

## 10 Opening a can of mopane worms<sup>1</sup>

Can cross-sectoral partnerships leverage agricultural biodiversity for better quality diets?

*Margaret McEwan, Gordon Prain and  
Danny Hunter*

### **Introduction**

Previous chapters have highlighted the multi-faceted nature of nutrition problems and provided examples of how agricultural biodiversity can contribute to dietary diversity and quality. They have illustrated the convergence of two streams of thinking which has taken place over the last three decades. Firstly, the agricultural and biodiversity community has a greater appreciation of the environmental benefits from more highly diverse systems (e.g. ecosystem services such as nutrient cycling, pest and disease regulation, pollination, hydrology etc., and climate regulation and carbon sequestration) (McNeely and Scherr, 2003; Pretty, 1995; Scherr and McNeely, 2007). Secondly, within the nutrition community there has been a growing consensus around the limitations of single nutrient interventions to address nutrition problems and the importance of food-based approaches to sustain nutritional well-being (Berti et al., 2004; DeClerck et al., 2011; Remans and Smukler – this volume). This convergence has helped to increase the understanding of the interdependence between human and ecosystem health, and how agricultural biodiversity plays a role in maintaining both (Blasbalg et al., 2011; Johns et al., 2006; Collette et al., 2011; Frison et al., 2011; Jackson et al., 2007; WHO, 2005).

Some of the case studies described in this book have shown the need and value of bringing an inter-disciplinary<sup>2</sup> bearing to the analysis of nutrition problems, and a cross-sectoral<sup>3</sup> approach to the design and implementation of interventions. However, while this kind of cooperation may seem obvious, it has until recently happened for the most part at the theoretical level rather than as action on the ground (Garrett et al., 2011). This chapter will explore some of the factors which have limited practical responses to previous calls for cross-sectoral collaboration between the environment, agriculture and health sectors to address nutrition concerns. The chapter begins with a brief examination of pre-World War II efforts to implement multi-sectoral and collaborative approaches between agriculture and health in Malawi. This is followed by an overview of

the evolution of disciplinary perspectives in the agriculture, environment and nutrition sectors. This shows that these sectors have occasionally demonstrated some meeting of concepts and approaches; yet this never seems to have been translated into practical, effective cross-sectoral and inter-disciplinary collaboration required to address current nutrition problems.

Given renewed calls for greater leveraging of agriculture for improving nutrition and health and greater synergies among relevant sectors, the chapter briefly reviews how new findings from research on partnerships could contribute to more effective cross-sectoral partnerships. The chapter concludes with an example of how a national model such as *Fome Zero* in Brazil has successfully linked strengthening agricultural biodiversity and improved nutrition; and an examination of what current reforms in the CGIAR and UNSCN might have to offer for greater mobilization of agricultural biodiversity. Finally the chapter poses the question as to what is different now that may make our current efforts more successful.

### **A glimpse backwards**

Stretching back to the early 1930s, the need for multi-sectoral analysis and collaboration to address food and nutrition concerns has been recognized. During a special session of the League of Nations Health Commission in 1935 there was a plea for a “marriage of health and agriculture” (Berry and Petty, 1992). The call reflected an appreciation that malnutrition was a multi-sectoral problem, demanding a multi-sectoral, multi-disciplinary solution involving politicians, economists, agriculturalists, social workers as well as the medical profession. This was the time when the Colonial Nutrition Committee was established in Britain and multi-disciplinary field research into local food systems was commissioned. An example of this was the Nyasaland Nutrition Survey carried out in 1938–39 in Southern Africa by a team composed of a medical officer, an agriculturalist, a food investigator, an anthropologist and a botanist, each using their own disciplinary approaches and methods. The Nyasaland Survey and other field work (e.g. Richards, 1939) undertaken during the 1930s and early 1940s conducted nutrient analysis of local foods, and surveyed their use in different agro-ecological zones and among different wealth groups. These studies recorded the roles of women and men in collecting or hunting for wild foods such as leaves and spinaches, fruits, small birds, rodents and insects, tubers, fungi, and honey, as well as collecting medicinal plants. They also documented the cultural rights and customs associated with these practices and the significance of these foods in contributing to dietary diversity, and in particular to fill seasonal shortfall periods. In Nyasaland, the findings from the survey were the basis for the establishment in 1939–40 of the Nutrition Development Unit (NDU) with the mandate to continue investigations and to introduce improved practices for fisheries, agriculture, livestock, forestry, soil degradation, in addition to medical interventions focusing on women and children (Berry and Petty, 1992). Investments in improved nutrition were seen

by the Colonial Office as leading to greater well-being and greater efficiency in production (Quinn, 1994). However, the initial intervention approach used by the Nutrition Development Unit was top-down. While this was quickly recognized by the team as being unrealistic and ineffective, the Second World War intervened, political support and funding dwindled, and the NDU was closed in 1943.

After Nyasaland declared Independence in 1964 to become Malawi, the emphasis of national development planning was on achieving macro-economic growth. This was the era of “the stages of economic growth”, a theory of economic development which preached the inevitability of emerging societies such as Malawi achieving high mass-consumption as part of modernization (Rist, 1997). With the shift to a macro-economic perspective, nutrition reverted to its traditional home within the health sector, with malnutrition regarded as a technical issue (lack of animal protein) within the context of disease and ignorance. Issues related to poverty were down-played and theories of planning were based on a single-sector approach (Quinn, 1994).

### ***Shifting disciplines and paradigm shifts***

Shifts in ideology and the global context have influenced not only change in national policies related to food and nutrition, but also the evolution of related disciplines and specializations (Maxwell, 2001a). As individual practitioners, policy makers or scientists, we bring to any collaborative effort different disciplinary perspectives and paradigms. These paradigms change in response to the advancement of theoretical and empirical understanding within our own disciplines, but also reflect changes in broader development theories and in the global setting. Often, one particular conceptual framework dominates the causal explanation of interrelated phenomena – in this case the causes of inadequate nutrition and poor health. The dominant explanation then strongly influences the choices around the most appropriate approaches and types of interventions for “solving” the problem. The following section briefly describes key shifts in conceptual and planning approaches in the agriculture, environment and nutrition disciplines over the last 50 years. These shifts have in turn influenced the types of institutional arrangements for cross-sectoral efforts to address nutrition problems.

### ***Agriculture, biodiversity and diets***

Recurrent famines during the 1960s in different parts of the “underdeveloped regions” as they were then called were interpreted by science policy makers and philanthropists in the West as a problem of food availability and led to the major agricultural research and development effort that became known as the Green Revolution. The philosophical underpinnings of the Green Revolution were themselves part of a post-war “development paradigm” involving a belief in the power of science and technology to carry the whole world towards an ideal state

of high mass-consumption (Rostow, 1960). The “transfer of technology” was the specific mechanism through which “advanced countries” could enable poorer countries to achieve economic take off (Biggs, 1990; Rist, 1997). The focus of the Green Revolution was on the increased production of macro-nutrients and this global and national preoccupation with the staple production and supply of calories intensified with the dramatic oil price increases of the early 1970s. This period witnessed the first high-yielding rice and wheat varieties of the Green Revolution becoming more widely available. This was also the time when the political preoccupation with urban food supplies came under attack as “urban bias” (Lipton, 1977).

Although radical critiques of the “transfer of technology” paradigm were relatively common during the 1970s (e.g. Bernstein, 1973), these were still on the margins. From the beginning of the 1980s two currents of criticism gathered force and led to major changes in thinking about development, even if actual development during at least the 1980s was on hold, pending “structural adjustment” (Rist, 1997). Firstly, economists such as Amartya Sen (1981) offered a new analysis of food crises which used the concept of entitlement to show that “there *being* not enough food to eat” does not determine starvation, but rather, “people not *having* enough food to eat” is the causal factor. In other words, from the standpoint of a person or family, the issue is not food availability in general, but food access through own production, purchase, gift, barter or other entitlement. Secondly, the concern with “the standpoint of the person or family” actually involved in food production and exchange led other researchers to argue for local participation in development processes in order for change to be appropriate and sustainable (e.g. Rhoades and Booth, 1982; Chambers et al., 1989, 1994; Scoones and Thompson, 2009). The focus on participation built on earlier farming systems research and emphasized the importance of learning with farmers and tapping into local and indigenous technical knowledge. This “Farmer First” paradigm has become further elaborated through the sustainable livelihoods framework, which applies an assets-based and systems approach in which agriculture, health and nutrition are considered in a broader environmental and ecological context (e.g. Farrington et al., 1999). Similar paradigm shifts, from “ecology first” to “people first” perspectives (O’Riordan and Stoll-Kleemann, 2002) have occurred in biodiversity conservation planning and management (Hunter and Heywood, 2011).

Meanwhile, a significant consequence of the rapid expansion of industrial agriculture was the growing reliance on chemical inputs to reduce pest attack and sustain production. Dramatic impacts on human health, ecology and biodiversity were catalogued and described by Rachael Carson in *Silent Spring* (Carson, 1962). The book was to become a major influence in creating greater awareness of environmental issues and how people perceived the impact of human activities on the environment and led to the development of numerous environmental organizations. In 1983, the World Commission on Environment and Development (the Brundtland Commission) was convened by the United Nations to address increasing concern about such impacts on the natural world

and human welfare. In establishing the commission, the UN recognized that environmental problems were global in nature and determined that it was in the common interest of all nations to establish policies for sustainable development. Among these environmental problems were growing concerns about the degradation of ecosystems and the loss of biological diversity.

In 1992, the importance of biological diversity conservation and its sustained utilization and development were central to the United Nations Conference on the Environment and Development (UNCED) held in Rio de Janeiro, Brazil, and it was here that the Convention on Biological Diversity (CBD) was opened for signature to enhance the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. The Convention entered into force in December 1993. Subsequently, there was an increasing recognition of both the growing erosion of plant genetic resources and their importance for food and nutrition security, together with the growing interdependence between countries on the use of genetic resources as the building blocks for sustainable agriculture. This led to the adoption of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) in 2001 (Hunter and Heywood, 2011).

In the 1960s and early 1970s the focus of nutrition research was to understand the role of protein in the diet. Nutritionists were preoccupied with levels of protein intake and concerns about protein quality. This led to an emphasis on curative and clinically-based interventions aimed at increasing protein intakes. However, subsequent studies showed that protein intake had in fact been underestimated and that the recommended daily intake had been overestimated (McLaren, 1974). With the exposure of these misconceptions, nutrition research attention then shifted to energy or calorific intake and distributive concerns (UN, 1975). This change in focus was influenced by concerns in the agricultural sector about global food availability. Another nutrition paradigm also opened up during the 1970s; this was related to the central importance of micro-nutrients, and in particular, vitamin A (Latham, 2010). In the late 1980s and 1990s, this interest in micro-nutrients which emerged in the 1970s received a strong boost with additional evidence of the relationship between specific micro-nutrient deficiencies and increased morbidity and mortality. This led to the notion of “Hidden Hunger” (WHO/UNICEF, 1991). There was a strong focus on “do-able” technical fixes through micro-nutrient supplementation and food fortification programmes. During this period there was also increased engagement by the private sector in public nutrition interventions, e.g. increased commercial interests in the production of micro-nutrient supplements (Latham, 2010). Iron fortification and iodization programmes are examples of vertical nutrition interventions which, through collaboration with the private sector, and coupling accessibility of commercial markets with social marketing campaigns, have been successful at going to scale (Bryce et al., 2008).

In parallel with some of these clinical paradigm shifts was a rediscovery of the importance of different sectors for understanding and influencing nutritional health (Garrett and Natalicchio, 2011). The notion of multi-sectoral nutrition

planning (MNP) emerged during the early 1970s to help build coordination, mostly between different national-level ministries, including health and agriculture (Joy and Payne, 1975). However, efforts to translate nutrition policies and strategies into operational plans, budgets and effective coordination across sectors encountered both bureaucratic and political difficulties. Each institutional sector with a stake in nutrition issues, e.g. agriculture, health, social welfare, gender, education, water, sanitation and environment, is housed in its own ministry or line organization. These all have their distinct professional approaches and particular organizational cultures. Food and nutrition have more often been separated with mandates under different line ministries. Action by multi-sectoral bodies can also be affected by asymmetric levels of representation or budget authority from each sector for decision making purposes. This compromises the ability to retain staff, and maintain institutional memory, which in turn compounds the challenge to sustain a continuous credible presence as nutrition problems reoccur. Therefore, despite the widely recognized theoretical benefits of system thinking for dealing with the “complex causality of nutrition”, public organizations with already weak institutional capacity were overwhelmed by the data demands and coordination needs of multi-sectoral work (Field, 1987; Berg, 1987; Garrett and Natalicchio, 2011). Furthermore, the special units that were responsible for MNP were often institutionally isolated, embroiled in turf wars and under-funded. The 1980s saw a general abandonment of these programmes and a return to “nutrition isolationism”.

Meanwhile, another element in the re-convergence of agricultural development and nutrition was occurring over a slightly later time period and at the level of civil society, rather than government. These were “food-based approaches” to nutritional health, which became more commonly discussed and implemented during the late 1970s and 1980s, although in relation to household gardens in particular this is a very ancient strategy for securing household nutritional health (Niñez, 1984; Ruel and Levin, 2002). Food-based approaches, by their nature, require labour and resource intensive efforts to influence behaviour at individual, community and agriculture and health systems levels. They do not have clearly defined biological pathways and are not conducive to vertical delivery strategies that have been successful for some fortification and supplementation interventions (Bhutta et al., 2008).

A more recent trend which also reflects cross-fertilization between sectors is the Right to Food framework (FAO, 2004; De Schutter, 2011a, 2011b), which is a latecomer to the rights-based approaches which came to the forefront in the 1990s. The Right to Food drew in issues of governance, and the need for a legal context to support not just the right to be fed, but the right to feed oneself. Grass-roots movements and networks around food sovereignty, such as La Via Campesina (Oxfam, 2011; Mulvany and Ensor, 2011), emphasized people-focused approaches based on local priorities. The call for strengthened food sovereignty reflects a decline in the self-reliance and dependence on local agricultural diversity and the shift towards increased reliance on external sources for food and/or monetary means to fulfil livelihood requirements.

Since the 1990s, there have also been renewed calls for food- (and life-style) based approaches to address the “double burden” of undernutrition and obesity (Popkin, 1999). The impacts of obesity and linked non-communicable diseases, such as diabetes and cardio-vascular disease, stretch across both developed and developing countries and socio-economic strata to the extent that over- and undernutrition can exist in the same communities. It is increasingly recognized that a diverse and balanced diet will ensure that we can benefit from the other functional elements in foods which have anti-oxidant, anti-cancer and other properties. There is also a return to an appreciation of the social and cultural role that food plays in urban and rural based lives. This has contributed to the growing movement to recognize, understand and value the agricultural biodiversity which has an essential role in sustaining our interlinked local and global food systems.

These shifting disciplinary paradigms have often formed the basis for the vision and mission of the different institutions which deal with nutrition and biodiversity, and in turn have influenced their organizational culture. Ironically, both nutrition and biodiversity are frequently seen as everyone’s business but nobody’s responsibility. Both nutrition and biodiversity conservation, including agricultural biodiversity, have struggled to find institutional homes, and these have varied according to the currently dominant paradigm or political whim. The uncertain and changing institutional arrangements for housing nutrition and biodiversity, and multi-sectoral coordination bodies, have influenced the capacity for strong technical leadership, continuity of coordination for cross-sectoral and inter-disciplinary partnerships, and contributed to limited financial and political support.

Agriculture, environment and nutrition are each part of changing processes that affect the needs and demands on each other (Hawkes, et al., 2007; Hoddinott, 2011, Pinstруп-Andersen, 2011). While there may have been sufficient convergence of concepts and approaches at some points, dietary diversity is declining, erosion of agricultural biodiversity is increasing and concerns about the sustainability of our agricultural and food systems remain. What are the chances for re-energizing cross-sectoral collaboration to change this scenario and how can the role of agricultural biodiversity be incorporated?

### **Cross-sectoral directions for the future: Agricultural biodiversity and dietary diversity**

This chapter started with an example of an early plea for better cross-sectoral collaboration, yet that call is still echoed today, more than 75 years later. In early 2011, IFPRI’s 2020 conference on leveraging agriculture for improving nutrition and health, reiterated calls for greater synergies and partnerships among relevant sectors, and underlined the need for a new paradigm for agricultural development to be driven by nutrition goals (IFPRI, 2011a). One of the achievements of the IFPRI 2020 conference was the participation of high profile keynote speakers to increase visibility for the need for the three sectors to

work together. However, there was little detail on the “how” of enabling greater collaboration among these sectors (Fanzo, 2011). Von Braun and colleagues (Von Braun et al., 2011) have explored some of the challenges around bridging the gap between the agricultural and health sectors, and note that these are “researchable issues in themselves”.

### ***Learning from partnership research***

New findings from research on partnerships can help make current and future cross-sectoral collaboration more effective. A recent review of the partnership literature found that there are few theoretically grounded case studies on partnerships in the context of research for development and there is not in fact a literature, but rather disparate literatures coming from different disciplines with little cross-disciplinary awareness or communication (Horton et al., 2009). This has resulted in the use of different terminologies (partnerships, inter-organizational collaboration, alliances, consortia, networks etc.) and widely different definitions, which can lead to confusion when organizations from different sectors are coming together.

#### **Box 10.1** Definition of partnership in agricultural research for development

“Partnership is a sustained multi-organizational relationship with mutually agreed objectives and an exchange or sharing of resources or knowledge for the purpose of generating research outputs (new knowledge or technology) or fostering innovation (use of new ideas or technology) for practical ends.”

Source: Horton et al. (2009)

The exploration of the different literatures led the authors to propose a common definition of partnerships (Box 10.1) which emphasizes key elements identified by many writers, such as: their multi-organizational nature; mutually agreed objectives and sharing of resources or knowledge; and linking research outputs with action. As briefly mentioned above, the multi-disciplinary nature of problems in the realms of nutrition and agricultural biodiversity, influenced earlier efforts to develop holistic and comprehensive approaches to address them. This was often in a context of lack of political ownership, and/or bureaucratic inflexibility. Previous attempts to establish cross-sectoral partnerships for nutrition improvement seem to have often been over-ambitious; to have experienced contradictory objectives among participating agencies and to have lacked the capacity to pool resources (Garrett et al., 2011). Thus, in order to re-energize these partnerships between agriculture and nutrition, there is a need for a robust dialogue to agree on a clearly defined problem which is beyond

the scope of a single discipline or sector to solve, and to agree on common objectives around that specific problem.

Building consensus for a common goal will require that the agricultural and biodiversity sectors respond to nutrition priorities. However, it also requires that adopting nutrition goals must bring additional benefits to all stakeholders in the agriculture and biodiversity communities. Many commentators (Pelletier, 2011; Hawkes et al., 2007) have emphasized the need to strengthen the capacity for inter-disciplinary/trans-disciplinary approaches to support effective cross-sectoral collaboration for nutrition and agriculture. This requires the creation of an effective “space” for improved communication across disciplines in order to develop a common conceptual language, and agreement on adapting methods and tools which can work across disciplinary boundaries (Hawkes et al., 2007; IFPRI, 2011a).

It is also seen so often that it is individual champions from the different agriculture and nutrition spheres that have catalysed cross-sectoral collaboration. However, the sustainability of these individual initiatives depends on leadership styles and coordination skills for partnership processes. An appreciation is needed that in addressing the “partnership problematic” it is not only sought to influence the behaviour of others in relation to affecting nutrition outcomes, but there is also a need to change our own behaviour in the partnering process. The first requires a clear understanding of our impact pathway, that is, the boundary partners whose behaviour we are seeking to change, and the type of behaviour change we are seeking, which would lead to actions that would leverage the role of agricultural biodiversity for dietary quality. The second requires a combination of technical leadership skills (across realms of agriculture, environment and nutrition) to provide strategic direction; together with “facilitation leadership” to manage internal partnership processes. This second type of leadership is also related to organizational culture. Building on Maxwell’s observations (Maxwell, 2001b), government ministries normally operate under a role culture, with clear hierarchical accountabilities and reporting structures. For inter-disciplinary work, a team-based task culture may be more effective, with leadership playing a more facilitating and enabling role rather than centralizing decision making.

Linking agriculture, nutrition and agricultural biodiversity draws in a larger group of stakeholders, with the risk of making cross-sectoral partnerships unwieldy and difficult to manage. Therefore, the process of the initial scoping and reaching agreement on common objectives and functions of the partnership should directly inform its stakeholder composition, structure (e.g. informal, formal) and governance norms. Collaboration for information sharing and advocacy on the contribution of agricultural biodiversity to improved dietary diversity may result in more flexible and inclusive partnership arrangements, while, on the other hand, collaboration, which demands the delivery of specific research or developmental outputs, will require clear definitions of roles, responsibilities, and agreement on mutual accountabilities. Some partnerships evolve from *ad hoc* informal arrangements to more formal arrangements. A partnership is dynamic and may go through different stages related to scoping

and formation, implementation, reflection and transition or exit. Drawing from this to learn from earlier efforts at cross-sectoral partnerships, the deliberate use of a partnership cycle can be a way to assess whether the partnership's original objectives are still relevant; whether these objectives are being met; and whether there is a need to adapt the structure and composition of the partnership.

The study by Horton and colleagues also found that there are strikingly different drivers leading organizations to partner and that these differences have a profound influence on both the partnering processes and results. Drivers can be external, such as donor expectations; institutional, such as an organization's vision and mission; or individual, such as the career benefits that can be gained through involvement with other organizations. It is critical that the actors in a partnership identify the drivers and motivation for their own participation. The inter-disciplinary, and cross-sectoral nature of nutrition problems is not conducive to easy political action (Bryce et al., 2008), and arguably the same might be said for agricultural biodiversity. Experiences from the 1970s show how *ad hoc* political opportunism (as one type of external driver) was insufficient to turn theoretically favoured cross-sectoral collaboration between agriculture and nutrition into sustainable partnerships. Pelletier has argued for the importance of civil society to sustain pressure for accountability improved nutrition outcomes (Pelletier et al., 2011).

Pelletier has also noted that the existence of evidence-based information alone is insufficient for decision making. There is the need to integrate scientific evidence, contextual knowledge, and stakeholder values, interests, and beliefs. External drivers, top-down driven agenda and shifting donor interests will continue to influence cross-sectoral partnerships working for nutrition improvement. However, a systematic exploration of the political landscapes for nutrition and biodiversity can help to identify common areas of interest, potential overlap of political constituencies and opportunities for joint action. An understanding of the political economies for both nutrition and agricultural biodiversity can ensure that external influences are recognized, balanced with evidence-based priorities, and negotiated in a way to be more consistent and integrated with locally specific socio-economic conditions and context.

More recently, positive examples of practical cross-sectoral collaboration are emerging. The chapter now turns to briefly examine some case studies of national, multi-country and global cross-sectoral initiatives which could have a high relevance for the role agricultural biodiversity can play in improving dietary quality.

### ***Synergies between agricultural biodiversity and dietary diversity: Emerging examples***

At a country level, Brazil provides a window on what might be possible for effective cross-sectoral partnering to mobilize agricultural biodiversity for improved nutrition and food security. Brazil has designed and implemented several highly innovative multi-sectoral platforms and policy instruments

**Box 10.2** The Zero Hunger Programme in Brazil

The Zero Hunger Programme was developed by the federal administration in Brazil as a public policy aimed at eradicating hunger and social exclusion. The programme is made up of a set of actions that are being gradually implemented by a cross-sectoral platform made up of the federal administration involving various ministries, other spheres of government (state and municipal administrations), and civil society in the following main areas: (1) implementation of public policies; (2) participatory development of a food and nutrition security policy and (3) self-help action against hunger. The Food and Nutrition Security Policy, which is a multi-sectoral policy, since it involves actions of different governmental sectors such as the health, education, labour, agriculture, and environment sectors among others, involves actions designed to foster the production, trade, quality control, access and use of food products. The National Food Security Council (CONSEA) plays a leading role in implementing this policy and both the PNAE (School Meals National Programme) and the PAA (Food Acquisition Programme) are members of this council.

Source: Grisa et al. (2011)

to enhance food security. Most of these fall under the “Fome Zero” or “Zero Hunger” programme launched in 2003 (Box 10.2) which has significantly reduced the number of undernourished people in the country (Grisa et al., 2011).

The PAA, or Food Acquisition Programme, has been one of the most important elements of “Fome Zero” and has had many important benefits including revitalization of local biodiversity and its consumption. The PAA was developed with the aim of ensuring that people facing food or nutritional insecurity have access to a regular supply of high quality food through social programmes such as the PNAE (the School Meals National Programme) and other programmes supplying food to hospitals etc. The PAA is stimulating a counter movement in Brazil by helping farmers to diversify their production using organic or agro-ecological approaches. The PAA purchases a diverse range of fruits, vegetables, processed goods and animal products from family farms and has also contributed to the revalorization and revival of many local products which have little or no commercial value in commodity markets. The programme also promotes the production and distribution of seeds of local varieties thereby supporting the conservation and management of agricultural biodiversity. Research undertaken in different regions of the country clearly demonstrates that farmers linked to the PAA programme are consuming more diverse diets and that schools receiving food from the PAA have significantly changed the composition and quality of meals they provide to students and that there are improvements in dietary diversity for children (Grisa et al., 2011 and case study in this volume). The contribution that

the PAA may have made to the dramatic reduction in underweight, wasting and stunting is difficult to separate out from the overall Zero Hunger programme, and the general macro-economic improvements in growth and employment in Brazil. The prevalence of stunting among children less than five years old has reduced from 13.5 per cent in 1996 to 7.1 per cent in 2006–7 (Monteiro et al., 2010). Studies suggest that family purchasing power has increased and that socio-economic inequalities have been reduced (Acosta, 2011). Policy continuity, political leadership and coalition building, legislative coordination, decentralization, active civil society engagement and conditional and targeted funding have all been key factors in ensuring that nutrition issues are prioritized on the political agenda and addressed in a multi-sectoral way (Acosta, 2011; Silva et al., 2010).

However, in the Brazilian case there is also a growing disconnect between the on-going political discourse on undernutrition and the current nutritional epidemiological profile. This shows that the majority of Brazilian mothers and children are overweight and at risk of non-communicable diseases such as diabetes, cardio-vascular disease and some cancers (Bryce et al., 2008).

The United Nations Environment Programme (UNEP)/Food and Agriculture Organization (FAO) implemented Global Environment Facility (GEF) “Mainstreaming biodiversity conservation and sustainable use for improved human nutrition and well-being” project (Box 10.3), is a multi-country project (Brazil, Kenya, Sri Lanka and Turkey) starting in 2012. It will be an important vehicle for the implementation of the Convention on Biological Diversity (CBD) cross-cutting initiative on biodiversity for food and nutrition to integrate and mainstream awareness and understanding of the nutritional value of local agricultural biodiversity through cross-sectoral collaboration. The CBD cross-cutting initiative provides a global reference point within a legally binding convention, and also provides an overarching framework for the implementation of country projects.

At the global level, the Consultative Group on International Agricultural Research (CGIAR) reform process aims to develop improved research-for-development synergies with multiple actors and is prioritizing cross-sectoral collaboration. Within its new strategic results framework, the CGIAR has committed to making agriculture research accountable for improving human health and nutrition. While the new CGIAR Collaborative Research Programme “Agriculture for improved nutrition and health” (CRP4) (IFPRI, 2011b) is the main vehicle for achieving this, other CGIAR Research Programmes will also contribute to this goal (e.g. the commodity CRPs will also develop bio-fortified varieties). The CRP4 is explicitly trying to capitalize on the potential synergies across the agriculture, nutrition and health sectors and has two of four components (Value Chains for Enhanced Nutrition, and Integrated Agriculture, Nutrition and Health Programmes and Policies) where agricultural biodiversity has been accorded significant recognition.

The value chains for nutrition approach is based on the premise that improved coordination among actors involved in the chain will help to identify bottlenecks, negotiate trade-offs between nutrition and economic value and

**Box 10.3** Mainstreaming biodiversity conservation and sustainable use for improved human nutrition and well-being (UNEP/FAO-GEF)

This multi-country Global Environment Facility (GEF) funded project will support sustainable biodiversity conservation and use for improved human nutrition and well-being by enabling planners and practitioners from agriculture, health and environment sectors to work together to mainstream agricultural biodiversity into nutrition, food, and livelihood security strategies and programmes at the national and global level. It will be led by Brazil, Kenya, Sri Lanka and Turkey and coordinated by Bioversity International, with implementation support from the United Nations Environment Programme (UNEP) and the Food and Agriculture Organization of the United Nations (FAO). Brazil, Kenya, Sri Lanka and Turkey contain unique agricultural biodiversity that is crucial to the world's food supply. However, in these countries, as in almost every country, the contribution agricultural biodiversity makes to local food security and nutrition, especially in poor rural communities, is undervalued resulting in lost opportunities to reduce hunger and malnutrition. The project will address these issues by undertaking assessments of the nutritional composition of prioritized biodiversity for food and nutrition as well as associated traditional knowledge, the development of national and global information systems and the establishment of new markets for biodiversity foods with high nutritional value. Mainstreaming biodiversity for food and nutrition will be supported by the development of cross-sectoral national policy platforms and other related promotional and scaling-up activities.

Source: [www.b4fn.org](http://www.b4fn.org), accessed 10 January 2013



improve the efficiency of the chain (Hawkes and Ruel, 2011). The value chain can act as an organizing principle to bring different stakeholders together and provide an impact pathway linking agricultural production and nutritional change. Thus, it has the potential to harmonize “competing” paradigms of an agricultural production “supply-side” focus and the consumer “demand side”. A value chain for nutrition partnership may contribute to addressing the nutrition and partnership problematic raised in earlier sections of this chapter. It provides a conceptual base to bridge the agriculture–nutrition divide; to bring public and private actors together; and the opportunity to scale out and scale up to achieve increased population and geographical coverage.

**Box 10.4** Research for improved nutrition through agricultural biodiversity: the value chain approach of the CGIAR's CRP4

The research undertaken in this component will attempt to characterize and understand the role of markets and value chains in improving nutrition and dietary diversification both (1) directly, through an increase in the supply, marketing, access, and consumption/demand of nutritious foods sourced from biodiverse systems, and (2) indirectly, through an increase in income for smallholder farmers. Likewise, smallholder farmers can diversify their diets and improve their nutritional status either by producing more biodiverse sourced foods directly or by accessing more nutritious and diverse foods in markets through a rise in their disposable incomes. There will be an emphasis on understanding what role nutritious local and traditional foods (LTFs) and neglected and underutilized species (NUS) play in creating demand for food products sourced from biodiverse landscapes by rural and periurban consumers and in boosting disposable incomes for smallholder farmers.

Source: IFPRI (2011b CRP4 Annex 6, p.83)

African leafy vegetables provide an example of a “value chain for nutrition” approach which has incorporated the promotion of agricultural biodiversity. Strengthening this value chain has involved a wide range of actions such as agronomic and nutrition studies to identify key constraints, seed dissemination, activities related to cultivation and conservation, and demand creation marketing strategies together with a range of actors including farmers, international organisations and local NGOs. These actions took place in a wider socio-economic context of increasing concerns about lifestyle and nutrition practices, and a changing awareness of the contribution that traditional and indigenous foods can make to better dietary diversity and quality (Weinberger and Pichop, 2009; IFPRI, 2011b; Case Study 3).<sup>4</sup> One of the areas of research under CRP4 will be to explore in more depth value chains for nutrition through agricultural biodiversity. The objectives of this are outlined in Box 10.4.

As mentioned earlier, in its overall partnership strategy, CRP4 identifies “value chain actors (and representatives)” as one type of partner. However, the configuration of these actors, their relationship to other types of actor, such as decision makers, development specialists (including health sector workers) or research partners and their utilization of agricultural biodiversity will vary according to the type of value chain. For example, among high-income consumers there is greater nutrition awareness of the contribution that dietary diversity can make to healthy lifestyles and thus increased demand for these products. This is being met through the commercial production and marketing of niche products (with promotion often based on biodiversity and health credentials)

in select outlets. In contrast, there is the situation where underutilized species and traditional foods may be available at the local level through women's production and/or collection efforts and female mediated exchange networks and informal markets. In this scenario, there may still be some stigma attached to eating these "wild" or "famine foods", but women remain the custodians of knowledge about collection sites, safe preparation and preservation practices. These examples present different challenges for cross-sectoral collaboration for scaling up benefits to both the producers and the consumers.

The CRP4 proposal recognizes that effective, cross-sectoral partnerships will be central to successful implementation. It identifies four broad categories of partners: enablers (policy and decision-makers); development implementers (government and non-government); value-chain actors (and representatives); and research partners. The CRP4 intends to implement its partnership approach through the development of a partnership strategy at the beginning of the programme, which will include a stakeholder mapping and a landscape analysis of public health, agriculture, and nutrition research and development actors and opportunities.

While the CRP4 proposal does not discuss the earlier challenges in cross-sectoral work, IFPRI, as the lead organization for the CRP, has supported evaluations and case studies of earlier experiences and new efforts involving cross-sectoral partnerships (Benson, 2007; Garrett et al., 2011). The CRP4 offers the chance to build on these assessments to ensure that different disciplinary paradigms do not reinforce certain types of institutional arrangements, which in turn undermine efforts for cross-sectoral collaboration. The CRP4 should also actively institutionalize "new ways of working" such as encouraging interdisciplinary and trans-disciplinary research-for-development approaches, through both incentive structures and capacity strengthening activities, which are already included as a strong component of the programme. Finally, as CRP4 becomes operational, it will hopefully ensure research space on the cross-sectoral partnering process itself.

In a post-conference statement on the way forward after IFPRI 2020, the authors questioned whether the global and regional institutions that play key roles in the governance of the agriculture, health and nutrition sectors might also need to be reformed for greater effectiveness and integration of efforts, greater openness and transparency. The statement highlighted the need to develop clear guidelines for stakeholder responsibilities (IFPRI, 2011a).

The UN is one of these global institutions, and the United Nations Standing Committee on Nutrition (UNSCN) was set up to act as a point of convergence and initiative in harmonizing nutrition policies and activities in response to nutritional needs of countries. The UNSCN has a mandate to promote cooperation among UN agencies and partner organizations in support of community, national, regional, and international efforts to end malnutrition in all of its forms. The UNSCN consists of UN agencies, "aid recipient" governments, multilaterals, bilateral donor agencies, the academic community, and civil society, all of which have divergent views. Within the UN itself, the

mandate for nutrition is spread across several organizations and programmes including FAO, WFP, WHO and UNICEF. This has caused duplication, competition and created a lacuna in terms of effective coordination. One example of an effort to address this situation is Renewed Efforts Against Child Hunger (REACH), an interagency initiative between FAO, WFP, WHO and UNICEF to better align and coordinate nutrition actions at the country level. The initiative was piloted in 2008 in two countries and is currently operational in 13 countries to address malnutrition through a multi-sectoral lens. However, as Müller and Coitinho have argued, the UNSCN has gradually lost its capacity to perform its function to promote cooperation. They consider that part of the problem, and possibly its solution, rests in the UNSCN itself, and they argue that the current reform of the UNSCN will not only strengthen UN coordination in nutrition, but also promote a broader dialogue and partnership with other key stakeholders and constituencies (Müller and Coitinho, 2011). The UNSCN reform proposals have been hotly debated, reflecting in essence the differing paradigms as to how nutrition should be addressed, together with a concern that existing institutional mandates and governance structures should not be tampered with. The reform proposals included the following areas: the extent of true power-sharing among the UNSCN constituencies, and in particular the contentious role of “big food industry” influence in the UNSCN, the role of the UNSCN vis-à-vis harmonization to ensure scientific consensus on current issues or a more activist role in coordination; securing consistent core funding to ensure independence from donor-driven agendas; and the accountability and reporting relationship to the UN Chiefs’ Executive Board (CEB). The Chair of the UNSCN has remained within the “4+1” (FAO, WFP, WHO, UNICEF, and World Bank), and it remains to be seen whether the reforms will result in a substantive change in the UNSCN’s position and influence in global nutrition governance (UN Standing Committee on Nutrition, 2010; Longhurst, 2010).

However, currently, at the global level, it is the Scaling Up Nutrition (SUN) movement (Box 10.5) which has taken up the initiative to rally political attention and action to address the problem of undernutrition through cross-sectoral action. Many have argued that such a partnership can be the game changer, if mechanisms are put in place to hold partners accountable for delivering on their responsibilities effectively.

## **Discussion and conclusion**

Currently there is renewed global political interest in addressing nutrition issues (e.g. SUN, IFPRI 2020 conference, REACH, the new CGIAR CRP4, and the CBD cross-cutting initiative). As pointed out in the introduction to this chapter, there has also been a growing convergence around the understanding that the current dominant model of agricultural production is not sustainable, and this presents an opportunity to re-evaluate the contribution that food-based approaches can make to improving dietary quality and diversity. While the evidence for food-based approaches (FAO, 1997; Low et al., 2007) and

**Box 10.5** Global alliances to end malnutrition – the SUN initiative

The Framework for Scaling-Up Nutrition (SUN) is a response to the continuing high levels of undernutrition in the world and the uneven progress towards Millennium Development Goal 1 to halve poverty and hunger by the year 2015. The SUN framework has been developed by specialists from governments, academia, research institutions, civil society, private companies, development agencies, UN organizations and the World Bank. It has been endorsed by more than 100 organizations and was unveiled in Washington in April 2010 at a meeting co-hosted by Canada, Japan, USAID and the World Bank. The SUN Framework's stakeholders intend that it be used within both industrialized, middle income, developing and least-developed countries whose people are affected by undernutrition. The Framework encourages a broad range of local and national level entities to work together in order to realize its different elements, and to do this by working within the context of an overarching national strategy for food, health and nutrition security. One of the elements of the SUN Framework is to promote broader multi-sectoral nutrition-sensitive approaches to development that acts to counter the determinants of undernutrition, including promoting agriculture and food insecurity to improve the availability, access to and consumption of nutritious foods.

Source: <http://www.scalingupnutrition.org/>, accessed July 2012

the contribution that agricultural biodiversity can make to diets and dietary diversity is growing, there is a need for much further research (Penafiel et al., 2011; Termote et al., 2012). Moreover, there is a need to build an understanding on how to work with partners to scale food and agricultural biodiversity based approaches effectively.

It has been argued that the differing intellectual and ideological paradigms that shape thinking and action in particular disciplines and sectors has strongly influenced earlier efforts at cross-sectoral collaboration between agriculture, health and nutrition. In the renewed efforts to partner for improved nutrition outcomes, these differences will need to be addressed through capacity strengthening for inter-disciplinary approaches and in the institutional arrangements, structures and dynamics of cross-sectoral collaboration.

Finding examples of inter-disciplinary and cross-sectoral partnerships where biodiversity, agriculture and health sectors are collaborating to leverage agricultural biodiversity for dietary diversity has been a challenge. There is also a need for examples of partnership mechanisms which can take into consideration the need to have reinforcing actions across the local–national–global scales. There is a need to continue to document and disseminate examples of these practices.

This would help us to understand what types of stakeholders are involved and their interactions, what factors drive collaboration, and what methods and tools they are using to do this. Working in partnership can improve accountability to the individual partners involved. However, it can also complicate accountability, because of the diverse, and in some cases conflicting, interests and accountability requirements of the different partners. Therefore there is also a need to be able to assess whether investments in cross-sectoral partnership processes and performance are worthwhile and what their contribution is to the partnership, the objectives of the different individual partners and the value added to development goals (Horton et al., 2009).

Finally, we have also seen the political capital for nutrition and agricultural biodiversity vacillate. The fact that neither nutrition nor biodiversity are clearly linked with particular sectors has tended to make them less politically attractive rather than be supportive natural opportunities for cross-sectoral action. This is particularly so when, across the agriculture, environment and health sectors, nutrition problems are low on the list of political and financial priorities (Bryce et al., 2008). There needs to be an understanding of, if and where there might be a convergence of opportunity across the political landscape for both biodiversity and nutrition. Hotspots of agricultural biodiversity often overlap with nutritionally vulnerable populations, as for example in the Andes (De Haan, 2009). There is also growing political interest in strengthening the role that small-holder farmers play in maintaining biodiversity, and linking this more formally to climate adaptation and mitigation programmes, using carbon finance mechanisms (Padulosi et al., 2011). These are examples that could provide opportunities to select adaptive agricultural practices which promote the sustainable use of biodiversity and can also contribute to addressing priority nutrition problems.

## Notes

- 1 A Southern Africa delicacy: *Gonimbrasia belina* is a species of moth found in much of Southern Africa, whose large edible caterpillar, the mopani or mopane worm, is an important source of protein. The availability of canned mopane worms epitomizes the struggle (and victory) to retain biodiversity, habitats, cultural values, and the use of technology to overcome seasonal shortages of the fresh product.
- 2 Inter-disciplinary collaboration involves the connection and integration of several academic schools of thought, professions, or technologies – along with their specific perspectives – in the pursuit of a common task.
- 3 Cross-sectoral collaboration is defined as the linking or sharing of information, resources, activities, and capabilities by organizations in two or more sectors to achieve jointly an outcome that could not be achieved by organizations in one sector separately. Available at: [http://www.hhh.umn.edu/people/jmbryson/pdf/cross\\_sector\\_collaborations.pdf](http://www.hhh.umn.edu/people/jmbryson/pdf/cross_sector_collaborations.pdf), accessed July 2012.
- 4 This can be compared with multi-sectoral collaboration where there is no integration among sectors and each sector retains its approach and assumptions without change or development from other sectors within the multi-sectoral collaboration. [http://www.cgiarfund.org/cgiarfund/sites/cgiarfund.org/files/Documents/PDF/CRP4\\_%20Oct06%202011\\_Revised.pdf](http://www.cgiarfund.org/cgiarfund/sites/cgiarfund.org/files/Documents/PDF/CRP4_%20Oct06%202011_Revised.pdf), accessed July 2012.

## References

- Acosta, A.M. (2011) Examining the political, institutional and governance aspects of delivering a national multi-sectoral response to reduce maternal and child malnutrition. *Analysing Nutrition Governance: Brazil Country Report*, Institute of Development Studies, <http://www.ids.ac.uk/idsproject/analysing-nutrition-governance>, accessed July 2012.
- Benson, T. (2007) Cross-sectoral coordination failure: How significant a constraint in national efforts to tackle malnutrition in Africa? *Food and Nutrition Bulletin*, vol 28, no 2 (supplement), United Nations University.
- Berg, A. (1987) Nutrition planning is alive and well, thank you, *Food Policy*, vol 12, no 4, November, pp.365–375.
- Bernstein, H. (eds) (1973) *Under-development and Development*, Penguin Books, Harmondsworth.
- Berry, V. and Petty, C. (1992) *The Nyasaland Survey Papers 1938–1939, Agriculture, Food and Health*, Academy Books, London.
- Berti, Peter, R., Krasevec, J. and FitzGerald, S. (2004), A review of the effectiveness of agriculture interventions in improving nutrition outcomes, *Public Health Nutrition*, vol 7, pp.599–609.
- Bhutta, Z.A., Tahmeed, A., Black, R.E., Cousens, S., Dewey, K., Giugliani, E., Haider, B.A., Kirkwood, B., Morris, S.S., Sachdev, H.P.S. and Shekar, M., for the Maternal and Child Undernutrition Study Group (2008) What works? Interventions for maternal and child undernutrition and survival, *Lancet*, vol 371, pp.417–440, doi: 10.1016/S0140-6736(07)61693-6.
- Biggs, S.D. (1990) A multiple source of innovation model of agricultural research and technology promotion, *World Development*, vol 18, pp.1481–1499.
- Blasbalg, T.L., Wispelwey, B. and Deckelbaum, R.J. (2011) Econutrition and utilization of food-based approaches for nutritional health, *Food and Nutrition Bulletin*, vol 32, pp.S4–S13.
- Bryce, J., Continho, D., Darnton-Hill, I., Pelletier, D. and Pinstrup-Andersen, P. (2008) Maternal and child undernutrition: effective action at national level, *Lancet*, vol 371, no 9611, pp.510–526.
- Carson, R. (2002) *Silent Spring*, Mariner Books, ISBN 0-618-24906-0 [1st published by Houghton Mifflin, 1962].
- Chambers, R., Pacey, A. and Thrupp, L.A. (1989) *Farmer First: Farmer Innovation and Agricultural Research*, Intermediate Technology Publications.
- Chambers, R., Scoones, I. and Thompson, J. (1994) *Beyond Farmer First: Rural People's Knowledge, Agricultural Research and Extension Practice*, Intermediate Technology Publications.
- Collette, L., Hodgkin, T., Kassam, A., Kenmore, P., Lipper, L., Nolte, C., Stamoulis, K. and Steduto, P. (2011) *Save and Grow: A policy makers guide to sustainable intensification of smallholder crop production*, FAO.
- DeClerck, F., Fanzo, J., Palm, C. and Remans, R. (2011) Ecological approaches to human nutrition, *Food and Nutrition Bulletin*, vol 32, pp.S41–S50.
- De Haan, S. (2009) *Potato Diversity at Height: Multiple dimensions of farmer-driven in situ conservation in the Andes*, PhD thesis, Wageningen University, The Netherlands.
- De Schutter, O. (2011a) *Agroecology and the Right to Food*, Report presented at the 16th Session of the United Nations Human Rights Council [A/HRC/16/49], 8 March 2011.
- De Schutter, O. (2011b) *The right to an adequate diet: the agriculture–food–health nexus*, Report presented at the 19th Session of the United Nations Human Rights Council, 26 December 2011.

- Fanzo, J. (2011) IFPRI's (2020) conference on leveraging agriculture for improving nutrition and health: keeping the momentum and translating ideas into action, doi 10.1007/s12571-011-0122-7.
- FAO (1997) *Preventing Micronutrient Malnutrition: A guide to food based approaches, A manual for policy makers and programme planners*, FAO and International Life Sciences Institute, Washington.
- FAO (2004) *Voluntary guidelines to support the progressive Realization of the Right to Adequate Food in the Context of National Food Security (the Right to Food Guidelines)*.
- Farrington, J., Carney, D., Ashley, C. and Turton, C. (1999) Sustainable Livelihoods in Practice: Early applications of concepts in rural areas, *ODI – Natural Resource Perspectives*, vol. 42, p.13, AQ5.
- Field, J.O. (1987) Multi-sectoral planning: a post-mortem, *Food Policy*, vol 12, no 1, February, pp.15–28.
- Frison, E., Cherfas, J., and Hodgkin, T. (2011) Agricultural biodiversity is essential for a sustainable improvement in food and nutrition security, *Sustainability*, vol 3, pp.238–253.
- Garrett, J. and Natalicchio, M. (eds) (2011) *Working Multi-sectorally in Nutrition, Principles, Practices and Case Studies*, International Food Policy Research Institute, Washington DC, USA
- Garrett, J., Bassett, L. and Levinson, F.J. (2011) Multi-sectoral Approaches to Nutrition: Rationale and Historical Perspectives, in J. Garrett and M. Natalicchio (eds) *Working Multi-sectorally in Nutrition, Principles, Practices and Case Studies*, International Food Policy Research Institute, Washington DC.
- Grisa, C., Schmitt, C.J., Mattei, L.F., Sérgio Maluf, O.R. and Pereira Leite, S. (2011) Brazil's PAA, Policy driven food systems, *Farming Matters*, 9/2011, 27.3.
- Hawkes, C. and Ruel, M.T. (2011) Value chains for nutrition. Conference Brief 4. Leveraging Agriculture for Improving Nutrition and Health. New Delhi, India, 10–12 February 2011, <http://2020conference.ifpri.info/publications/briefs/>, accessed July 2012.
- Hawkes, C., Ruel, M. and Babu, S. (2007) Agriculture and health: Overview, themes and moving forward, *Food and Nutrition Bulletin*, vol 28, no 2 (supplement), United Nations University.
- Hoddinott, J. (2011) Agriculture, Health, and Nutrition: Toward conceptualizing the linkages, 2020 Conference Brief 2. Leveraging Agriculture for improving Nutrition and Health. New Delhi, India, 10–12 February 2011, <http://2020conference.ifpri.info/publications/briefs/>, accessed July 2012.
- Horton, D., Prain, G. and Thiele, G. (2009) Perspectives on Partnership: A Literature Review, Working Paper 2009-3, International Potato Centre (CIP), Lima, Peru.
- Hunter, D. and Heywood, V. (2011) *Crop Wild Relatives: A Manual of In Situ Conservation*, Earthscan.
- IFPRI (International Food Policy Research Institute) (2011a) Leveraging Agriculture for Improving Nutrition and Health: The Way Forward, Washington DC, <http://2020conference.ifpri.info>, accessed July 2012.
- IFPRI (International Food Policy Research Institute) (2011b) CGIAR Research Programme 4 Agriculture for improved nutrition and health, Revised proposal submitted October 2011.
- Jackson, L., Pascal, U. and Hodgkin, T. (2007) Utilizing and conserving agro-biodiversity in agricultural landscapes; *Agriculture, Ecosystems and Environment* 121 (2007) 196–210. Elsevier. (doi:10.1016/j.agee.2006.12.017)

- Johns, T., Smith, I.F. and Eyzaguirre, P.B. (2006) Understanding the links between agriculture and health for food, agriculture and the environment, *Agrobiodiversity, Nutrition, and Health*, IFPRI 2020 Vision, Focus 13, Brief 12.
- Joy, L. and Payne, P. (1975) Food and Nutrition Planning, *Nutrition Consultants Reports Series*, no 35 ESN CRS/75/35 FAO, Rome.
- Latham, M. (2010) Commentary: The Great Vitamin A Fiasco, *World Nutrition, Journal of the World Public Health Nutrition Association* vol 1, no 1, www.wphna.org, accessed July 2012.
- Lipton, M. (1977) *Why poor people stay poor: Urban bias and world development*, Temple Smith and Harvard University Press.
- Longhurst, R. (2010) Global Leadership for Nutrition: The UN's Standing Committee on Nutrition (SCN) and its Contributions, *IDS Discussion Paper, Volume 2010 Number 390*.
- Low, J.W., Arimond, M., Osman, N., Cunguara, B., Zano, F. and Tschirley, D. (2007) A food-based approach introducing orange-fleshed sweet potatoes increased vitamin A intake and serum retinol concentrations in young children in rural Mozambique, *Journal of Nutrition*, vol 137, pp.1320–1327.
- Maxwell, D. (2001a) The Evolution of Thinking about Food Security, in D. Deveraux and D. Maxwell (eds) *Food Security in Sub-Saharan Africa*, ITDG, London.
- Maxwell, D. (2001b) Organisational Issues in Food Security Planning, in D. Deveraux and D. Maxwell (eds) *Food Security in Sub-Saharan Africa*, ITDG, London.
- McLaren, D.S. (1974) The Great Protein Fiasco, *Lancet* 304 (7872) pp.93–96.
- McNeely, J. and Scherr, S. (2003) *Eco-agriculture: Strategies to Feed the World and Save Wild Biodiversity*, Island Press, Washington DC.
- Monteiro, C.A., D'Aquino Benicio, M.H., Conde, W.L., Konno, S., Lovadino, A.L., Barros, A.J.D. and Vitoria, C.G. (2010) Narrowing socio-economic inequalities in child stunting: the Brazilian experience, 1974–2007, *Bulletin of the World Health Organization* 88:305–311, doi: 10.2471/BLT.09.069195.
- Müller, A. and Coitinho, D.C. (2011) Commentary: Global nutrition: What should change? in David L. Pelletier (ed.) *Mainstreaming Nutrition in National Policy Agendas: Successes, Challenges, and Emergent Opportunities*, *Food and Nutrition Bulletin*, vol 32, no 2 (supplement).
- Mulvany, P. and Ensor, J. (2011) Changing a dysfunctional food system: Towards ecological food provision in the framework of food sovereignty, *Food Chain* (2011), vol 1, no 1, pp.34–51.
- Niñez, V.K. (1984) *Household gardens: theoretical considerations on an old survival strategy*, International Potato Center, Lima.
- O'Riordan, T. and Stoll-Kleemann, S. (2002) *Biodiversity, Sustainability and Human Communities: Protecting Beyond the Protected*, Cambridge University Press, UK.
- Oxfam (2011) *Growing a Better Future, Food justice in a resource-constrained world*, Oxfam International, www.oxfam.org/grow, accessed July 2012.
- Padulosi, S., Heywood, V., Hunter, D. and Jarvis, A. (2011) Underutilized crops and climate change – current status and outlook, in S. Yadav, B. Redden, J.L. Hatfield and H. Lotze-Campen (eds) *Crop Adaptation to Climate Change*, Wiley-Blackwell, Ames, IA, pp.507–521.
- Penafiel, A.D.D., Lachat, C., Espinel, R., Van Damme, P., Kolsteren, P. (2011) A systematic review on the contributions of edible plant and animal biodiversity to human diets, *Eco-health*, vol 8, no 3, pp.381–399.

- Pelletier, D.L., Frongillo, E.A., Gervaise, S., Hoey, L., Menon, P., Ngo, T., Stoltzfus, R.J., Ahmed, A.M.S. and Ahmed, T. (2011) Nutrition agenda setting, policy formulation and implementation: lessons from the Mainstreaming Nutrition Initiative, *Health Policy and Planning* 2011, pp.1–13, doi:10.1093/heapol/czr011.
- Pinstrup-Andersen, P. (2011) The food system and its interaction with human health and nutrition, IFPRI 2020 conference brief 13.
- Popkin, B.M. (1999) Urbanization, lifestyle changes and the nutrition transition, *World Dev*, vol 27, pp.1905–1916.
- Pretty, J. (1995) *Regenerating Agriculture*, Earthscan, London.
- Quinn, V.J. (1994) Nutrition and National Development, An evaluation of nutrition planning in Malawi from 1936 to 1990, Thesis, Department of Human Nutrition, Wageningen Agricultural University, Wageningen, The Netherlands.
- Rhoades, R.E. and Booth, R.H. (1982) Farmer back to farmer: a model for generating acceptable agricultural technology, *Agricultural Administration*, vol 11, pp.127–137.
- Richards, A. (1939) *Land, Labour, and Diet in Northern Rhodesia: an economic study of the Bemba tribe*, Oxford University Press, Oxford.
- Rist, G. (1997) *The history of development: from western origins to global faith*, Zed Books, London.
- Rostow, W.W. (1960) *The Stages of Economic Growth: A Non-Communist Manifesto* Cambridge University Press.
- Ruel, M.T. and Levin, C.E. (2002) Food-Based Approaches for Alleviating Micronutrient Malnutrition: An Overview, in Palit K. Kataki and Suresh Chandra Babu (eds) *Food Systems for improved human nutrition: linking agriculture, nutrition and productivity*, The Haworth Press, New York.
- Scherr, S. and McNeely, J. (2007) *Farming with Nature: The Science and Practice of Eco-agriculture*.
- Scoones, I., and Thompson, J. (2009) *Farmer First Revisited: Innovation for Agricultural Research and Development*, Intermediate Technology Publications.
- Sen, A. (1981) *Poverty and Famines: An Essay on Entitlement and Deprivation*, Clarendon Press, Oxford.
- Silva da, J. G., Grossi del, E. and Franca de, C.G. (2010) *The Fome Zero (Zero Hunger) Program: The Brazilian experience*, Ministry of Agrarian Development, Brasília, NEAD Special Series 13, FAO, ISBN 978-85-60548-82-8.
- Termote, C., Bwama Meyi, M., Dhed’a Djailo, B., Huybregts, L., Lachat, C., Kolsteren, P. and Van Damme, P. (2012) A Biodiverse Rich Environment Does Not Contribute to a Better Diet: A Case Study from DR Congo, *PLoS ONE*, vol 7, no 1, e30533. doi:10.1371/journal.pone.0030533.
- UN (1975) *Report of the World Food Conference*, New York, 5–16 November 1974, Rome.
- UN Standing Committee on Nutrition (2010) Is it necessary to re-invent it? [Editorial] *World Nutrition*, June (2010) 1, 2: 46–52, www.wphna.org, accessed July 2012.
- Von Braun, J., Ruel, M. and Gillespie, S. (2011) Bridging the gap between agriculture and health sectors, IFPRI 2020 conference brief 14.
- Weinberger and Pichop (2009) Marketing of African Indigenous Vegetables along Urban and Peri-Urban Supply chains in Sub-Saharan Africa, in *African Indigenous Vegetables in Urban Agriculture*, Earthscan.
- WHO (2005) *Ecosystems and Human Wellbeing – Health Synthesis*, A report of the Millenium Ecosystem Assessment, Geneva.
- WHO/UNICEF (1991) *Proceedings: ending hidden hunger (A policy conference on micronutrient malnutrition)*, Montreal, Canada.