

CHAPTER XIV

Conclusions

Grasslands occupy approximately half of the ice-free land area of the world, make up about 70 percent of the world's agricultural area, and are an important agricultural resource, particularly in areas where people are among the most food insecure. Despite their significant potential for carbon (C) sequestration and emission reductions, they are currently not included in international agreements to reduce greenhouse gas (GHG) emissions. The chapters in this book have presented new data on management systems that could sequester C in the soil or biomass, assessed the policy and economic aspects of C sequestration in grassland soils, and evaluated limitations and those techniques required to capitalize on grassland C sequestration as a viable component of mitigation strategy.

Taken as a whole, the papers published here have suggested that there are reasons to be optimistic about the potential of grasslands to sequester C to offset greenhouse gas (GHG) emissions. Jones (Chapter I) suggests that the mitigation potential in European grassland C stocks is substantial and that management is key to determining whether they can act as a source of CO₂ to the atmosphere or a sink under future climates. Franzleubbers and Amézquita *et al.* (Chapters VIII and VII) offer new assessments as to how management practices in mesic pastures affect ecosystem C stocks; both authors find significant potential for sequestration. A common objection to grassland C sequestration is that the costs of changing management practices or verifying C stocks changes may outweigh the benefits. Ibrahim *et al.* (Chapter X) demonstrate the C increases associated with managed silvopastoral systems while increasing biological diversity and livelihoods. Moran and Pratt (Chapter XI) show that costs associated with the adoption of many emission reduction practices in the United Kingdom are low or sometimes negative. To the extent that grassland management practices can enhance forage yield and ecosystem processes, they too may cost less to implement with good grazing management and could lead to enhanced

adaptation to climate variation and climate change (Neely, Bunning and Wilkes, Chapter XIII). Milne *et al.* (Chapter V) discuss a new tool designed to assess C benefits that should substantially lower transaction costs associated with documenting changes in C stocks. The tool is intended to benefit small farmers and pastoralists living in rural areas to foster adequate benefit sharing and proper management of natural resources. By providing a standardized C benefits protocol, the Carbon Benefits Project will allow a consistent comparison of different sustainable land management projects by the United Nations Global Environmental Facility and other donors. It would also bring developing countries and project managers closer to being able to gain rewards for land management activities that sequester C and reduce GHG emissions. Such a tool could broaden acceptance of practices that sequester C and enhance revenue for smallholders. At the global level, Petri *et al.* (Chapter II) provide a C pool map and corresponding potential C sequestration, taking into account different levels of grassland improvement potential.

In order to ensure that policies and practices intended to lead to C sequestration in grasslands act as intended, the chapters of this book have identified several challenges. Firstly, data are lacking for many rangeland areas around the world (Gifford, Chapter III; Wilkes and Tennigkeit, Chapter XII). Large-scale assessments of technical potential are typically extrapolated from peer-reviewed studies to cover rangelands representing different physioclimatic, various management practices and differing land-use histories. Thus, the utility of compiled information may be of limited value for a given location. Secondly, economic assessments of costs to adopt new management practices are similarly limited (Wilkes and Tennigkeit, Chapter XII). Wilkes and Tennigkeit also point out that high initial costs may not be compatible with *ex post* payments and that households will have differential economic capacity to adopt new management practices. Uncertainty about land tenure among smallholders and weak institutions are key issues that discourage potential participants from adopting C sequestering practices (Grieg-Gran, 2005, No. 7705). Lastly, it should also be pointed out that management for grassland C sequestration could lead to unintended consequences for emissions of other GHGs (Soussana, Chapter VI) while also leading to important environmental co-benefits. These aspects of grassland management warrant further study.



RECOMMENDATIONS AND THE WAY FORWARD

The Fifteenth Conference of the UNFCCC Parties did not advance agreement on policies and procedures for grassland C sequestration, but promising advances were made with respect to advanced REDD (Reducing Emissions from Deforestation and Forest Degradation) programmes that could foster future developments for grassland C sequestration. Whether agriculture and food security are within the negotiated text in Cancún, Mexico (COP 16, 2010) is not certain but it will be important to ensure evidence related to the potential for grasslands C sequestration is used by the relevant scientific bodies. Despite the uncertainty about whether and how national and international policies to encourage mitigation through grassland C sequestration arrive, there are many efforts that can be undertaken in the meantime. There are “no-regrets” strategies that could benefit grazing-land managers today, while preparing them for participation in C markets of the future.

Research, practice and policy strategies must simultaneously be put in place to fully establish the appreciation for and use of grasslands and silvopastoral systems as a significant means of increasing ecosystem health and food and nutrition security, and also to ensure that grassland managers are recognized for their contribution to sustainable food-producing landscapes.

Addressing knowledge gaps

A top priority is to make better use of existing data on grassland management impacts on soil C stocks. Data limitations lead to large levels of uncertainty in some regions. Broader synthesis of existing data that have been overlooked to date because of language, format, publication outlet, etc. should be a top priority. Collection of new data should provide much-needed baselines following rigorous, replicated sampling schemes that allow for future resampling and coordinated collection of information about costs of adoption of practices, measurements or accurate assessments of effects on other GHGs as well as environmental co-benefits including water infiltration and storage capacity, increased biological diversity and adaptation to climate variation and change.

A protocol is needed for adequately measuring and monitoring C dynamics in grasslands and silvopastoral systems. Pilot projects will add value to the global grasslands and silvopastoral systems knowledge base and these should take place where implementation of changes in practices will most likely lead to enhanced forage production and biological diversity, a more effective

water cycle and greater income, where practices can be sustained over time, and where land tenure issues can be adequately addressed to ensure that they do not undermine implementation efforts. Pilot efforts should have a mitigation and adaptation component.

Development of marginal abatement cost curves for a variety of practices feasible within important geographical regions could be very useful for demonstrating the benefits of grassland C sequestration. Comprehensive local assessment of benefits (C sequestered, productivity enhancements, environmental co-benefits) versus costs (investment required, other GHG emissions, etc.) would enable national bodies to evaluate the role of grassland C sequestration as a component of nationally appropriate mitigation actions (NAMAs). Coupled with well-justified, cost-effective protocols for assessing C sequestration in rangelands (following the pathway described in Fynn *et al.*, Chapter IV), this information could facilitate development of bilateral C trades or the opportunity to engage in emerging C markets. Better broad-scale grassland statistics on grassland conditions, management and productivity would aid in directing resources to those areas with the opportunities for the most substantial impacts on grassland productivity and C sequestration. Such an effort is recently underway at FAO. Results from that work are intended to inform policy makers and to feed into future comprehensive global scale analyses such as the IPCC Fifth Assessment Report.

Good management in practice

Practitioners and those who serve them must be fully knowledgeable about good grassland and silvopastoral systems management, leading to improving ecosystem health, food security and mitigation, and resilience and adaptation to climate change impacts. This warrants the participatory development of grassland and silvopastoral systems management guidelines as well as capacity development tools and opportunities such as pastoral field schools, land care coalitions and innovation platforms for equipping farmers, pastoralists and extensionists towards this end.

Informed policies

Awareness must be raised for donors, policy-makers and consumers. Evidence for policy development at national and international level is needed in order to promote good grassland and silvopastoral management as instrumental to achieving agricultural and environmental goals. In the context of national pilot efforts, relevant country plans (national development plans, NAMAs,

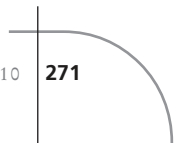


national action plans [NAPAs], Poverty Reduction Strategy Papers [PRSPs] and relevant policies related to grasslands) can be reviewed and revised to include the importance of grasslands for sustainable development and food security. Furthermore, grasslands can contribute to commitments of local authorities at the subnational level for their role in enhancing sustainable local food sheds and climate change adaptation at the landscape level. At the global level, evidence for policy-makers must be in place to ensure recognition within the United Nations Convention on Biological Diversity (UNCBD), the UN Convention to Combat Desertification (UNCCD) and the UN Framework Convention on Climate Change (UNFCCC) of the importance of grassland and silvopastoral systems and their managers to meet convention objectives. In the run-up to the Earth Summit 2012 (Rio+20), there is an important opportunity to highlight the contribution of grasslands and silvopastoral systems in achieving sustainable development goals.

A global platform

The Grasslands Carbon Working Group (GCWG), facilitated by FAO, is positioned to take these efforts forward by serving as a clearinghouse for information on science, practice, policy and finance mechanisms related to the promotion of grasslands as a critical avenue for mitigation and adaptation strategies. The purpose of GCWG is to provide up-to-date science- and market-based information for land managers, scientists, development practitioners, traders and policy-makers in support of sustainably managed grasslands as a means to adapt to and mitigate the impact of global climate change.

GCWG serves as a multistakeholder innovation platform for network national, regional and global partners on good practices related to grasslands by providing a resource on pilot projects, best practices, grassland management practices, measurement and monitoring protocols, and economic and policy information. The group aims to highlight the role of grasslands in contributing to economic, environmental and social resilience while mitigating GHG emissions. It seeks to gather evidence on the role that C sequestering practices might play in combating desertification, enhancing biodiversity and improving water cycles in a changing climate. Advocacy efforts will be undertaken in each of the associated conventions (UNFCCC, UNCCD and UNCBD) as well as at Rio+20. GCWG is elaborating examples of best management practices at local, ecosystem, national and global levels with the intention of facilitating the ability of farmers and pastoralists to adopt practices that enhance their well-being and contribute to global public goods.



To access, join and contribute to GCWG, please see the Web site at <http://www.fao.org/agriculture/crops/core-themes/theme/spi/gcwg/en/>.