.fao.org/es/esa/en/pubs_sofa.htm

Statistical annex

The statistical annex contains a selection of data from the *FAO Statistical Yearbook 2005/06*. A mini-CD-ROM containing the full *Yearbook* is attached to the inside back cover of this report. A new edition of the *Yearbook* will be available in early 2008 and can be accessed at http://www.fao.org/es/ess/yearbook. The source for the data on food and agriculture is the FAOSTAT database (http://faostat.fao.org). More information on concepts, definitions, country notes, etc., can be found at the same address. Non-FAO sources are indicated in the notes on individual tables.