

Farming without harming by John Williams



As world population is set to expand from 6.7 billion to 9.2 billion by 2050, projected demand for food will require agricultural and fisheries production to double over the next fifty years.

Substantial increase in production must be achieved with a decreasing impact on the natural resources and environment^(1,2). Producing our foods and ensuring that we also reduce the number of people who are malnourished in light of all the environmental pressure that must be managed is a huge challenge.

THE ISSUES....

Some issues we face include^(1,2):

1. The rising price of oil, fertilisers and pesticides, diminishing supplies of phosphorus, and a crisis in water supply. Genetically improved crops have increased yields but were successful due to access to relatively cheap oil based fertilisers, pesticides and abundant water. Monoammonium and Diammonium Phosphate, two fertilisers of choice for Australian cereal crops, more than doubled in price over 12 months prior to the financial crisis. 'Round-up' herbicide more than tripled in the same year. Phosphorus

is essential for food production; however reserves will be depleted in the next 50-100 years according to Dana Cordell (University of Technology Sydney, 2008).

2. Many of our soils are tired, impoverished and need rehabilitation and there is urban encroachment onto fertile productive agricultural land. Urban expansion also drives the increasing trend for water to be moved from agricultural production to urban and industrial use.
3. Traditional low food prices have not included the cost of this environmental damage. Failure to cost and price environmental damage into the price of food will mean the natural resource base for producing more food in the future will decline.
4. Pressure to increase food production by further expansion of agriculture into rainforests, wetlands, peat lands, savannahs and grasslands will mean further loss of biodiversity at a time when the mitigation of climate change requires repair of this function and increased carbon sequestration.
5. Climate change will impact by increasing uncertainty in agricultural production.
6. The rising price of oil will continue to push the growth of bio-fuels where food producing land will be converted to bio-fuel production and further clearing of forests and natural habitat will be lost to bio-fuels.

'GREEN REVOLUTION' FADING

Climate change creates increased production risk in many farming systems through affecting productivity via changes in temperature, precipitation, carbon dioxide fertilisation, climate variability and surface water runoff^(1,2). The distribution of plants, invasive species, pests and disease systems may also be affected^(1,2).

Williams and McKenzie^(1,2) report that the 'Green Revolution' in the 1960's, based on high input systems sustained by a suite of new seed varieties, pesticides and fertilisers, was thought to be the solution. However, the productivity of many of these systems is being undermined by pollution, soil degradation and

pest and weed build-up^(1,2). Today, billions of hectares of land (and its people) are affected by significant land degradation via salinity, erosion and acidification⁽³⁾. Salinisation alone affects more than 2.1 million hectares of agricultural land⁽³⁻⁵⁾. Although there is an urgent need to increase productivity, the land we rely on for food production is under threat.

WHAT CAN BE DONE?

The cost of maintaining and improving the natural resource base in agricultural systems has to be included in the price of food for farmers to be able to farm sustainably and profitably^(1,2).

We need governments to adopt policies that create incentives for sustainable practices and result in costs to the environment being internalised^(1,2). This may mean dearer food, but it will also mean ensuring that we can continue to produce enough food.

We need increased investment in agricultural and agro-ecological research^(1,2). The focus in agricultural science needs to shift from only production to hydrological, ecological, and energy systems as a whole (a core message from the recent International Assessment of Agricultural Science & Technology report⁽⁶⁾).

We need investment in the economic valuation of ecosystem services^(1,2). With a market for these services, farmers in the future will be paid for the goods they produce as well as for the services they deliver through the management of healthy landscapes, rivers, wetlands and estuaries for the public good.

FOOD PRODUCTION SENATE

In August 2010, the Select Senate Committee on Agricultural and Related Industries released its report on Food Production in Australia⁽⁷⁾. Their goal was to investigate how food is produced that is affordable, viable for farmers and environmentally sustainable. Recommendations made by the Committee highlighted the importance of ownership of commercial agricultural, pastoral land and water by sovereign-owned companies for future security, investment in agriculture research,

KEY POINTS

- There is a need for incentives to farmers for sustainable practices
- The economic costs to the environment and for sustainable production needs to be internalised in food prices
- We need an increased investment in agro-ecological research
- We need to invest in economic valuation of ecosystem services

and re-establishment of the Committee to 'further examine issues relating to food production, including the implications of any proposed emissions trading scheme for affordable, sustainable food production and viable farmers' (5, p ix).

The Committee View (see Table 1) and the issues raised by the report are consistent with concern examined by myself⁽²⁾ and others but the recommendations are somewhat disappointing. The hard work to be done is to produce greatly increased amounts of food which has high nutritional value AND at the same time does no further damage to land, rivers, oceans and their biodiversity. It is the damage to ecological systems that must stop because to keep producing from the planet's ecosystems require them to be healthy and fully functional. This emphasis is lost to a large extent in the Senate report. The emphasis of the report is on how to increase production with little emphasis on how to do that and keep the ecosystems from which production comes in healthy functional condition.

The Committee recommended the establishment of a broad strategic food plan to encompass these complex issues but also stated that some issues needed to be explored in more depth than the timing of the report submission allowed.

CAN WE SECURE OUR FOOD WHILST MAINTAINING OUR ENVIRONMENT?

'Governments around the world, including Australia's, must plan for the food needs of the population into the long term future. Such planning should begin in earnest as of now.' (7, p14)

We must learn better to farm without harming. Past efforts in agricultural science have not included adequate attention to a more holistic integration of natural resource management with food and nutritional security. Australian agricultural science can contribute significantly to international leadership and could contribute much to the global problem we now face.

TABLE 1: THE COMMITTEE VIEW ⁽²⁾

1. The global community faces an enormous challenge to feed itself by the middle of this century as the demand for food increases significantly, perhaps doubling, while our capacity to produce food is constrained by water scarcity, declining arable land, declining nutrient inputs, declining agricultural research and development and deteriorating climatic conditions in key food growing regions of the world. If the challenge is not met, the consequences for global peace and security could be grave and Australia will not be immune.
2. From Australia's perspective, it is imperative that we maintain a productive base capable of meeting the food needs of the domestic population to ensure food security in the event that other countries become unwilling to trade food grown within their borders. Even more important, however, is the need for Australia, as a major food exporter, to contribute to meeting the global food task and thereby prevent the potentially disastrous consequences of major food shortages.
3. The committee is therefore of the view that governments around the world, including Australia's, must plan for the food needs of the population into the long term future. Such planning should begin in earnest as of now. The views expressed by the committee in the remainder of this report reflect changes to our current approach to agricultural food production that must occur if Australia is to meet its food production objective of producing food that is affordable and can be produced viably by farmers in an environmentally sustainable way.

For further information see www.wentworthgroup.org, and in particular:

<http://www.wentworthgroup.org/uploads/Speaking%20Notes-Our%20Food%20versus%20Our%20Environment%20250610.pdf>

References

1. Williams J et al Aust Sci 2008; 29: 31-34. (A more detailed version is available at: <http://www.wentworthgroup.org/uploads/Can%20We%20Secure%20Our%20Food%20Whilst%20Maintaining%20Our%20Environment%20250610.pdf>)
2. Williams J et al, 2009. ACIAR Partners, March-June. Available at: Keating BA et al Crop Pasture Sci 2010; 61: 269-278.
3. <http://www.wentworthgroup.org/uploads/Williams-CollisACIARarticle.pdf>
4. Hatton T, 2001. CSIRO Land and Water Technical Report 18/01.
5. McFarlane DJ, et al, in 'Proceedings of the Engineering Salinity Solutions Conference', 9-12 November 2004, Perth, W. Aust. (Eds S Dogramaci, A Waterhouse) pp 51-61.
6. IAASTD, 2008. The International Assessment of Agricultural Knowledge, Science and Technology for Development. Available at <http://www.agassessment.org/>.
7. Commonwealth of Australia, Select Committee on Agricultural and Related Industries: Food production in Australia Final report (August 2010). Available at: http://aph.gov.au/senate/committee/agric_ctte/food_production/report/report.pdf.

Dr John Williams, PhD, is Commissioner of NSW Natural Resources Commission, Adjunct Professor of Agriculture and Natural Resource Management at Charles Sturt University, Chair of the Advisory Board to CERF Hub Landscape Logic, Chair of the Science Advisory Council to Murray-Darling Freshwater Research Centre, Director of John Williams Scientific Services Pty Ltd and Founding Member, Wentworth Group of Concerned Scientists.